Interactive Art Therapy for Mental Health Using Microsoft Kinect

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Abstract. Nowadays, mental illness also called mental health disorders was becoming the most common illness among people. Many people who suffer from mental illness having difficulties in expressing their feeling and commit suicide because they normally do not or cannot open up in verbal communication such as traditional therapy. Interactive art therapy has the potential to decrease mental health among people. The main objective of this paper is to introduce an interactive art called Interactive Art Therapy (IAT) for people who are suffering from mental health that is needed non-verbal communication. The completed IPT application has been successfully developed by using Microsoft Kinect and Touchdesigner software which utilizing visual and audio elements for their interactivity. Based on the results from the usability testing, most of the respondents are agreed that this application is effective and usable for everyone especially those who are suffering from mental illness.

Keywords: Interactive art · Mental illness · Visual · Audio

1 Introduction

Mental illness has been one of the most common illnesses among people regardless of age today. Mental illness is also known as mental disorders which refers to different kinds of mental conditions and can affect the behavior and mood of people. Some mental illnesses are depression, anxiety disorders, schizophrenia, eating disorders, and addictive behaviors. Mental health is the potential to becomes a mental illness when signs and symptoms occur frequently due to stress. This will affect the brain's ability to function. A mental illness can make them feel miserable and can cause problems in their daily life which affects their daily productivity and when this happens constantly it would worsen the emotion of a particular person. People who are having a mental illness could treat their condition by taking medications and also through psychotherapy. Psychotherapists actually can help the person who has mental illness by listening to them in a non-judgmental and compassionate way. With their ability to listen in this way, the solutions to the problem could be solved and discuss. But some of the mental disorders could not be solved by psychotherapy. This is because some mental disorders

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patients choose to suppress their emotions, and also choose to not open up their problem and discussed it with somebody. For a long time ago, the field of art therapy is effective in helping individuals explore and express feelings and improve overall wellbeing. Furthermore, interactive art has the potential as a therapy to decrease mental health among people. Through creating art and discovering its meaning, the process of making art itself becomes therapy. This unconventional approach assists the patients, especially those who don't or can't normally open up in traditional therapy and counseling sessions. Therefore, these group of people could undergo their therapy through non-verbal communication such as this interactive art which consists of both - visual and audio.

In this study, the concentrations on the problem of a group of people who suffer from mental health are given priority. Mental health is the level of psychological well-being or an absence of mental illness. It is the state of someone who is functioning at a satisfactory level of emotional and behavioral. Many people nowadays have been suffering especially from depression and anxiety. A mental health concern becomes a mental illness when ongoing signs and symptoms cause frequent stress and affect their ability to function. Depression plays a role in more than one-half of all suicide attempts, whereas the lifetime risk of suicide among patients with untreated depressive disorder is nearly 20%. Although depression and anxiety can be treated by medication which psychiatrists usually recommend that patients continue to take medication for six or more months after symptoms have improved. Longer-term maintenance treatment may be suggested to decrease the risk of future episodes for certain people at high risk which with all medicines, this change can cause side effects. Besides, the researcher has found that people commit suicide because they normally do not or cannot open up in verbal communication such as traditional therapy or counseling sessions. Increase the number of people who suffer from mental illness. People having difficulties in expressing their feeling or just keep them to themselves. People tend to take drugs or other dangerous medication to calm themselves. The objective of this paper is to introduce an interactive art therapy called IAT by using Microsoft Kinect for people who are suffering from mental health that is needed non-verbal communication.

2 Literature Review

Microsoft had launched the Kinect sensor at the end of 2010 [1]. This sensor is for the videogame system Xbox 360. However, this sensor has gained popularity not only in gaming [2, 3], but also in other areas such as robotics [4, 5], gestures [3, 6], medical [7], and rehabilitation [8–10] applications. Microsoft Kinect is a motion sensing input device that using state of the art motion sensing camera to allow full-body 3D motion capture, facial recognition, and voice recognition capabilities. This technology allows the users such as patients to interact with computer program which known as natural user interface. This kind of technology could be applied in many different types of medical setting such as for helping in mental health illness using art therapy. Mental health such as anxiety disorders and depression are very serious illness which could be affecting anybody. These kinds of mental health were the two most common mental disorders which brought great challenge to personal wellbeing. Based on latest trend, the need for private and home-based settings to act as therapy for mental illness is needed. The

methods of interactive art as therapy for mental health not yet been fully established [11]. As mentioned before Kinect has potential to be used as art therapy. The Kinect used to allow the patient or the user to interact with the system in a 3D environment, where they perform multiple movement combinations without the need of an attached device or a controller. It is tackling issues related to act as therapy. Focusing on the rounded-particle and the relaxing audio added which would bring the user to feel the movement and feels along. This visual will be more effective with the dark surrounding with no outer sound disturbance. Some of the works related to Kinect conducted by Zao et al. [11]. He has conducted an experiment on 179 participants where there are required to walked on the footpath naturally while shot by the Kinect cameras. The result shows that by using different machine learning algorithms to train the regression models, the anxiety and depression levels were recognized. Other than that, Webster and Celik [12] present a review of research about Kinect-based elderly care and stroke rehabilitation systems. The results provide an overview of the state of the art, limitations, and issues of concern as well as suggestions for future work in this direction. Physiopedia [10] has discussed how Microsoft Kinect could be utilized for different kind of purposes which related to rehabilitation physiotherapy rehabilitation for stroke patients. Microsoft Kinect allows virtual rehabilitation to be conducted which has ability to provide more innovative and exciting ways to rehabilitate. Dove and Astell [13] in their Kinect project have demonstrated that learning and improvement over time of 23 participants for final analysis shown significant decreases in number of prompts per turn and turn duration and significant increases in turns completed independently.

3 Development of Interactive Art Therapy

The development of IAT consists of three phases which enable Kinect node and calibration at phase 1, design particle and motion at phase 2, and creating effects on particle visual at phase 3. It is very important to make sure each of the phases should be completed successfully before other phases could proceed. The development stage can be used as a guideline and identified as a strategic plan for developing the project.

At phase 1, the interactive sensor which is Kinect was used and set. The software used in this project called Touch designer [14]. Before this software could be used with the Kinect, it has to be enabled and test. Kinect sensors need to be tested to make sure that their sensor functioning well (refer Fig. 1). During the testing, the calibration needs to be performed. The calibration of the Kinect sensor needs to be tested with the human body part such as the hand, neck, shoulder, and leg. To merge the sensor with the visual, the setup needs to be performed. The setup involves by activating the Kinect calibration with the value of x, y, and z. When the calibration value appears and is verified successfully, the next phases could be started.

After the Kinect node is enabled, set and calibrate, phase 2 can be started. At this phase, the design of particle and motion are involved because the project is related to therapy visuals. The process of designing the particle and motion is very crucial and needs to make sure it is working properly. The process starts with creating the particle nodes to display visual and platform to merge with the Kinect. The size of this particle can be set in different sizes accordingly and could move randomly in motion. This process

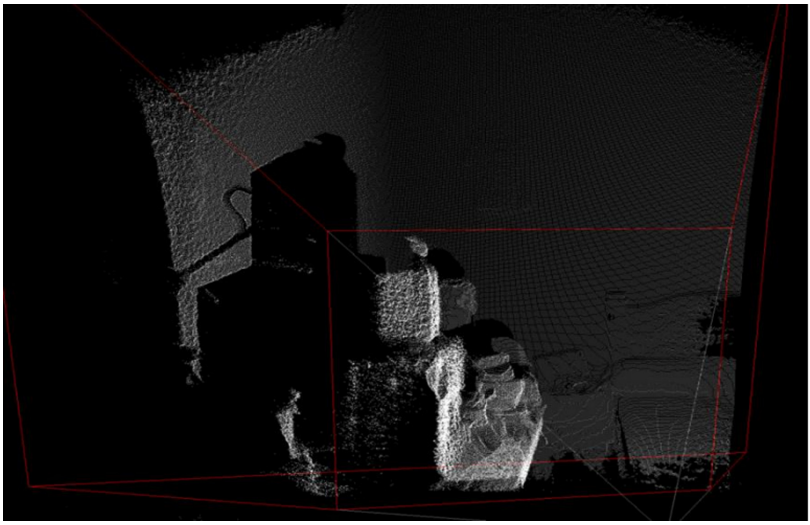

Fig. 1. Testing the Kinect sensor

could be performed by settings up the property of this particle accordingly. When the particle is setup properly, this particle node needs to be merged with the Kinect node (refer Fig. 2). This merging could be performed by using node geometry as a bridge to connect both nodes. After that, the particle visual and motion will be appeared based on what being set before. When these phases are completed, phase 3 could be started.

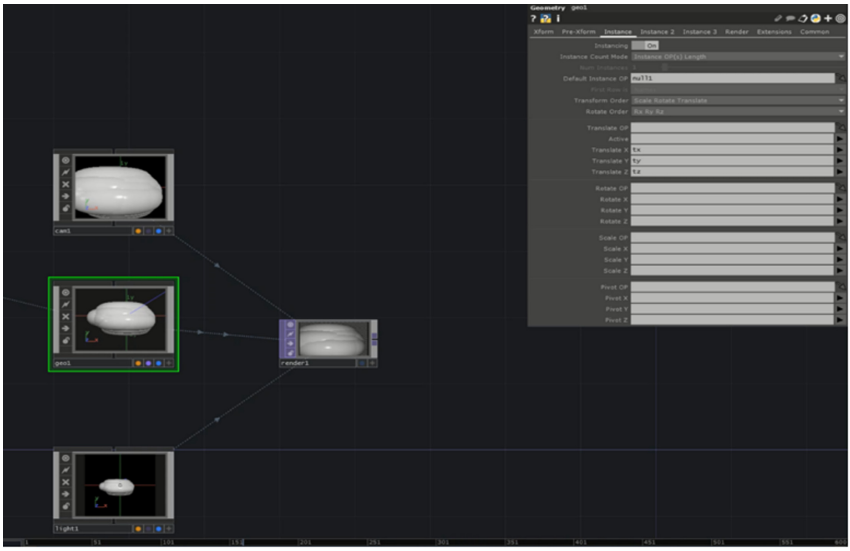

Fig. 2. Process of merging the visual node

After phase 1 and phase 2 are completed, phase 3 could be started. At this phase, the effects such as colours, shape, edge, and delay could be added into the particle that being created before at phase 2. First, the effects of colour could be set to the visual. Effects such as optical flow, feedbackEdge and RGBblur also can be set to the visual. After that, the delay effects can be added to the visual. Finally, audio can be added to the node to enable turn on audio in the project. When all these effects are set, the visual is ready. Then the process of calibration for hand to control and interact with visual could be performed. In order to perform this, have to turn back to phase 1 to make sure all effects were applied and calibrate well with the visual and also motion. At this stage, the particle attractor was added and merged. To produce calming visuals, some of the effects need to be reduced and maintain only certain effects. The particle must be set randomly. The purpose of adding effects is to give more therapy looks on visual. As mentioned before, to produce and boost more relaxing and calming feelings, the related and calm audio is added. The audio could help the user feel more relaxing and calming while interacting with the visual and motion. After all the phases are finished, the final look of the visual is ready and could be controlled with the hand gesture through the Kinect sensor. The demo of the IAT is released. The final visual is projected on the television screen. The setup is included Kinect Xbox 360 V.2, Kinect adapter, and television screen. The environment setup for IAT should be in the dark background to make sure that the visual representation of IAT could be seen clearly and affects more to the user. A few peoples are tested to interact with the visual. After testing with the demo project, there are some feedbacks given by the user. Therefore, some improvement needs to be done. Some of the changes or improvement is changing the size of the particle, shapes and add more particles to the project. After that, the final changes are made, and the final project is released. Figure 3 shows the final visual representation of the project which can be interacted by the users.

Fig. 3. Final IAT tested by the users

4 Results and Discussion

After finished the development of the IAT, the evaluation on the effectiveness of the IAT was conducted. The instruments have been developed for the purpose of the evaluation. These instruments consist of 5 questions. Below are the questions: -

Question 1: "Does the color of the visual, make you feel calm or relaxing?"
Question 2: "Do you agree that audio in this visual used could make you feel calm?"
Question 3: "After you interact with the visual, how do you feel?"
Question 4: "Do you think that this project could help others to improve their mental illness?"
Question 5: "So, based on your opinion, will you suggest this to those who have or facing with mental health problem?"

The questionnaire has been distributed to the 30 respondents randomly and all the respondents give their feedback by answering the questionnaire. Due to the pandemic covid-19, only 5 respondents could be tested IAT directly before they give the feedback. But the rest of the respondents are giving their feedback by watching the video of IAT. The results from these feedbacks are discussed in this section.

Question 1: "Does the color of the visual, make you feel calm or relaxing?".

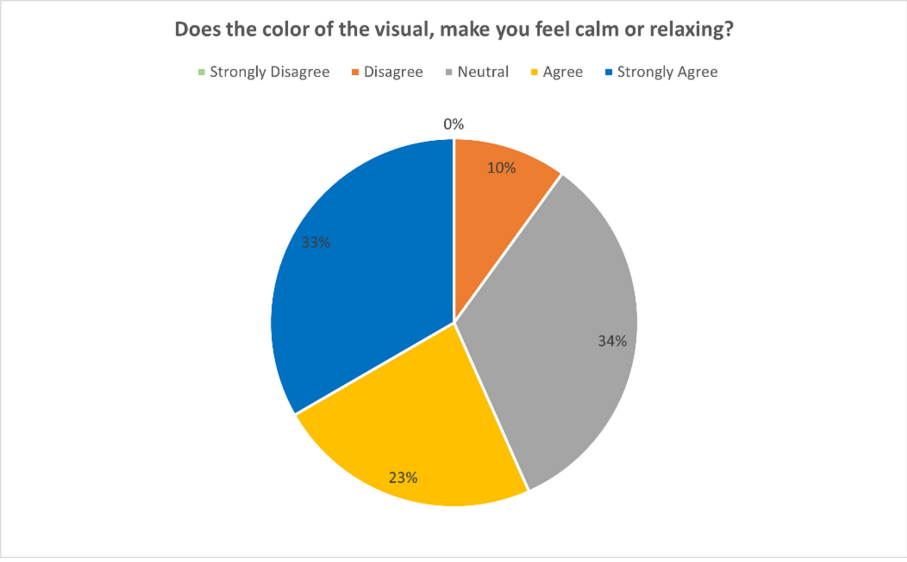

Fig. 4. Result of Question 1

The results for Question 1 shows in Fig. 4. From a total of 30 respondents, there are 33% respondents are strongly agreed that the color of the visual could make them feel calm and relaxing. While there are 23% of respondents are agreed that color of the visual helps them to feel calm and relaxing. Another 34% of respondents are feeling neutral

with the color of the visual. And the rest of the respondents (10%) were disagreeing that the visual could make them feel calm and relaxing. This may be because they expected more variety of color on the visual to make them calm and relax.

Question 2: "Do you agree that audio in this visual used could make you feel calm?".

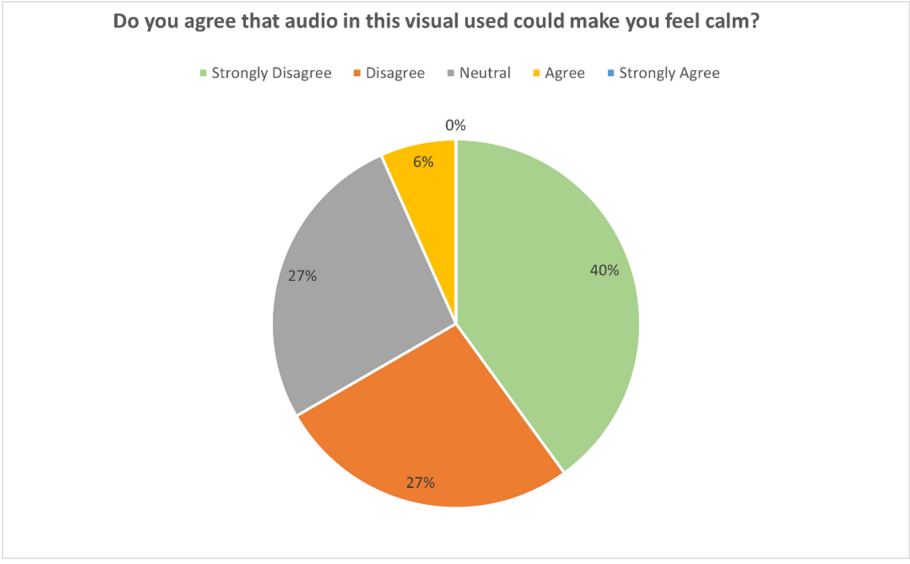

Fig. 5. Result of Question 2

The results for Question 2 shows in Fig. 5. From the total of 30 respondents, there are 40% respondents strongly agree that audio used in the visual could make them feel calm and relaxing. While 27% of respondents are agreed that the audio together with the visual could make them feel calm. The other 27% of respondents answered as feeling neutral and the rest 6% respondents have disagreed.

Question 3: 'After you interact with the visual, how do you feel?'

The results for Question 3 shows in Fig. 6. From a total of 30 respondents, there are 83% respondents feel very calm after interacting with the visual. While there are 14% of respondents feel no feeling on the visual. And there are 3% of respondents feel stressed with the visual after he or she interacts with the visual.

Question 4: 'Do you think that this project could help others to improve their mental illness?

The results for Question 4 shows in Fig. 7. From the total of 30 respondents, there were 64% respondents are strongly agreed that this project can help people who are suffering from mental illness. While 23% of respondents are agreed. Follow with 10% respondents answered neutral and only 3% respondent has disagreed. And there is no one who answered strongly disagree. This result has support by work done by Haeyen et al. [15]. Whereby in their work on quatitative research on finding the effects of art therapy with mental illness and health outcomes has concluded that art therapy has potential to promotes mental health and reduces the mental illness.

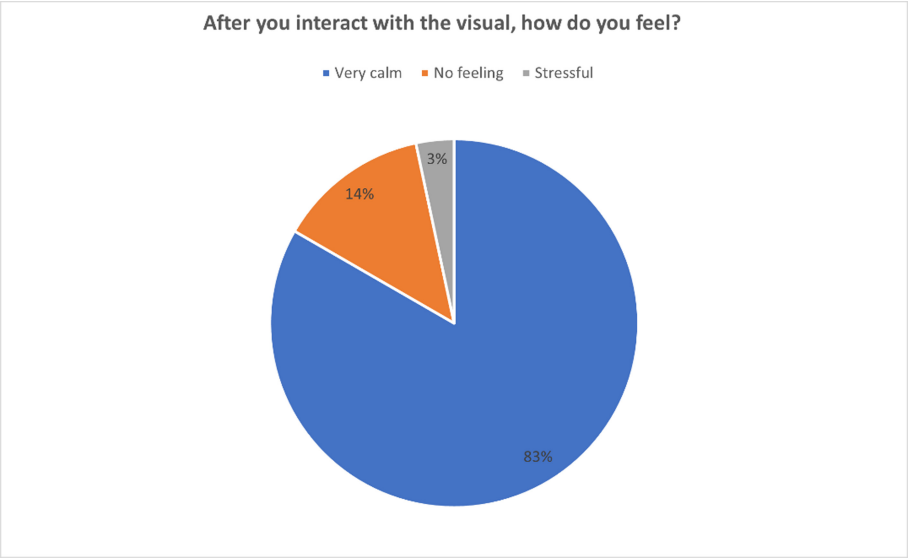

Fig. 6. Result of Question 3

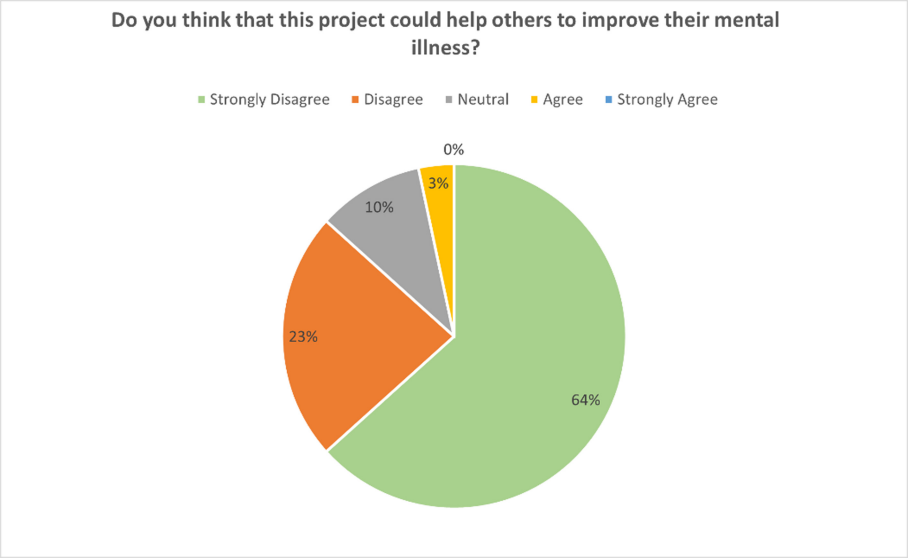

Fig. 7. Result of Question 4

Question 5: "So, based on your opinion, will you suggest this to those who have or facing with mental health problem?"

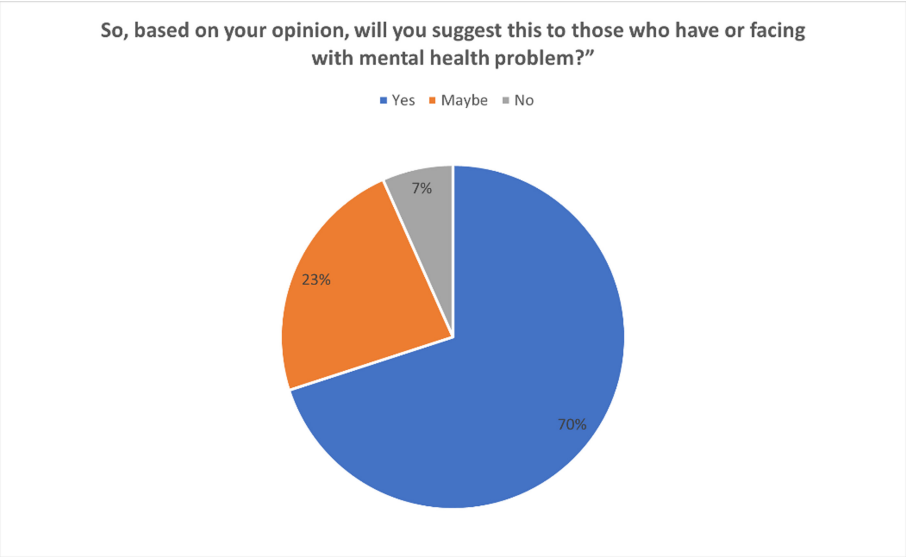

Fig. 8. Result of Question 5

The results for Question 5 show in Fig. 8. From a total of 30 respondents, there were 70% respondents answered 'Yes' to will suggest this project to those who have a mental health problem. While there are 23% of respondents voted for 'Maybe' and the last 7% of respondents voted for 'No'.

5 Conclusion

In conclusion, the project namely IAT has met in successful which achieve the objectives to improve mental health especially for the people who are needed non-verbal communication. The project has been successfully developed by using the latest technology which utilizing Microsoft Kinect and Touchdesigner software. Due to the pandemic of Covid-19, some of the respondents could not interact directly with the project. The results show that most of the respondents are agreed that IAT is effective and usable for people who are suffering from mental illness. The majority of the respondents select strongly agree with all aspects being asked in the questionnaires. They agreed that the IAT makes them feel calm and relax. The audio used with the visual art also makes them feel calm. When they interact with IAT, the majority feel very calm and would suggest this IAT for others to improve their mental health. In the end, this IAT has the potential to help and improve the health of people who are suffering from mental illness which needed non-verbal communication. For future work, the IAT could be improved and enhanced especially on the particle representation by adding more effects on the particle to improve the quality of the visual representation.

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