

DIGITAL TECHNOLOGIES FOR ART THERAPY PRACTICES USED IN HEALTHCARE

GERGANA AVRAMOVA-TODOROVA^{A,E-F}

• ORCID: 0000-0002-5068-3642

MILEN TODOROV^{A,E-F}

• ORCID:

University "Prof. Dr. Assen Zlatarov", Burgas, Bulgaria

A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

The use of digital technologies influences practically almost all aspects of our daily life. In the field of healthcare, in particular, technology plays a very important role in activities related to data collection, data storing, and data analysis. The aim of technology in healthcare is to provide a range of healthcare professionals with access to information that will help increase the cost-effectiveness of care delivery and improve the efficacy of care.

Psychology counseling is an area where specific elements, such as evaluation of emotional health, could be supported by the use of appropriate technologies. Such technology could increase accessibility to this type of assistance by reducing lengthy and costly travel to specialized centers. In addition, technology may enable overburdened professionals to increase the reach of their services, and help people with physical limitations who have restricted ability to travel to receive care.

So-called 'virtual assistants' (also known as 'chatbots') could help patients to identify emotional imbalance. In general, the evaluation process could include a series of questions that aim to find the emotional problem, and ultimately to propose a suitable program of art therapy.

The current study aims to outline the steps needed to develop a chatbot that is capable of identifying emotional imbalance and selecting a suitable program of art therapy. We also consider the addition of virtual and augmented reality as a further possibility for improving the therapeutic process.

KEYWORDS: digital technologies, digital healthcare, chatbot, art therapy practices, human-computer interaction

DIGITAL TECHNOLOGIES IN HEALTHCARE

Advances in digital (i.e., information) technologies give pace to the rapid development of variety methods and tools that can be used in practically all areas of our daily life. As these technologies continue to evolve, numerous investigators have explored the challenges, barriers, and opportunities associated with the use of information in healthcare. Broadly defined, digital health refers to the use of digital information, data, and communication technologies to collect, share, and analyze health information with the aim of improving patient health and health care delivery [1].

One beneficial application of technologies in healthcare is their use as a diagnostic tool. The rapid growth in computing power has enabled the development of machine-learning algorithms that are used in variety complex data evaluations. These algorithms arise from the development of artificial neural networks in attempt to simulate the human brain's neuronal response to external stimuli and thus facilitate learning and pattern

recognition. There are numerous examples showing the utility of neural networks for detecting different diseases, including diabetic retinopathy [2] and lymph node metastases after the diagnosis of breast cancer [3,4].

The same or similar technologies could be also used in other areas such as psychology, and more specifically, in the sub-field of art therapy. Growing evidence suggest that art therapists utilize digital media for personal and professional use, and increasingly for therapy [5]. Art therapists using digital media maintain ongoing digital culture membership through their interest, upgrade, and continued use of digital media tools for creative and clinical work.

ART THERAPY AND DIGITAL TECHNOLOGIES

Art therapy can be defined as a natural and spontaneous expression, which helps to develop both inter- and intrapersonal communication. Artistic expression is a way to assess the feelings and perceptions of the

person's inner world, and to facilitate communication between this inner world and the outer world. In this way, art therapy could be used to resolve a variety of emotional problems. Therapeutic digital media provided to persons in need may include various creative 'apps' for art making such as video, animation, digital drawing, collage, photography, and augmented reality. In addition to these expressive digital techniques, another opportunity is developing the digital equivalent of dialog with the art therapist. This digital dialog aims to identify emotional problems and find a suitable art practice that will help to overcome the imbalances.

Human-computer interaction is currently an area of high importance, and a key to understanding it is an appreciation of the fact that interactive interfaces mediate the redistribution of cognitive tasks between humans and machines. In fact, the interaction between humans and machines is a perfect example of the implementation of state-of-the-art consumer-oriented artificial intelligence (AI). Such interactions simulate human behavior based on formal models, and represent an interesting subject for research on patterns of human interaction as well as issues related to assigning social roles to others, finding patterns of successful and unsuccessful interactions, and establishing social relationships and bonds.

ART IN HEALTHCARE

"Little as we know about the way in which we are affected by form, by color, and light, we do know this: that they have an actual physical effect. Variety of form and brilliancy of color in the objects presented to patients, are actual means of recovery." Florence Nightingale 1860

"Research shows art is far more than aesthetic beauty made for entertainment. It supports health by its ability to reduce stress, decrease the duration of treatment, lowers blood pressure, accelerates healing, heightens mood, and initiates the joy response. Patients, visitors, staff, health experts, and scientific researchers unanimously agree that art in hospitals improves care, raises outlook, and is enjoyable, lifting and positive for everyone. Patients, especially those anxious about undergoing procedures and tests, respond well to the visual stimulation, finding it reduces their stress." [6]

WHAT SORT OF THING DOES ART IN HEALTH INVOLVE?

There are, broadly, five main areas of arts in healthcare work:

1. Arts in healthcare environments: Nowadays, many hospitals have artists working to improve gardens and clinical areas.
2. Participatory arts programs: Getting involved in the arts provides both social and creative out-

lets for people who are ill – either with physical or mental health issues.

3. Medical training and Medical Humanities: For hundreds of years, the arts have played a part in developing the practice of medicine, and in our understanding of wellbeing. The arts are also often used to help explore ethical issues in medicine.
4. Art Therapy: the art therapies (drama, music and visual art) have now become an established psychotherapeutic tool for used by qualified therapists with clients, usually on a one-on-one basis.
5. Arts on Prescription: Arts on Prescription schemes provide arts and creative activities for participants, usually for people experiencing mental health problems and social isolation. The purpose of such schemes is not to replace conventional therapies but rather to act as an adjunct, helping people in their recovery through creativity and increasing social engagement [7].

Art in hospitals is generally viewed positively by both patients and staff. A qualitative evaluation of the Exeter Healthcare Arts Project found that the display of visual arts in the hospital was perceived by patients, staff, and visitors to have a positive effect on morale [8]. Forty-three percent of frontline clinical staff believed that the arts had a positive effect on healing, and 24% indicated that the arts improved clinical outcomes. Other studies have assessed the importance of patient choice. A volunteer program in Canada allowed long-term hospital patients to choose from a selection the piece of art that they would like displayed in their room. Patients reported that the added element of choice improved their mood. There is, moreover, considerable evidence that mental health can be improved by participation in arts projects [8].

EMOTIONAL INTELLIGENCE, AI, AND CHATBOTS

The promise of AI in healthcare is to provide a set of tools to augment and extend the effectiveness of the therapists in practically all fields. The introduction of data-rich technologies to the clinic will require specialists to interpret and operationalize information from many (bio)medical sources. Thus, it is expected that decisions - particularly those made in urgent situations - could be more efficient, more effective, and personalized when they are supported by reliable digital technology. While AI is needed to support the processes leading to an ultimate medical decision, there are other possibilities that will bridge the gaps in healthcare. For example, AI can assist customers with booking appointments and can assist doctors by operating like pseudo nurses [9-11].

Over the past few years, virtual help agents - also known as 'chatbots' (software program that interacts with users using natural language) - have taken on sur-

prisingly sensitive jobs in modern society by offering help, support, and companionship. As chatbots gather mood data and any texts or emojis that a patient might enter, the chatbot traces the branches of a decision tree to offer personal responses. In general, the chatbot asks questions like as “What is your energy like today?”, “How are you feeling?”, or “What’s going on in your world right now?” Those prompts are modelled on today’s most popular form of talk therapy, cognitive behavioral therapy (CBT), which instructs individuals in how to recast their negative thoughts in a more objective light. Users are encouraged to talk about their emotional responses to life events, and then stop to identify the psychological traps that cause their stress, anxiety, and/or depression.

A chatbot may also be useful for providing advice on an appropriate art therapy practice. In the counselling process, the therapist may ask specific questions to evaluate the emotional balance of the user. By analyzing the dialogues that occurred during therapy sessions, a specific order of question could be constructed to identify the type of emotional imbalance. Then, it is possible to offer a suitable practice that will influence the needed emotion. If the question sequence is known, it can be technically structured in a simple *If-Then-Else* logic. Currently there are numerous open source and paid decisions for construction of such logic as interaction with chatbots.

METHODOLOGY AND EXPERIMENTAL DESIGN OF CHATBOT FOR ART THERAPY

Depending on type of technology that is used, the chatbot could interact by text messaging, voice, or combination of these modalities. In current work, the interaction process is based on text messages and visual elements. Because it is based on logical flow of information a structured type is used including menus, buttons, choices, and forms that need to be filled. To evaluate emotional balance, a sequence of questions adapted from the standardized Toronto Alexithymia Scale (TAS) [12]. The TAS is a 20-item instrument that is one of the most commonly used measures of alexithymia. Alexithymia is a condition associated with difficulty in identifying and describing emotions, and individuals with alexithymia tend to minimize emotional experience and focus attention externally. The questions from the original TAS have been modified slightly, to add a personal engagement to the respondent – e.g. “I am often confused about what emotion I am feeling” is now “Are you often confused about what emotion you are feeling”. The part of the conversation flow is schematically presented in fig. 1.

Following the question sequence, the user should give answers to twenty questions. As a result of scoring of the answers it will become clear if there are any potential problems with identification of emotions.

Another test that can be used is the *Strengths and Difficulties Questionnaire* (SDQ) [13]. If any problem-

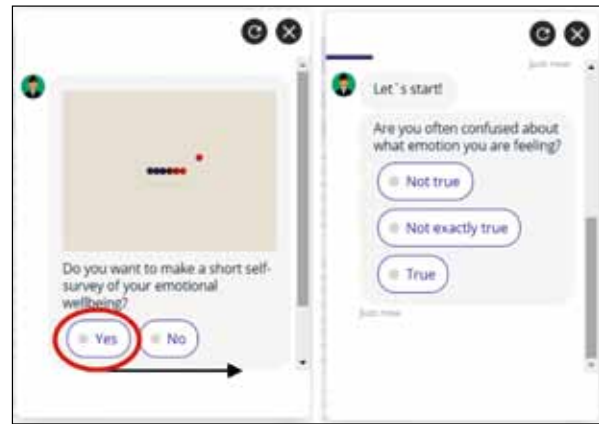


Figure 1. Representation of dialog with the chatbot.

atic score is achieved, the user can be advised to use a suitable art therapy practice – e.g. “*draw yourself as a super hero*”.

POSSIBILITY OF USING VIRTUAL REALITY IN ART PRACTICES

In its simplest sense, virtual reality (VR) describes a three-dimensional, computer-generated, interactive environment that can be explored by an individual user [14]. The user essentially becomes part of the virtual world and is immersed within the VR environment with the ability to manipulate it in various ways or perform actions within it.

A range of mental health professionals are currently using VR as a part of various treatments. According to these professionals, an advantage of VR is that individuals know that it is not real, but their bodies and minds respond as if it is. In other words, people can much more easily encounter difficult situations and interactions through VR than through the real world, and they have a greater ability to try out new responses and behaviors.

From practical point of view, in some cases the art therapy practice could be extended by making use of VR models. For example, the art therapy practice “*draw yourself as a super hero*” could be transferred into a VR environment and could be seen in quite different way. Visualization of such a scene is represented in fig. 2, taken from the Google Poly website.

CONCLUSIONS AND PROSPECTIVE RESEARCH

Digital health technologies have significant potential to revolutionize healthcare delivery, transform clinical trials, and improve health outcomes. In the field of psychology counselling, the use of virtual assistants (known also as chatbots) is expected to become more valuable for use in both diagnostic and therapeutic activities. Chatbots are expected to be easily constructed and applied in practically all forms of evaluations related to emotions and overall wellbeing. As a

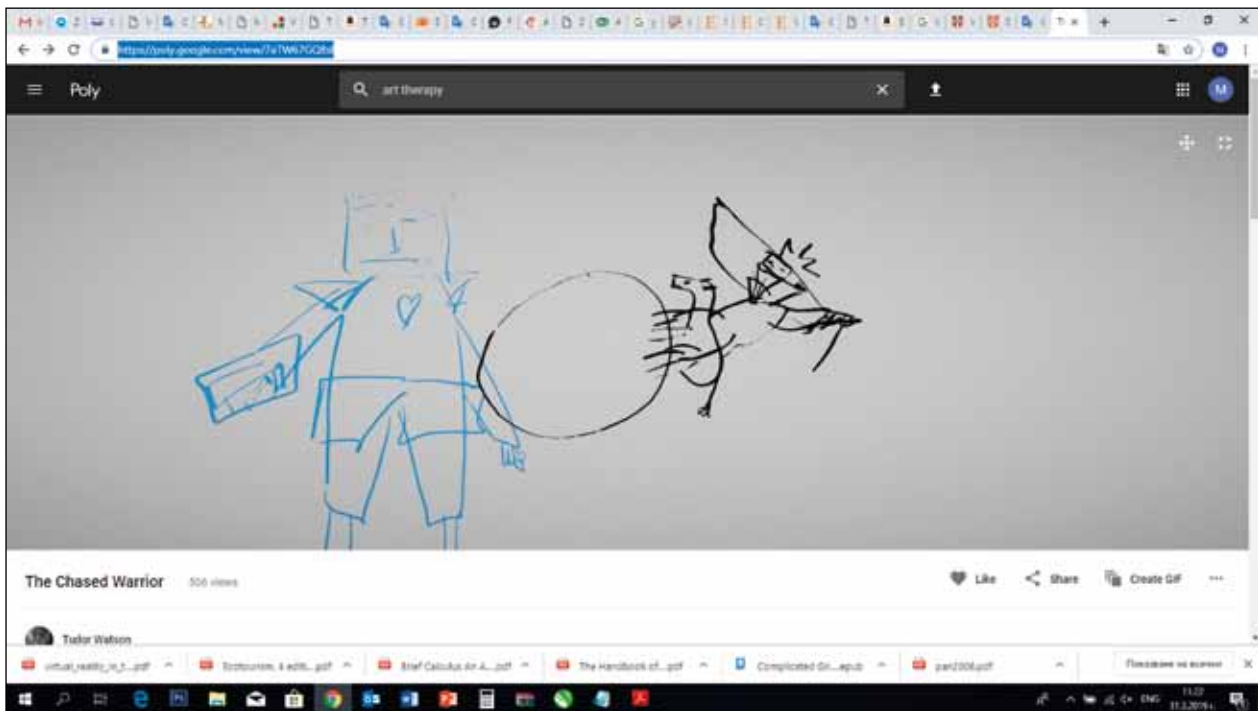


Figure 2. Representative image of scene that can be used in VR art practice. Image from <https://poly.google.com/view/7aTW67GQ8sl>.

result, the most appropriate art practice can be selected and applied to recover an emotional balance.

As a further step in the process of art therapy, VR is considered to be a natural extension of the art

practices. A challenge in applying these technologies to art therapy will be in finding the most appropriate combination that yields the best therapeutic outcomes.

REFERENCES:

1. Beam AL, Kohane IS. Translating artificial intelligence into clinical care. *JAMA* 2016; 316: 2368–2369.
2. Wong TY, Bressler NM. Artificial intelligence with deep learning technology looks into diabetic retinopathy screening. *JAMA* 2016; 316: 2366–2367.
3. Ehteshami Bejnordi B, Veta M, Johannes van Diest P, van Ginneken B, Karssemeijer N, Litjens G, et al. Diagnostic assessment of deep learning algorithms for detection of lymph node metastases in women with breast cancer. *JAMA* 2017 Dec 12; 318(22): 2199–2210.
4. Digitization of healthcare organizations: the digital health landscape and information theory. *Int J Med Inform* 2019; 124: 49–57.
5. Orr PP. Technology use in art therapy practice: 2004 and 2011 comparison. *Arts Psychother* 2012; 39: 234–238.
6. Art for hospitals+ [online] 2019 [cit. 1.03.2019]. Available from URL: <https://www.artforhospitals.org>.
7. The National Alliance for Arts, Health & Wellbeing [online] 2019 [cit. 1.03.2019]. Available from URL: <http://www.artshandwellbeing.org.uk>.
8. Lankston L, Cusack P, Fremantle C, Isles C. Visual art in hospitals: case studies and review of the evidence. *J R Soc Med* 2010 Dec 1; 103(12): 490–499.
9. Florence. Your health assistant [online] 2019 [cit. 1.03.2019]. Available from URL: <https://florence.chat>.
10. Your personal health guide and symptom checker [online] 2019 [cit. 1.03.2019]. Available from URL: <https://www.your.md>.
11. Babylon health: online doctors consultaion and advice [online] 2019 [cit. 1.03.2019]. Available form URL: <https://www.babylonhealth.com/>
12. Bagby RM, Parker JD, Taylor GJ. The twenty-item Toronto Alexithymia scale—I. Item selection and cross-validation of the factor structure. *J Psychosom Res* 1994 Jan; 38(1): 23–32.
13. Goodman R. Psychometric properties of the strengths and difficulties questionnaire. *J Am Acad Child Adolesc Psychiatry* 2001 Nov; 40(11): 1337–1345.
14. North MM, North SM. Virtual Reality Therapy. In: Luiselli JK, Fischer AJ, eds. *Computer-Assisted and Web-Based Innovations in Psychology, Special Education, and Health*. London & San Diego: Academic Press 2016; 141–156.

Word count: 1917

• Tables: –

• Figures: 2

• References: 14

Sources of funding:

This paper is partially supported by the National Scientific Program “Information and Communication Technologies for a Single Digital Market in Science, Education and Security (ICTinSES)”, financed by the Ministry of Education and Science.

Conflicts of interests:

The author reports that there were no conflicts of interest.

Cite this article as:

Avramova-Todorova G, Todorov M.
Digital technologies for art therapy practices used in healthcare.
MSP 2019; 13, 1: 43–47.

Correspondence address:

Gergana Avramova-Todorova
University “Prof. Dr. Assen Zlatarov”
Burgas, Bulgaria
E-mail: g.avramova@abv.bg

Received: 15.03.2019
Reviewed: 2.04.2019
Accepted: 3.04.2019