

# A WhatsApp Application-Based Therapy for Adolescents with Depression

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**Abstract—** In providing a therapy treatment to a patient with depression, the communication between a psychiatric doctor and a patient with depression must not be limited solely during the therapy session. Therefore, this study aims to identify the appropriate mobile application according to the types of depression therapy that require mobile application-based therapy for adolescents with depression. The participants in this study were recruited based on purposive sampling. The first round which consisted of four psychiatric doctors involved two males and two females participating in this study followed by participation of 14 experts in the second round. This study which employed the Fuzzy Delphi Method revealed that Whatsapp is necessary and thus categorized as the main based-therapy for adolescents with depression and Cognitive Behavioural Therapy has been acknowledged as the most suitable type of depression therapy that needs mobile application-based therapy for adolescents with depression. This method is useful to design a particular based-therapy module for the doctors to use in mobile application for adolescents with depression. The results of this study would be useful for doctors, particularly in using Whatsapp as a based therapy to interact with adolescents with depression in the future.

**Keywords—** Adolescents, communication, depression , therapy, whatsapp

## I. INTRODUCTION

Depression refers to an emotional as well as a mental disorder. It can affect anyone at any age, gender, and socioeconomic level (Pampel & Williamson, 2001)<sup>24</sup>. A person's depression level can be mild, moderate, or severe (Marcus et al., 2012)<sup>18</sup>. Adolescents can suffer from depression starting from the age of fifteen (Angold et al., 1998)<sup>4</sup> and in the age range of 15 to 19 depicts higher rates of Major Depressive Disorder (Force, 2009)<sup>14</sup>. A person with depression is characterized as feeling unhappy, anxious, unenergetic, having an unstable appetite, and tends to think of suicide (Dedić, 2016)<sup>13</sup>. According to Nock et al. (2013)<sup>22</sup>, an increase in the suicide rate is usually prevalent from childhood to adolescence years and a suicidal attempt has been reported in about 60% of adolescents with depression. In addition to medications, depression patients require therapy treatment provided by psychiatric doctors. There are different types of therapies for patients with depression, such as

cognitive – behavioural therapy (CBT), behavioural therapy, music therapy, and exercise therapy. However, a long waiting list for the therapy session is one of the drawbacks of these therapies. Matthews et al. (2008)<sup>19</sup> reported that adolescents tend to use mobile phones. Vahlberg's (2012)<sup>34</sup> study also discovered that adolescents between 13 to 17 years old are more likely to send and receive text messages. Therefore, a mobile application-based therapy has been suggested by psychiatric doctors for adolescents with depression to strengthen the doctor-patient communication and to track the patients' progress.

By using mobile applications psychiatric doctors can monitor their patients' progress, thoughts, and daily routines while making their patients feel close to them.

### A. Research Objectives

This study intends to fill in the gap the communication between psychiatric doctors and their adolescent patients with depression by achieving the following objectives. The objectives of this study are:

1. To identify the consensus of experts on the preferred mobile application as a form of therapy for adolescents with depression.
2. To identify the consensus of experts on the preferred type of depression therapy utilizes mobile application as a form of therapy for adolescents with depression.

## II. LITERATURE REVIEW

Whatsapp, Email, Facebook, Online Website, and Twitter are instances of mobile applications. They are communication as well as entertainment tools, and their installment does not involve cost (Andre & Leroux, 2011)<sup>3</sup>. Whatsapp serves to ensure prompt and easier communication and delivery of multimedia messages (Sahu, 2014)<sup>31</sup>. Interaction via email assists the doctors to have an in-depth communication with the patients pertaining to their clinical health issues (Patt et al., 2003)<sup>26</sup>. In doctor-patient communication, emotional support can be given to the depressed patients through Facebook. It enables the doctors to communicate with the patients regarding their health issues (Oh et al., 2013)<sup>23</sup>. More accurate information can be provided by the doctors to the patients through the website. This can increase the patients' curiosity and make them to communicate in-depth about their health matter (Reynolds et al., 2014)<sup>29</sup>. With regard to the Twitter application, Twitter posts enable expression and sharing of emotions by the depressed patients with their peers. Patients can

also receive emotional support from their peers through this application which consequently avoids them from feeling lonely, however, encourages them to convey their emotions freely Park et al. (2012)<sup>25</sup>.

The use of mobile applications for several types of depression therapies (e.g., Cognitive Behavioral Therapy, Computerised Cognitive Behavioural Therapy, Mindfulness, and Cognitive Therapy) have been reported by several studies. The Headstrong programme, a four-session Cognitive Behavioural Therapy, was examined in Connelly et al.'s (2006)<sup>11</sup> study. It is a therapy based on a CD-ROM programme for children aged 7-12 years. In this programme, the therapist provided assistance to the children through a weekly phone call. The findings of this study showed a higher reduction in pain in children in the treatment group than children in the follow-up sessions. In Percevic et al.'s (2004)<sup>27</sup> study, a smartphone has been identified useful in the face-to-face Cognitive Behavioural Therapy involving doctors and patients. This therapy comprises using software programmes to conduct computerized assessments of the patients' symptoms and rating scales prior to the commencement of the session. These assessments are also carried out after the end of the session to discover the patients' results. Computerized Cognitive Behavioural Therapy (CCBT) is a type of therapy that involves delivering a cognitive behavioural therapy via computer (Reynolds et al., 2014)<sup>29</sup>. i-Couch online therapy is beneficial for the patients who require Computerized Cognitive Behavioural Therapy. i-Couch online therapy is an application that involves patients recording their activities. The clinician would then deliver therapy to the patients after receiving the recorded activities emailed by the patients. In Hedman et al.'s (2012)<sup>16</sup> study, online symptom programmes for patients who require Computerized Cognitive Behavioural Therapy were discussed. It refers to an application that contains online symptom questionnaires to be completed by the patients. It can be easily downloaded and the doctors can identify the patients' moods and offer feedback based on the data collected from the questionnaires. "The Shredder" application in the mindfulness therapy has been determined in Bowers' (2011) study as cited in Chittaro and Vianell (2014)<sup>9</sup>, to be able to overcome the patients' difficulties faced by providing descriptions of negative feelings and situations experienced by them. Through this application, results which are similar to the mindfulness therapy pertaining to the patients experience in a therapy session can be obtained. The AEON application, as mentioned in Chittaro and Vianell's (2014)<sup>9</sup> study, serves to assist patients increasing their mindfulness through an application called the thought distancing approach. This application enables patients to list down their negative feelings prior to sharing and delivering them to their clinician.

In Cognitive Therapy, the use of Good Days Ahead application provides the opportunity for the patients to interact with their clinician at any time and not limited solely to the therapy setting. Through this benefit of this application, it is able to enhance the patients' mental condition. Patients can also track their therapy through the Multimedia programme for Cognitive Therapy (Wright et al., 2002)<sup>35</sup>.

#### **A. Related Theory on Mobile Applications: Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM) was developed by Davis (1989)<sup>12</sup>. This theory views that the acceptance of using the technology and the usefulness of using the technology are the two most important factors in explaining use of the technology (Vanye, Muesser, Hasan, 2020). This study suggests using this model in preferred mobile applications such as WhatsApp, Email, Facebook, Twitter, and online websites. Based on the psychiatric doctors' suggestion regarding the usage of mobile application-based therapy, the doctors perceive that the usefulness of using mobile application-based therapy is in strengthening the doctor-patient communication. This is because patients will only meet their doctor at their next appointment. With the help of a mobile application, a doctor could communicate with a patient and find out about the patient's progress. Effective results can be obtained when incorporating mobile application-based therapy for adolescents. However, mobile application-based therapy can only useful when both parties, namely the doctor and patient continuously utilize it as a based therapy.

### **III. RESEARCH METHODOLOGY**

This study was conducted using the Fuzzy Delphi Method which refers to a procedure to find out the views and consensus of experts pertaining to future expectation or forecast a particular aspect or aspects (Brown, 1968)<sup>7</sup>. The Fuzzy Delphi Method, which was explained by Murray et al. (1985)<sup>21</sup>, includes theory and semantic variables that are correlated to solve the ambiguity that occurs in the Delphi Method. The Fuzzy Delphi method involves collecting the experts' opinions to draw a conclusion and get coherent results. This method allows the experts to freely share their perceptions on a particular matter. Moreover, the questionnaires used in this method makes data collection process effective and speedy. The study is implemented in Psychology Department Clinic which is located in the University of Malaya Medical Centre (UMMC). The Sampling technique in this study is based on purposive sampling.

#### **A. Data Analysis Procedures**

This section describes the seven steps involved in the data analysis in this study.

##### **Step 1: Participants**

The first step in the data analysis method was determining the participants and their total number. This study involved a total of four and fourteen experts in rounds one and two, respectively. The number of participants in round two of this study was consistent with Adler and Ziglio (1996)<sup>1</sup> who claimed a total of 10 to 15 experts are required in the Fuzzy Delphi Method for a high agreement and consistency among experts.

Step 2: Determination of the Linguistic Scales 'based on the Triangular Fuzzy Number'. This step involved the linguistic scales, specifically a five-point fuzzy scale was determined. The linguistic scales consisted of 'Strongly Agree, Disagree, Not Sure/Moderate Agree, Agree, and Strongly Agree' which

indicated the experts' agreement level to a given statement (Chu & Hwang, 2008)<sup>10</sup>.

Step 3: Mean Average

$$\text{Average}(m_1, m_2, m_3) = \left( \frac{\text{Sum of agreements } n_1, n_2, n_3}{\text{Total of experts}} \right)$$

The mean average of fourteen experts in this study was obtained using the above formula. The triangular fuzzy number refers to a number consisted of values of  $m_1, m_2, m_3$ . The forms  $m_1, m_2, m_3$  indicates 'the present value of the minimum value (small value), the most reasonable value (most plausible value), and the maximum value (largest value), respectively (Mohd Ridhuan et al., 2015)<sup>20</sup>. The triangular Fuzzy number in this step serves to 'determine the general understanding of a group decision' (Klir & Yuan, 1995)<sup>17</sup>.

Step 4: Obtaining 'd' value (Threshold value)

The  $d$  value (Threshold Value) in this study was obtained following the below formula.

$$d(\tilde{m}, \tilde{n}) = \sqrt{\frac{1}{3}[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2]}$$

This step involved getting the  $d$  value for each item, followed by getting the  $d$  value for total items, and lastly the  $d$  value construct. The 'd' value must be lesser than or equal to 0.2 ( $\leq 0.2$ ) in order to get the threshold value. The consensus of experts was obtained when achieving the value of  $\leq 0.2$ . The second round of data collection would be required if the 'd' value obtained was greater or equal to 0.2 ( $\geq 0.2$ ) (Chen, 2000)<sup>8</sup>. Step 5: Achieving a Consensus of 75%

This step involved achieving a 75% consensus of experts using three steps. Firstly, item  $d$  lower than 0.2 was obtained. The second and third steps involved getting a percentage for each item  $d$  lower than 0.2 and a percentage of overall items  $d$  lower than 0.2, respectively. A 75% consensus in the experts' responses aimed to be achieved in this study. This study would require another rounds one and two if less than 75% of consensus in the experts' responses was achieved (Chu & Hwang, 2008)<sup>10</sup>.

Step 6: Fuzzy Evaluation and Fuzzy Number

Fuzzy evaluation refers to a method of placing each item based on its degree of importance, ranging from the most to the least important.

Step 7: 'Defuzzification Process'

This step involved determining the position of an item and its sub-items (Mohd Ridhuan et al., 2015)<sup>20</sup>. The data of this study can be produced accordingly through the process of placing the average of fuzzy number. Through this process, the results on three core values ( $m_1, m_2, m_3$ ) can be obtained. The median value

for the  $\alpha$ -cut value must be obtained in order to get the  $\alpha$ -value for each item. The  $\alpha$ -cut had to be equal to  $= (0+1)/2 = 0.5$ . In the case the  $\alpha$ -cut value obtained was less than  $\alpha$ -cut = 0.5, the item would not be accepted or included in the questionnaire. Only the  $\alpha$ -cut = 0.5 value which was higher than the  $\alpha$ -cut = 0.5 value would be taken into account in this study, as it indicated the questionnaire item has been accepted and reached a consensus among the experts' (Bodjanova, 2006)<sup>6</sup>. Among the three complex calculation formulas in the Defuzzification process (Mohd Ridhuan et al., 2015)<sup>20</sup>, this study employed the first formula as follows:

- i.  $A = 1/3 * (m_1 + m_2 + m_3)$
- ii.  $A = 1/4 * (m_1 + 2m_2 + m_3)$
- iii.  $A = 1/6 * (m_1 + 4m_2 + m_3)$

#### IV. RESULTS AND DISCUSSION

This study discovered that WhatsApp, email, Facebook, online website, and Twitter are the preferred mobile applications. The sub-items are ranked from the highest to the lowest defuzzification value based on the questionnaire data collected from 14 experts. Based on the findings, the highest defuzzification value of 0.643 was achieved for sub item 1.4 on WhatsApp which is considered as 'the most preferred mobile application as a form of therapy for adolescents with depression'.

This is followed by Sub-item 1.5 "Email" is ranked in second place based on a defuzzification score of 0.574, Sub-item 1.2 "Facebook" is ranked in third place based on a defuzzification score of 0.571, Sub-item 1.3 "Online website" is ranked in fourth place based on a defuzzification score of 0.562, Sub-item 1.1 "Twitter" is ranked in fifth and last place based on a defuzzification score of 0.557.

This application is employed widely by adolescents and is regarded as more attractive. A study by Sarker (2015)<sup>32</sup> found that 72% of adolescents used WhatsApp due to its features, such as rapid, affordable and more suitable to be used by them themselves. It is also beneficial and regarded as the best among all applications, such as Viber and Telegram (Sutikno et al., 2016)<sup>33</sup>.

The communication between the doctors and patients can take place easily through WhatsApp, as it involves the use of internet connection to deliver messages, voice messages, voice calls, and images in a quick manner (Petrucci & De Benedittis, 2016)<sup>28</sup>. WhatsApp can be simply used at any time and it is an effective application for its prompt multimedia messaging and it can deliver information easily. This is in line with Saavendra Ramirez' (2015)<sup>30</sup> study that revealed WhatsApp is an effective tool to enhance the doctor-patient interaction. It becomes a communication tool for the doctors and patients pertaining to health treatment solutions. Moreover, it is appropriate for the two-way communication between doctors and patients.

Therefore, the doctors and patients experience easier communication and delivery of images via WhatsApp (Astarcioglu et al., 2015)<sup>5</sup>. Since WhatsApp is the experts' first

choice among all mobile applications, such as email, Facebook, Twitter, and online website, this finding of this study implies that WhatsApp will become a new treatment for adolescents with depression in the future.

The findings of this study discovered that there are four types of depression therapies that require mobile application as a form of therapy for adolescents with depression. These preferred types of depression therapies included Cognitive Therapy, Mindfulness, Computerized Cognitive Behavioural Therapy, and Cognitive Behavioural Therapy.

The sub-items are ranked from the highest to the lowest defuzzification value based on the questionnaire data collected from 14 experts. Among these depression therapies, Cognitive Behavioural Therapy (Sub-item 1.4) was ranked first based on the findings of this study which is indicated with a defuzzification score of 0.557. This is followed by Sub-item 1.3 "Computerized Cognitive Behavioural Therapy" is ranked in second place with a defuzzification score of 0.533, Sub-item 1.1 "Mindfulness" is ranked in third place with a defuzzification score of 0.516 and, Sub-item 1.2 "Cognitive Therapy" is ranked in fourth place with a defuzzification score of 0.514. The findings of this study suggest that Cognitive Behavioural Therapy with the highest defuzzification score of 0.557 will require mobile application - based therapy for adolescents with depression in the future. The use of mobile phone in the Cognitive Behavioural Therapy was examined in Gravenhorst et al.'s (2015)<sup>15</sup> study. It was found that treatment was provided to the patients through video calls, images, and short messaging system (SMS). The use of mobile phone application was identified useful for the patients, as they can receive continuous feedback at anytime and anywhere from their doctors. It is discovered that patients' negative thoughts also changed through the incorporation of a mobile application in the Cognitive Behavioural Therapy. The positive effect of SMS on the Cognitive Behavioural Therapy for patients with depression is also revealed in a study by Aguilera and Munoz (2011)<sup>2</sup>. Through SMS, doctor-patient interaction can take place outside of the therapy setting instead of the patients relying on the therapy session and waiting for the next appointment. Communication via SMS messages also enables doctors to help improving the behaviour of the depressed patients. With the use of mobile application in the Cognitive Behavioural Therapy involving patients with depression, it allows them to communicate with their doctors and to know their depression symptoms.

### CONCLUSION

To conclude, mobile application, such as Whatsapp could be employed by the psychiatric doctors as a form of therapy in a clinical setting. Patients may express their emotions to their psychiatric doctors through social media than face-to-face interaction. The use of Whatsapp also enables communication with the doctors to take place even if the patients are far away or in other country.

### RECOMMENDATIONS

Based on the findings of this study, this study would suggest future studies to focus on other applications such as games application as a therapy other than mobile application. Another recommendation of this study is the scope of data collection in rounds 1 and 2 to be widened to getting the participants' perspectives on justification for their preferred mobile application as a therapy. Moreover, future research can involve a large number of participants. For instance, more than 14 experts (psychiatric doctors) can participate in round two of data collection (questionnaire) for a similar study. This is to ensure different perceptions can be gained from psychiatric doctors of different academic qualification, age, and working experience. This study involved 14 experts solely from one government hospital. Future studies, however, can involve participation of psychiatric doctors in rounds 1 and 2 from various government and private hospitals worldwide. This enables different viewpoints to be obtained for similar study in the future. Mixed method consisting of both quantitative and qualitative is recommended for future studies. This can involve experimental research, which is quantitative research, to be conducted in the future to examine the benefits of using mobile application as a form of therapy. Future studies can also focus on different types of psychological issues, such as stress or bully other than depression. This study focuses solely on the adolescents group. The current study would recommend future research to focus on different age groups, so that the preferred mobile applications for patients of different age groups can be identified. This study would also recommend the use of the interpretive structural modeling (ISM) method for future studies. This method is useful to design a particular module for use in mobile application for adolescents with depression.

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