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Social Sustainability in Medicine: The Role of Artificial Intelligence in Future Doctor–Patient Communication. A Methodological Experiment

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Abstract. Social sustainability is a development alternative that focuses on preserving and sustaining opportunities and resources for future generations rather than exploiting them. In addition to resource management, it is important to emphasize the focus on human well-being, in which the provision of a healthy life is a key factor. One possible alternative to improve the quality, safety, and affordability of universal healthcare is to integrate artificial intelligence into the health system. The development of AI in healthcare has brought a paradigm shift, as big-data-driven analytics can enable AI itself to identify symptom complexities and communicate with patients. In this process, it is important to explore the attitudes of healthcare professionals towards AI-based technologies, as doctor–patient communication is moving away from authoritarianism towards partnership medicine, in which AI will be an integral part of communication. In my research, I investigate the attitudes of future doctors, i.e. medical students and doctors already in practice, towards AI by using a hybrid research method of semi-structured interviews, photo collage techniques, and a questionnaire survey. The photo collage technique, due to its projective nature, can be used to reveal the respondent's underlying evoked memories and attitudes. The new image network (collage) can be used to model the doctor–patient–AI relationship envisioned by the doctors. The results highlight the aspect of the application of AI in medicine and point out that it is not only the capabilities of the software but the attitudes of the entire health stakeholder community that influence the uptake of innovation. The exploration of issues of authority and trust in the field provides an opportunity for the creation of educational and outreach programmes.

Keywords: artificial intelligence, doctor–patient communication, attitude, photo collage technology, healthcare

1. Introduction

According to Bertalan Meskó and his colleagues (2017), the paternalistic model of doctor–patient relationships of the past decades has started to be replaced by shared decision-making, of which AI is an integral part. "The conceptual triad of automation, robotics and artificial intelligence, which is slowly but surely transforming digital technologies into autonomous agents, plays a major role in the increasing symmetry of human–machine communication" (Bokor, 2021: 3).

In my research, I explore the doctor–patient–AI relationship from the perspectives of doctors, medical students, and residents using interviews, photomontage techniques, and questionnaire methods. My research findings draw attention to the aspect of the application of AI in medicine, what are the current attitudes of healthcare workers towards AI, what perceptions will enable AI to be a participant in healthcare interactions, and what role it will have in the modern medical system.

In the first unit of the literature review, I present the doctor–patient relationship in addition to describing the differences between doctor-centred and patient-centred medicine and decision-making. I also discuss the issues of medical authority and technology as a new agent. I introduce the concept of artificial intelligence in general and then the use of AI in healthcare. In the last part of the theoretical background presentation, the concept of attitude, its axes and functions will be explained in relation to AI, which is relevant to the topic because although we cannot yet observe the process itself when AI is part of the consultation, we can infer the direction of AI technology development from the doctors' attitudes (Forgács, 2017).

2. Doctor–Patient Communication

Empirical research on doctor–patient communication began in the 1970s. Research conducted by Korsch and Negrete in the United States in 1972 showed that the consequence of a lack of (medical) information sharing was that patients were less likely to follow their doctor's advice, or not to follow it at all. Byre and Long (1976) examined two thousand five hundred voice recordings between doctors and their patients, revealing that these dialogues were largely doctor-centred. What does doctor-centredness mean in communication with patients?

"The main characteristic of doctor-centred communication is that its aim is to obtain information quickly, on the basis of which a diagnosis is made, which is briefly communicated to the patient, together with the further necessary action to be taken" (Málovics–Vajda–Kuba, 2009: 253). During a consultation, the doctor dominating the conversation expresses his/her own point of view and gives only a small chance to the patient to ask questions or interpret his or her illness, thus

suppressing the patient's emotions and resolving his/her doubts about the diagnosis. The relationship between doctor and patient is essentially hierarchical, as medical expertise and greater access to information empowers the practitioner, while patients come to the doctor worried, in pain, and in need of help, putting them in a weaker position in the discourse (Mast et al., 2011). The lay patient, in a subordinate role, delegates the right to decide to the doctor, but also the responsibility, which he or she will be held accountable for in case of a possible error or complication.

The literature (Emanuel–Emanuel, 1992; Klemperer, 2005) describes physician-centred communication as a paternalistic style, in which the relationship between the competent expert and the lay patient is asymmetric and the physician makes the decision independently, which s/he communicates to the patient. In paternalistic medicine, patients' trust in physicians is of paramount importance, as it significantly influences their willingness to cooperate, the sense of control, and perceived risk reduction (Kincsesné, 2013). Based on the results of qualitative research among physicians, nurses, and patients by Málovics and co-authors (2009), paternalistic medicine is dominant in Hungary, in which the patient is in a dependent relationship with the physician providing expertise. This was indicated by the fact that people accept the asymmetric relationship created by the knowledge gap and delegate the right to make decisions to competent doctors in order to improve their health.

3. Patient-Centred Communication Models

According to Emanuel and Emanuel (1992), four communication styles can be distinguished in doctor–patient communication, which are: paternalistic, consumeristic, interpretive, and mutual consultation. In contrast to the physician-centred, paternalistic style, the patient-centred styles start from the patient's perspective, from the patient's decision-making status. One of these styles is the consumer model: "control is in the hands of the patient, the patient sets expectations about the doctor's actions, the doctor offers his expertise to the patient, fulfils his expectations" (Boronkai, 2014: 19). The consumer model, according to Ágnes Kuna (2020), can be used for preventive tests (e.g. screenings, artificial insemination), but these are not sufficient in themselves to make a diagnosis, so at some point decision-making is again in the hands of the doctor. The other patient-centred style, according to Emanuel and Emanuel (1992), is the interpretative style, which is an attitude-centred model in which the doctor offers the patient possible therapies and intervention options, and the patient makes the decision according to his or her attitudes and values.

Shared Decision Making (SDM) is a style of mutual consultation in which the doctor and patient participate together as partners in the process of improving

health and making decisions (Vajda–Horváth–Málovics, 2012). Elwyn et al. (2012) break down the SDM method into three practical steps to facilitate its application. The first step is the discussion of options, where the expert lists the options, and then, after discussing them in detail in the second phase, they jointly consider the best option in the third phase. In all cases, the success of the method should be built on providing information and supporting dialogue. The doctor should help the patient to understand any concepts that may be unfamiliar to him/her, thus helping to engage him/her in the partnership, and the doctor him-/herself should explore what the patient already knows about his/her illness in order to ensure that these are sufficiently correct and scientifically based facts. In supporting dialogue and deliberation, it is important that the patient does not feel that he or she has to make decisions alone, as they may feel abandoned, which can lead to a withdrawal behaviour in some patients (Elwyn et al., 2012: 1363).

The practice of modern medicine is undergoing a reordering as a result of social and technological advances, whereby collaborative thinking and decision-making is taking place in the interest of efficiency. The lack of trust in ethical regulation (such as the existence of a medical oath and authority) in the renewed medical practice is due to changes in the legal status and powers of the patient and the gradual loss of unconditional trust and respect for doctors.

4. The Role of Technology in Doctor–Patient Communication

Technological progress has brought changes in the healthcare sector, as new ways of communication have emerged alongside medical instruments and databases. "First the landline telephone, the fax, the computer, later the mobile phone, the smartphone, and with the rise of the Internet, e-mail, online therapy (especially in psychiatry), forums, blogs, websites, social networking sites, e-health, etc. are becoming increasingly available" (Molnár et al., 2018: 2137). However, knowledge sharing and access to information alone is not enough to match medical expertise, so it is important to mention the concept of media literacy.

Media literacy is a set of skills used to make sense of a given mediatized communication. It is the competence to interpret the information that comes to us, through its source and its nature. In the online space, compared to traditional media, there is the possibility to discuss information in a community (for example, in comment sections), opening space for online community collaborations (Aczél–Andok–Bokor, 2015: 202). Thus, in the doctor–patient relationship, the information asymmetry is reduced by greater access to data via the Internet, but its conscious analysis, the interpretation of sources, databases and the understanding of the interests behind

them require other, already higher-level competences. "For science, digital media have brought open access and for the layperson the prevalence of pseudoscience" (Aczél–Veszelszki, 2018: 11). Some scientific publications are freely available to patients, but these are usually difficult to interpret without prior training. However, when searching for more easily consumable content, there is a risk of finding news and content on the Internet that is not from a credible source. This non-scientific content is called pseudo-scientific content, which, in order to be more easily consumable or to suit the interests of the content producer (e.g. offering a quick cure), makes relative interpretations of scientific findings (cf. Veszelszki–Falyuna, 2019).

According to a qualitative study (Győrffy–Meskó, 2012), almost 76% of the doctors do not think it is appropriate for their patients to research their illness on the web. Their fears include the possibility of being misinformed and the deterioration of the doctor–patient relationship. A 2012 study (Sára et al., 2013) aimed to explore the limitations of doctor–patient communication, interviewing both doctors and patients. The results were that "the most important limiting factors included lack of time, patient anxiety, inadequate health culture, and lack of communication skills of some doctors" (Sára et al., 2013: 7).

How can technology address these? So-called "self-tracking" apps and software are becoming increasingly popular today, which help us monitor our activities and lifestyle, and by sharing the results with our doctor, we can help him or her to gain more information about our health culture in a shorter time (Molnár et al., 2018). It is important to add, however, that patient proactivity does not replace but only reinforces the importance of doctor involvement, and the differentiation of responsibility is also important.

5. What Is Artificial Intelligence?

The main obstacle to defining artificial intelligence is our concept of intelligence, which, according to Didem Ozkiziltan and Anke Hassel (2021), is still uncertain despite the wide range of studies on the subject available from different fields of research (such as psychology, neuroscience, etc.). So, until we know exactly what human intelligence is, how it is built, what parts it has, what functions it performs, we cannot claim with absolute certainty that a software can reproduce it. This problem is also raised by György Csepeli (2020) in his book *Human 2.0: The Economic and Social Impact of Artificial Intelligence*, in which the author explains that intelligence is a function of the network in the human cortex that we consider to be the whole of human consciousness, which is also an ill-defined concept. Artificial intelligence is therefore a generic term for the most part, so rather than giving a precise definition, I will attempt to summarize its categories and the common elements of attempts to define it.

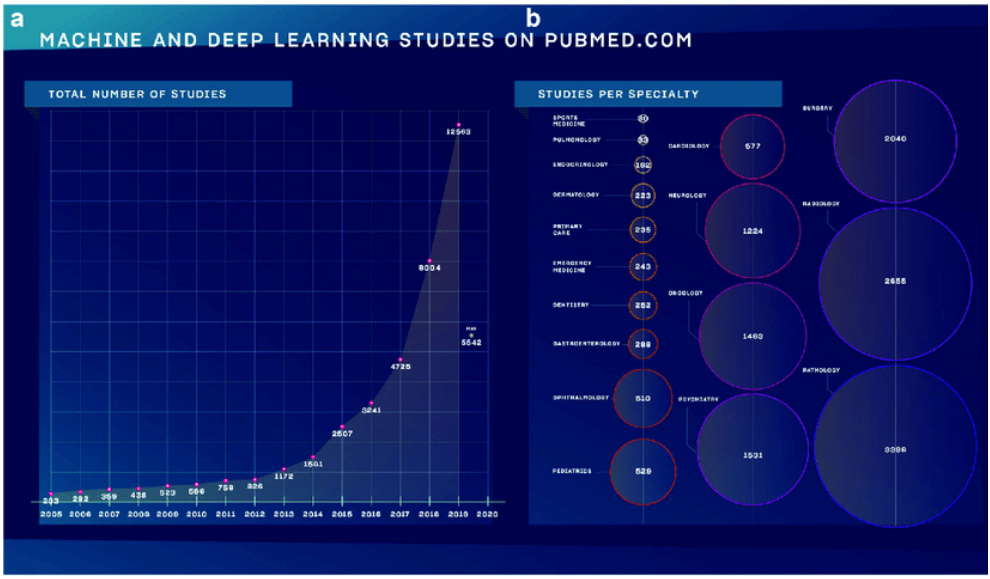
Ferenc Mező and Katalin Mező (2019) divide AI-based systems into two groups: on the one hand, software that operates in digital space, with no extension in physical space, and, on the other hand, software embedded in hardware such as self-driving cars or robots. So, artificial intelligence cannot only be in the form of robots but can also be entirely digital. This categorization of AI is in line with the one used by European Parliament researchers (w1), which distinguishes between software-based and physical types of AI.

Another categorization is the classification by capabilities. AI technologies can be classified into three categories based on their ability to mimic human characteristics, the technology they use, the actual application, and our concept of human consciousness, according to Eban Escott (2017). The first level in the categorization of AI by capability is Artificial Narrow Intelligence (hereafter: ANI), which is goal-oriented and designed to perform specific tasks such as facial recognition, speech recognition/voice assistant, driving a car, or searching the Internet. In the activities for which it is programmed, ANI-level technology excels, but it lacks autonomous consciousness, falling short of human intelligence in terms of flexibility. The next level is Artificial General Intelligence (AGI), which is the concept of a machine with human-like intelligence. It can mimic human intelligence, behaviour, and learning. Currently, the technology has not yet reached this stage. The top category in terms of capabilities is artificial superintelligence, or ASI, which not only mimics or understands human intelligence and behaviour but also surpasses it (Escott 2017). In line with ASI, Domingos (2015) foresees the possibility of developing the perfect algorithm, where his basic premise is that if human consciousness is capable of solving all problems, with the help of a conscious algorithm, all problems can be solved. Whoever is the first to develop this "master algorithm" will have a major impact on the balance of power in the world.

6. The Use of Artificial Intelligence in Healthcare

According to the European Commission's Communication on a coordinated plan for Artificial Intelligence (w1), health is a priority sector for the development and use of AI. The last decade has seen a significant increase in research and publications on the application of AI in health. Bertalan Meskó and Márton Görög (2020: 1362) summarized in a visual format the increase in the number of publications on AI topics on Pubmed.com and their distribution by discipline.

In *Figure 1*, the left graph shows the rate of increase in the volume of AI-related medical studies, while the right graph shows their distribution by specialization. Most publications are in pathology, while the fewest are in sports medicine.



Source: Meskó–Görög, 2020: 1362

Figure 1. *Medical AI applications between 2010 and 2020 and by medical speciality*

According to Szalavetz (2019), AI aids diagnostics through its image recognition function by analysing X-rays, CT scans, and other images. However, this requires a large dataset, which is collected by both government and private institutions. An example is the Deep Patient project, in which AI can predict illness, length of stay in hospital, and the likelihood of readmission by analysing the patient's health data and recording their data upon arrival, 24 hours following their admission into the hospital, and upon their discharge (Rajkomare et al., 2018). So far, it performs best in predicting severe diabetes, schizophrenia, and various cancers (Miotto, 2016). However, data can be provided not only by health systems or large companies but also by patients. Csepeli (2020) highlights the potential of using data from self-tracking tools, which can use artificial intelligence to help detect abnormalities at an early stage and predict hereditary diseases based on genome information.

Methods that have not yet been used in live clinical trials, but are working, are reported by Devosa and colleagues (2021), who use speech processing to measure the stage of Parkinson's disease and image processing to measure eye and lung disease in patients. However, this would require more labelled (annotated) data, which hospitals cannot provide, as this would be a serious breach of data protection guidelines. There are therefore some ethical questions about AI in healthcare. Buzás (2021) raises the following moral dilemmas in this area. From a data processing point of view, it is questionable whether the amount of data offered voluntarily is

sufficient for the development or whether it needs to be regulated at a higher level. The issue of accountability can come into focus when AI fails, as it can; hence one of the most socially sensitive questions: can AI take the place of humans (in this case, doctors)? So, the fears have been outlined by exploring the ethical concerns, but what expectations might doctors have as a result of letting AI in?

7. Attitudes

The objective of this paper is to explore the attitudes of doctors and medical students towards the use of AI in healthcare. As outlined in the discussion of ethical dilemmas in the previous chapters, there are many ethical, resource, or technological factors that make AI not yet fully accepted in its application. It is important to assess the attitudes of health professionals towards AI, the perceptions along which AI can be a participant in health interactions, and the role it is playing in the modern medical system. This can be explored by looking at the attitudes of healthcare workers, as their attitudes influence both the acceptance of the technology by patients and the direction and pace of developments in healthcare.

What is attitude? How will attitudes be measured? As Ágnes Domonkosi (2007) summarizes the consensus in the literature: attitude is a persistent attitude of value judgements that helps individuals to cognitively classify a person, object, or concept, but it reflects not only the attitude of the individual but also, through its social embeddedness, that of the communities of which it is part of. Attitudes thus express the value system of a community, its beliefs on a particular subject. The responses of the doctors interviewed in the research also reflect the views of the medical community because they present the community's views on the issue through their own attitudes. Attila Forgács (2017) summarized the definitions of attitude, in which three recurring elements can be observed: emotional attitudes, cognitive attitudes, and behavioural manifestations. These are called the affective, cognitive, and conative axes of attitude.

8. Methodology

Doctor–patient communication is most often studied through process or discourse analysis, which is most often criticized for lack of context and representativeness. According to Kuna (2020: 287), the solution to these criticisms can be found in their blending, as both the sequentiality of discourse and the shared meaning-making are important because they reinforce the pragmatic view that communication is not a tool but an activity.

I do not focus on the discourses or processes between doctor, patient, and AI but on the attitudes of health professionals towards the new actor that may enter the system. In Hungary, the integration of AI into public health has not yet taken place, so this (transitional) state provides an opportunity to assess current attitudes towards the inclusion of AI-based systems, which will be increasingly applied in the near future. When will AI become a real participant in the health system, and in what role will it be largely influenced by the current attitudes towards it? In this exploratory research, I use a hybrid method of semi-structured interview and photo collage technique to assess the attitudes of physicians. The five physicians were selected from Budapest and its surroundings for ease of access, all of them practising specialized care in Budapest.
In my research, I investigated the attitudes of not only the currently practising physicians but also of future physicians among the participants of the healthcare stakeholder system. I measured the attitudes of seventy medical students and residents towards AI using a questionnaire method, which allowed me to investigate the intensity and direction (quality) of attitudes, as well as the potential uses and risk factors they identify in the issue of AI uptake.

9. Research Results

The methodological experiment demonstrates the potential of the photo collage method for mapping attitudes and identifying cognitive structures. In order to explore attitudes towards AI, I first analyse semi-structured interviews with doctors and attitudes revealed using photo collage techniques, and, finally, I report the results of a questionnaire completed by medical students in the analysis.

9.1. Analysis of the Semi-Structured Interviews

The attitudes of the doctors participating in the research are first analysed according to the cognitive axis of attitude. This is the attitudinal axis, i.e. it explores the relevance of the questioning about AI and the current knowledge about AI among the interviewees. This is followed by a presentation of the affective axis to identify the intensity and quality of the attitude by exploring the emotional background of the opinions expressed. Finally, there is the communal nature of the attitude and the highest level of behaviour.

Cognitive Axis – The Relevance of Artificial Intelligence in Health

During the interview, I asked the doctors to recall when they first encountered AI in their careers. Their answers suggested that they had not heard about the

technology in their daily medical practice but rather in connection with research and publications. With one exception, the interviewees reported that AI was new in their field and had been discussed less than a year before. However, Doctor 1 reported that AI had been a long-standing topic in pathology.

The respondents' attempts at definition show that they are familiar with the current state of the technology in terms of software, being able to take over sub-processes and thus see the technology as applicable to areas and processes that can be quantified and modelled. However, they do not see the added value, the art of healing, which can come from AI in the current state of the technology, as it cannot diagnose based on independent thoughts or atypical symptoms, which doctors can do based on their experience. It is also worth pointing out that it was not in their own field of expertise that they first mentioned the potential use of AI but rather in other fields, where they cited activities that could be automated. This phenomenon may be due to the fact that they consider their own specialization to be more complex and that they have much more information and experience in the field of their specialization.

Information at the cognitive level is the knowledge of the resources needed for the development since in order for the doctor to apply the technology, the institution needs to have resources to make it available. The doctors interviewed are aware that getting from the research phase to the application of AI in surgery is a very resource-intensive process. The risk of this realization is that they may move away from AI at the initial stage due to a lack of resources, with the consequence that they may be less likely to approach the technology with a positive attitude.

However, conative attitudes are not only shaped by the information they possess but also along an emotional, affective axis, wherefore I will present the emotional components in the following.

The affective level of attitudes is also influenced by doctors' previous experiences with AI in the context of digitalization. It should be noted that the majority of interviewed physicians consider that the information patients get about their illness online raises several problems. First of all, they mentioned that patients lack basic health knowledge and are not aware that atypical symptoms exist, thus misdiagnosing themselves. Lack of interpretative competence means that they are unable to distinguish between credible scientific and pseudoscientific content on the World Wide Web. These thoughts support the findings of Veszelszki and Falyuna (2019) in their study on pseudoscience, which argues that it is difficult for lay people to interpret and recognize authentic scientific content, partly as a consequence of the greater popularity of pseudoscientific content among ordinary people. The emotional attitudes of the interviewees suggest that paternalistic medicine is still a basic principle among them, but that the gap between doctor and patient is no longer one of information asymmetry but of interpretative competence, as patients are already in possession of information through web 2.0 but are not able to interpret it properly.

Affective Axis – The Doctor–Patient–AI Relationship from the Doctors' Perspective

In order to assess the direction and intensity of attitudes towards AI, interviewees described how they currently perceive doctor–patient communication and then reflected on how AI could change this. Both negative and positive possible changes in this area of questioning were included in the responses.

The negative change, according to the doctors, is the complacency and inattention that comes with the use of technology, which makes doctors less aware of the data and trust the machine to diagnose, which increases the possibility of error (for example, in atypical symptoms) and can reduce the knowledge and expertise of doctors when they are served by the machine. This finding not only demonstrates the relevance of the deprofessionalization phenomenon as described by Gaal (2016) but also extends the fear beyond the reduction of asymmetry in the doctor–patient relationship to the impact of AI on medical status.

The fact that the doctors interviewed believe that a robot will never be an equal participant in the doctor–patient relationship because the human body has a level of complexity that is difficult to determine from data, and thus AI can only ever be a proposer, overridden by medical expertise, indicates a negative attitude towards AI.

However, in addition to the above-mentioned opinions, some possibilities have been listed that point to a positive change. One such effect that the spread of AI could bring about is the ability to analyse existing knowledge and datasets. Human capacity to absorb information is finite, but AI can help them access more data, saving time in data collection. The issue of time and speed was identified as a key factor for the doctors in the study. Lack of time is the biggest barrier to doctor–patient communication (Sára et al., 2013: 4), so reducing this barrier could bring about a marked change in medicine. However, according to Imola Sándor and János Piling (2016), it is not enough to increase the amount of time, as doctors could spend hours talking to patients using medical terms, and they will still be in an asymmetric relationship. In fact, the solution lies in making efficient use of the time available.

To conclude the affective axis, I will highlight the interviewed doctors' thoughts on the medical role. They explained that medicine cannot be identified with the recognition and categorization of symptoms, as it is a much more complex process, a set of communicative interactions in the process of healing, in which the doctor is a key participant. These statements are in line with Mihály Bálint's (1990) philosophy of "medicine is the doctor himself", which I presented in previous chapters on the topic of medical authority.

After the cognitive and affective components, I will present the conative, i.e. the acting attitude, which in the present research can only be interrogated on a theoretical level since in many cases, even if doctors would like to use artificial

intelligence, they do not yet have the possibility to do so in everyday patient care since they do not possess such a tool.

Conative Axis – AI-Based Technology in Healthcare Practice

The fusion of affective and cognitive factors results in behaviour, in this case openness or actual use of AI. It is worth pointing out that when I asked doctors whether they use or would use AI in the future for medical treatment, they invariably listed other specialties where AI could be applied or even have a positive impact. This attitude, as I mentioned in the cognitive axis, may indicate that doctors feel less involved in other areas. Based on these statements, a self-protective function of this attitude can be identified, which has the effect of removing themselves from the use of technology that threatens medical authority.

For some doctors, however, an instrumental attitude function can also be observed. In this case, the goal orientation can be interpreted as an interest in innovation being rewarded in the profession, and thus an openness to it, but not yet to the extent of questioning one's own role as a doctor but rather to projecting the possibility of its use into other, less important areas. Doctor 3, for example, defined the diseases for which AI could and could not be used: "We have to distinguish between diseases that can be described very nicely, modelled and solved by a machine and those that cannot be modelled because they have atypical symptoms and require the synthesising power of a human being" (Doctor 3).

According to the attitudinal axes presented, it can be observed that on a cognitive level, the current limitations of technology are revealed, which, in addition to the resource requirements, lie in the understanding of the complexity of the human body. Along the affective axis, fears can also be identified in terms of past experiences (pseudoscientific content available on the Internet), the risk of becoming impoverished, and the need to maintain a paternalistic medical style. Positive effects of AI were also articulated by physicians, namely in terms of time constraints, which is one of the main communication barriers (Sára et al., 2013: 4). All these reflect, to a small extent, not only the attitudes of the interviewed physicians, due to the small number of items in the sample, but also the medical community through social embeddedness (Domonkosi, 2007). In the following, I will shed light on these collective attitudes.

Collective Attitude – The Issue of Responsibility in the Doctor–Patient–AI Relationship

When discussing the issue of AI, none of the physicians showed neutrality, which, in addition to confirming the relevance of the topic, suggests that the medical community feels addressed by the topic.

During the interview, I shared with the physicians a fictive case in which future medicine will use artificial intelligence to make diagnoses, and the physician, the patient, and the AI will be involved in making the diagnosis, but the AI will give an incorrect diagnosis. My question was about whose responsibility is the harmful consequence in this case. The doctors invariably identified the doctor as the responsible party, which points to the fact that the artificial intelligence is not recognized as an independent participant and decision maker in the process of treatment and diagnosis, but the doctor is. It was pointed out that if the technological development goes that far, it will be necessary to develop regulations for such cases, as in the case of GDPR, but it will always be the doctor who will be responsible for the patient. These parts of the interview reveal a sense of medical responsibility and the presence of a paternalistic decision-making style in the medical community, which is in line with the research findings of Málovics and colleagues (2009) that this decision-making model is most often used in Hungary.

Broadening the scope of the stakeholders, I also asked for the views of the profession as a whole. Doctors separated young doctors from older ones and described the attitudes of these two age groups differently. According to them, the younger generation is more adaptable and interested in new technologies, while older colleagues find it difficult to rethink practices and processes that have been tried and tested over decades. Doctor 3 says the following in this regard:

> Young people are very open-minded, and older people are becoming more closed in their discipline, so it will be difficult in their case. They find that they have to relearn everything that is new. The routine and the profession, which is already in their pockets, makes it difficult for them to say that they will now take on extra knowledge because extra knowledge requires extra energy. (Doctor 3)

According to Győrffy (2019), the use of artificial intelligence will become part of everyday medicine in developed countries in the next ten years, so doctors will need to acquire new types of knowledge to use these tools, and medical education and training will need to catch up. How do the doctors we interviewed see themselves, the patients, and AI in this new relationship? Using photo collage techniques, I explore the relationality of this triple relationship.

9.2. Presentation of the Results of the Photo Collage Technique

As a complementary method to the semi-structured interviews, I used the photo collage technique with the interviewees. The aim of using this technique was to

gain insight into the doctor–patient–AI relationship using this alternative research method. By stepping out of the formal question–answer structure, it was also possible for the doctors to express their attitudes towards this complex issue through collage making.

Summarizing the attitudes revealed by the collages, it can be concluded that physicians do not identify AI as a participant in its own right but as a facilitating tool. A common finding of physicians based on the collages is that the lack of sensitivity and the psychic impact of peer relationships cannot be replicated by an AI-based technology.

The use of AI is not seen as a way to communicate with patients but rather as a technology to provide data and possible solutions for doctors. Of course, there may be shifts in this, but the extent of these shifts depends on the specialism of the respondents, and the physician's decision is always treated as the highest level, as the responsibility (as they understand it) is also theirs.

However, the issue of responsibility is more nuanced in the minds of medical students whose attitudes I measured using a questionnaire. In the following, I will present the views of future doctors on artificial intelligence.

9.3. Analysis of the Questionnaire Results

The questionnaire revealed that the attitudes of medical students and residents towards AI are rather negative, which may be due to the self-protective function of the attitude because they are concerned about the presence of AI threatening medical authority. They also insist on the practice of paternalistic-style decision making when it comes to its use in diagnostics, trusting more in empirical medical knowledge than in an AI-based technology. However, it is worth highlighting that they are positive about the use of AI, seeing it as useful for reducing time pressure and evaluating large datasets. Diagnostics and the pharmaceutical industry are identified as potential areas for development, and private institutions are seen as the first to have a chance of using the technology in practice, with resources as a backdrop. The risk is therefore that many institutions will be unable to afford the high price or will put other things at the top of the list of priorities for development and that doctors will be isolated from the technology or will exclude themselves from it because they are convinced that there is no budget for it. A further concern about AI is that it is not flexible enough, does not treat patients in a sufficiently individualized way, and does not recognize unusual symptom complexes. As for the sense of responsibility among medical students and residents, it can be concluded that the paternalistic style is less likely to hold in terms of responsibility, as that would already be shared with AI by the doctors of the future.

10. Conclusions

My research is exploratory, and to explore the topic more widely, it is necessary to broaden the range of respondents. In addition to doctors, medical students, and residents, an attitudinal research of other actors in the healthcare system could complement the research. I am also planning to study doctors in specific specialties (e.g. pathology, gynaecology), which would also help to identify differences between specialties. My analysis could form the basis for the creation of a doctor–patient–AI communication model.

According to Meskó (2020), AI technology can become part of medical practice if the distance between developers and users is shortened. To this end, the role of AI in healthcare communication is a priority issue, just as the attitudes of users, i.e. healthcare workers. The healthcare actors interviewed in my research express concerns about the potential of AI use, which could initiate a dialogue between developers and users and point the way to future developments.

I also plan to further investigate the attitudes of other actors involved in health communication, such as patients, nurses, and facility managers on this topic. I also find it a worthwhile area of research to learn about the attitudes of the stakeholders in order to gain insight into the attitudes of the developers so as to build a more comprehensive picture and to initiate a possible collaborative development process between the stakeholders.

References

Aczél, P.–Andor, M.–Bokor, T. (2015). *Műveljük a médiát!* [Cultivate the Media!]. Budapest.

Aczél, P.–Veszelszki, Á. (2018). Egy új tudománykommunikációs modell szükségességéről. A scixcom-modell [On the Need for a New Science Communication Model. The Scixcom Model]. *JEL-KÉP: kommunikáció, közvélemény, média* (4): 5–18.

Bálint, Mihály (1990). *Az orvos, a betege és a betegség*. Budapest: Animula.

Boronkai, D. (2014). A konverzációelemzés alkalmazása az orvos–beteg kommunikáció kutatásában. In: Bocz, Zsuzsanna (ed.), *PORTA LINGUA–2014 Szaknyelvi regiszterek és használati színterek. Cikkek, tanulmányok a hazai szaknyelvoktatásról és -kutatásról.* Budapest: Szaknyelvoktatók és -Kutatók Országos Egyesülete, 17–34. <http://real-j.mtak.hu/16753/1/porta2014.pdf#page=17> [Accessed on: 26 March 2022].

Buzás, Gy. M. (2021). A mesterséges intelligencia története [The History of Artificial Intelligence]. *Gasztroenterológiai és Hepatológiai Szemle / Central European Journal of Gastroenterology and Hepatology* 7(3): 121–127.

Byrne, Patrick S.–Long, Barrie E. L. (1976). *Doctors Talking to Patients: A Study of the Verbal Behaviours of Doctors in the Consultation*. London: HMSO.

Csepeli, Gy. (2020). *Ember 2.0: A mesterséges intelligencia gazdasági és társadalmi hatásai* [Human 2.0: The Economic and Social Impact of Artificial Intelligence]. Budapest: Kossuth Kiadó.

Devosa, I.–Grósz, T.–Kardos, P. (2020). A mesterséges intelligencia (AI) az egészség szolgálatában [Artificial Intelligence (AI) in the Service of Health]. *GRADUS* 7(3): 141–144.

Domonkosi, Á. (2007). Attitűd, értékítélet, minősítés: az értékszempont érvényesülése a nyelvi-nyelvhasználati reflexiókban [Attitudes, Value Judgements, Ratings: The Value Perspective in Language-Linguistic Reflections]. *Acta Academiae Paedagogicae Agriensis. Sectio Linguistica Hungarica* 34: 38–54.

Elwyn, G.–Frosch, D.–Thomson, R.–Joseph-Williams, N.–Lloyd, A.–Kinnersley, P.–Barry, M. (2012). Shared Decision Making: A Model for Clinical Practice. *Journal of General Internal Medicine* 27(10): 1361–1367.

Emanuel, E. J.–Emanuel, L. L. (1992). Four Models of Physician–Patient Relationship. *The Journal of the American Medical Association* 267(16): 2221–2226. <https://www.unlv.edu/sites/default/files/story_attachments/1111/11.08.18%20SOM%20Journal%20Club%20Article.pdf> [Accessed on: 26 March 2022].

Forgács, A. (2017). *Fejezetek a kommunikáció szociálpszichológiájából* [Chapters in the Social Psychology of Communication]. Budapest: Akadémiai Kiadó. https://doi.org/10.1556/9789634541059.

Gaal, I. (2016). Az internet hatása az orvos–beteg viszonyra [The Impact of the Internet on the Doctor–Patient Relationship]. *Orvosi Hetilap* 157(17): 680–684. <https://akjournals.com/view/journals/650/157/17/article-p680.xml> [Accessed on: 26 March 2022].

Győrffy, Dóra (2018). *Trust and Crisis Management in the European Union*. An Institutionalist Account of Success and Failure in Program Countries. Palgrave Macmillan.

Győrffy, Z. (2019). E-páciensek és digitális gyógyítóik [E-Patients and Their Digital Healers]. *Magyar Tudomány* 180(10): 1471–1485.

Győrffy, Z.–Meskó, B. (2012). E-doktorok és e-páciensek Magyarországon – Kvalitatív vizsgálat a magyarországi orvosok gyógyítással kapcsolatos internethasználatáról és attitűdjeiről [E-Doctors and e-Patients in Hungary – A Qualitative Study on the Use and Attitudes of Hungarian Doctors towards the Use of the Internet for Medical Treatment]. *Lege Artis Medicinae* 22(12): 677–683.

Horváth, D.–Mitev, A. (2015). *Alternatív kvalitatív kutatási kézikönyv* [Alternative Qualitative Research Manual]. Budapest: Alinea.

Kincsesné Vajda, B. (2013). *Kommunikációs, kapcsolati és egyéni tényezők az egészségügyi szolgáltatások minőségében és kimeneteiben* [Communication,

Relationships, and Individual Factors in the Quality and Outcomes of Health Services]. PhD Thesis. Szeged: University of Szeged.

Korsch, B. M.–Negrete, V. F. (1972). Doctor–Patient Communication. *Scientific American* 227(2): 66–75. <http://www.jstor.org/stable/24927407> [Accessed on: 26 March 2022].

Málovics É.–Vajda B.–Kuba P. (2009). Paternalizmus vagy közös döntés? Páciensek az orvos–beteg kommunikációról [Paternalism or Joint Decision-Making? Patients on Doctor–Patient Communication]. In: Hetesi, E.–Majó, Z.–Lukovics, M. (eds.), *A szolgáltatások világa*. Szeged: JATEPress, 250–264.

Mast, M. S.–Hall, J. A.–Cronauer, C. K.–Cousin, G. (2011). Perceived Dominance in Physicians: Are Female Physicians under Scrutiny? *Patient Education and Counseling* 83(2): 174–179. https://doi.org/10.1016/j.pec.2010.06.030.

Meskó, B.–Görög, M. (2020). Rövid útmutató egészségügyi szakemberek számára a mesterséges intelligencia korában [A Short Guide for Medical Professionals in the Era of Artificial Intelligence]. *Magyar Tudomány* 181(10): 1361–1377.

Miotto, R.–Li, L.–Kidd, B. A.–Dudley, J. T. (2016). Deep Patient: An Unsupervised Representation to Predict the Future of Patients from the Electronic Health Records. *Scientific Reports* 6(1): 1–10.

Molnár, R.–Sági, Z.–Fejes, Z.–Törőcsik, K.–Köves, B.–Paulik, E. (2018). Az orvos–beteg kommunikáció új lehetőségei – a betegek elvárásai alapján [New Possibilities for Doctor–Patient Communication – Based on Patients' Expectations]. *Orvosi Hetilap* 159(50). <https://akjournals.com/view/journals/650/159/50/article-p2136.xml> [Accessed on: 26 March 2022].

Rajkomar, A.–Oren, E.–Chen, K.–Dai, A. M.–Hajaj, N.–Hardt, M.–Dean, J. (2018). Scalable and Accurate Deep Learning with Electronic Health Records. *NPJ Digital Medicine* 1(1): 1–10.

Rózsa, E. (2016). Részvétel, laikusság és kompetenciák – az orvos–beteg együttműködési modell perspektívájából [Participation, Layness and Competences – From the Perspective of the Doctor–Patient Collaboration Model]. *REPLIKA* 100: 153–158.

Sára, Z.–Csedő, Z.–Tóth, T.–Fejes, J.–Pörzse, G. (2013). A korszerű információtechnológiai megoldások szerepe az orvos–beteg kommunikáció javításában [The Role of Advanced Information Technology Solutions in Improving Doctor–Patient Communication]. *IME* 12: 20.

Szalavetz, A. (2019). Mesterséges intelligencia és technológiavezérelt termelékenységemelkedés [Artificial Intelligence and Technology-Driven Productivity Growth]. *Külgazdaság* 63(7–8): 53–79.

Tamás, B. (2021). Individuals and Pseudo-individuals on the Internet: Reflections on the Janus-Faced Medium of Digital Nomads. *Információs Társadalom* 21(1): 73–87.

Veszelszki, Á.–Falyuna, N. (2019). Az áltudományosság leleplezése érveléstechnikai-nyelvészeti eszközökkel [Debunking Pseudo-science with Argumentation

Technique-Linguistic Tools]. *Médiakutató* 20(3): 39–51. <http://epa.niif.hu/03000/03056/00073/pdf/EPA03056_mediakutato_2019_osz_039-051.pdf> [Accessed on: 26 March 2022].

Online References

w1= n. a. (2018). A Bizottság közleménye az Európai Parlamentnek, a Tanácsnak, az Európai Gazdasági és Szociális Bizottságnak és a Régiók Bizottságának: A mesterséges intelligenciáról szóló összehangolt terv [Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Coordinated Agenda for Artificial Intelligence] <https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX:52018DC0795> [Accessed on: 26 March 2022].