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SCIENCE, TECHNOLOGY & HUMANITIES : REINVENTING THE FUTURE

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Virtual Assistant to Suicide Prevention in Individuals with Borderline Personality Disorder

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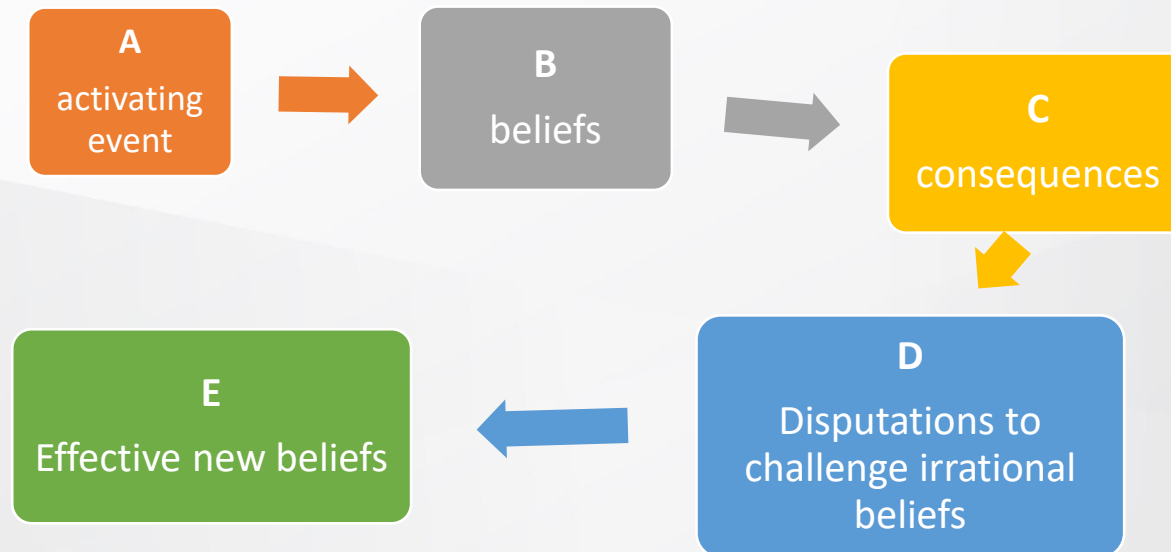


Introduction

- Suicide and Borderline Personality Disorder
 - the number of people with suicidal behavior is increasing from year to year
 - the theme of Mental Health Day 2019 was suicide prevention.
 - The Indonesian Central Statistics Agency noted an increase in suicidal behavior in Indonesia
 - One of the provinces in Indonesia, Central Java, is the province with the highest number of suicides.
 - Suicidal behavior is also caused by psychological disorders or personality disorders.
 - Borderline personality disorder (BPD) is one of disorders that affect individuals to commit suicide
 - BPD often called “the suicidal personality disorder”

Suicide Prevention

- Cognitive Behavioral therapy (CBT)
 - One of therapy for suicide prevention
 - CBT assumes that individuals can experience disorders because it is influenced by several factors, namely irrational beliefs, psychological and environmental factors (Aaron T. Beck and Albert Ellis)



Technology Intervention

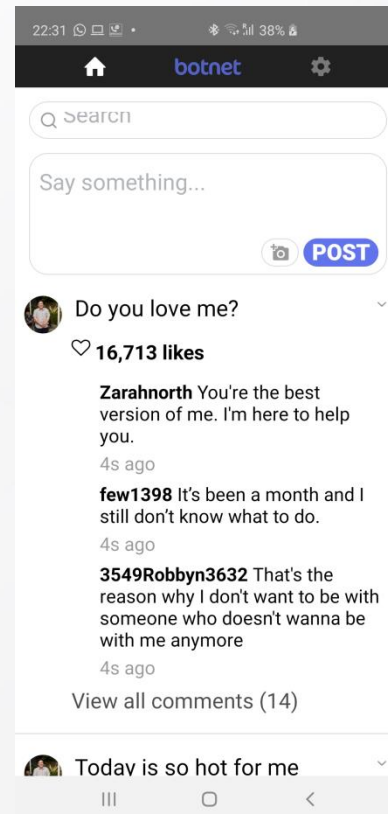
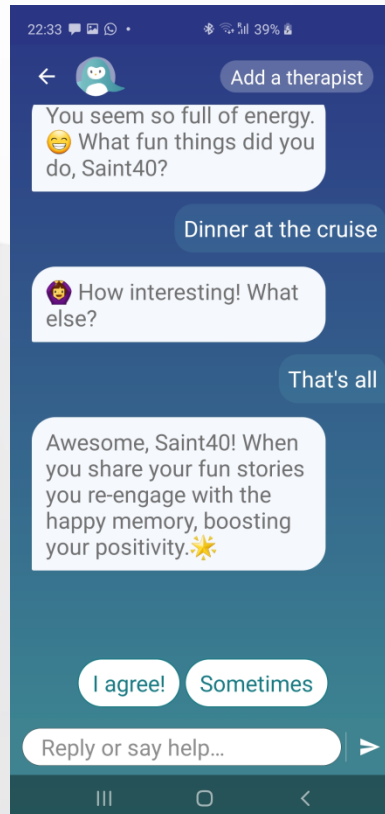
- Virtual Assistant
 - In guiding individuals with Borderline personality disorder (BPD), it is not enough just to have face-to-face counseling meetings with a psychologist.
 - The suicidal thoughts of a person with BPD can occur at any time.
 - It is necessary to provide a virtual assistant which can be used by individuals anytime and anywhere.
 - Van Spijker, Van Straten and Kerkhof conclude that a therapy uses technology to reduce suicide is effective
 - In fact, the number of users of digital technology and its application also tends to increase as digital technology is already user-friendly and there is a playing effect when used (gamification).

Technology Intervention

- Virtual Assistant is
 - an artificial intelligence chatbot
 - able to give responses automatically based on questions' pattern
 - using Artificial Intelligence Mark-up Language (AIML), which is consisting the questions' pattern and the answer
 - able to be integrated with any famous chat platforms (Line, Telegram, Facebook Chat)
 - able to serve 24-hours a day

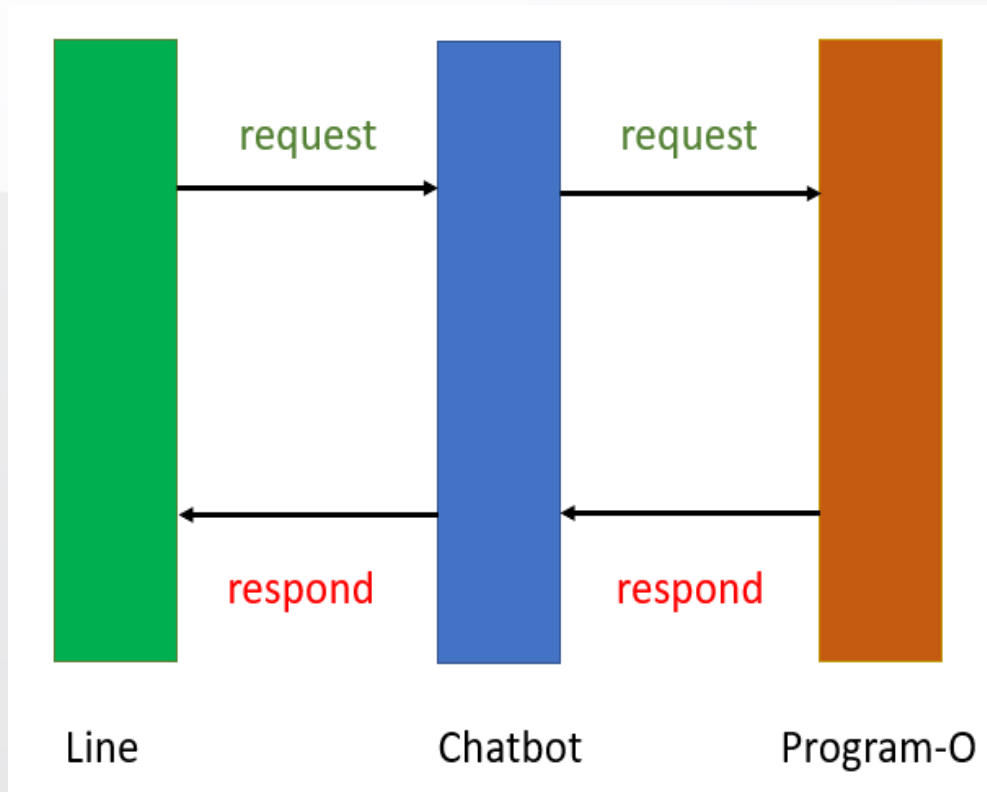
Technology Intervention

- Virtual Assistant
 - can answer at any time, like chatting with friends



Technology Intervention

- Virtual Assistant
 - uses Program-O to ease in forming AIML
 - Text Flow between Line Chat Application and Program-O



Create Virtual Assistant

- There are some steps to prepare as follows
 - Collecting a bank of questions that often appear to individuals who will commit suicide
 - Mapping the crucial responses of questions that might arise
 - Making responses for questions that do not have answers, among others by advising individuals to have counselling with a psychologist.

Conclusions

- Virtual Assistant to Suicide Prevention in Individuals with Borderline Personality Disorder has not been applied to the wider community
- But it is still in the testing phase.
- Five participants who tried Virtual Assistant said that they were helped by the automatic answers delivered by Virtual Assistant
- This research should be continued with more participants.

Virtual Assistant to Suicide Prevention in Individuals with Borderline Personality Disorder

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Abstract— The number of individuals committing suicide is increasing. Such behavior is often carried out by individuals with borderline personality disorder (BPD). These individuals will commit suicide because they feel hopeless, anxious, and impulsive. They need people who they can trust and be with all the time. Therefore, it is essential to develop a chatbot as a virtual assistant or a virtual friend to reduce the feelings caused by BPD. This virtual assistant can provide appropriate responses based on Dialectical Behavior Therapy (DBT) derived from Cognitive Behavior Therapy (CBT). The use of Line chat application and Program-O is the easiest way to develop a virtual assistant that facilitates psychologists with basic computer literacy to manage their question and answer content and to provide alternative communication, without depending on the programmer.

Keywords— *borderline personality disorder, chatbot, suicide prevention, virtual assistant, virtual friend*

I. INTRODUCTION

According to WHO [1], the number of people with suicidal behavior is increasing from year to year. At present, every 40 seconds there are cases of individuals who commit suicide. Therefore, the theme of Mental Health Day 2019 was suicide prevention. The suicide rate committed by adolescents is also increasing, for example in South Korea. The result of research conducted by Ben Park, Jung, and Lester [2] shows that the tendency of suicidal behavior in adolescents is caused by the attitudes towards life, death, and disagreement with life. Other causes of suicidal behavior are anxiety and not having a good body image.

The Indonesian Central Statistics Agency noted an increase in suicidal behavior in Indonesia [3]. One of the provinces in Indonesia, Central Java, is the province with the highest number of suicides. The causes include guilty feelings, prolonged sadness, failure at achieving something and harassed feeling. Suicidal behavior is also caused by psychological disorders or personality disorders.

Borderline personality disorder (BPD) and major depressive episodes are two disorders that affect individuals to commit suicide because someone with BPD or depression has impulsive and hopeless emotions [4]. Moreover, Pompili, Girardi, Ruberto, and Tatarelli state that 9-33% of suicides are individuals with BPD [5].

According to the Diagnosis and Statistics of Manual of Mental Disorders, BPD is a personality disorder that has the criteria of pervasive instability of social relationships, self-image, and emotions [6]. These criteria include frantic efforts to avoid real or imagined abandonment, reflecting intolerance to be alone, unstable and intense relationships, impulsivity, chronic feelings of emptiness, displays of inappropriate or

intense anger and recurrent suicidal. The big number of individuals with BPD who commit suicide makes BPD often called “the suicidal personality disorder” [5]. Therefore it is necessary to do therapy for individuals with BPD to prevent a suicide attempt.

II. CONCEPT OF PREVENTION

There are several therapies for individuals with BPD, including pharmacology [7] and Dialectical Behavior Therapy (DBT) derived from Cognitive Behavior Therapy (CBT) [8]. There is no therapy which is the most suitable for preventing or treating BPD. Even Adolf Stern [9] said that individuals with BPD have a negative nature in the therapy process. The individual is hypersensitive and does not follow the therapy process because he is impulsive. When meeting with a therapist, the individual can follow the therapist's instructions, but he can forget all the instructions of therapy in his daily life.

Paris concludes that no therapy that can prevent suicidal behavior [10]. Hospital treatment has also not been effective because individuals with BPD cannot be treated continuously. Suicidal behavior can be done at any time throughout life, outside of the therapy session. Both individuals and therapist cannot do therapy sessions every day. Therefore, these individuals need companions who can help them to remain stable, not to feel hopeless and lonely all the time.

Individuals who are at risk of developing BPD are around 18-40 years old [6]. This age is a young age that is affected by a digital lifestyle. This is also supported by the data from the Indonesian Central Statistics Agency which states that in 2017 the number of mobile phone users reached 59.59%. Internet usage has increased from 14.9% in 2013 to 32.34% in 2017 [3]. Therefore, it can be concluded that the rate of suicidal behavior in Indonesia is increasing.

The cause of BPD is not a single factor. Neurobiology is one of the factors causing BPD. The other factors are including childhood trauma, adult attachment, and social support [11]. An individual can have childhood trauma experiences if he/she feels hurt physically, verbally, feels ignored, and when he/she sees a fight carried out by those closest to him/her (parents, siblings). If they feel pain more often, they can conclude that pain will solve the problem. He/she can often hurt himself and even attempted suicide. The higher the trauma experienced, the tendency for suicide in people with BPD will increase.

Therefore, one of the goals in therapy to prevent BPD is to help individuals no longer feel traumatized and make them aware that the feeling of being sick does not solve the problem.

Therapy for individuals with BPD must also be able to help individuals to be able to establish a warm relationship with others in adulthood (adult attachment). Individuals with adult save attachments will feel comfortable and safe. He can learn from relationships established with others. This warmth will reduce suicidal thoughts.

Another factor causing BPD is social support. The important thing from social support is the feeling of individuals who feel supported. In addition, with social support, someone feels loved, valued and easy to seek help. Thus, therapy for BPD also aims to enable individuals to have perceive social support. Furthermore, he will not feel alone and do not want to commit suicide.

Cognitive behavioral therapy (CBT) is a therapy that assumes that individuals can experience disorders because it is influenced by several factors, namely irrational beliefs, psychological and environmental factors. Aaron T. Beck and Albert Ellis (in Mahoney, 1980) stated that CBT emphasizes the importance of potential irrational beliefs in the occurrence of disturbances in individuals [15]. The procedure in CBT can be described in the following ABCDE.

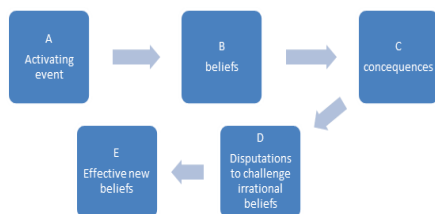


Fig.1 ABCDE in CBT

Individuals with BPD often experience irrational beliefs that cause them to become frustrated and commit suicide (for example: one friend does not answer his call, then he already feels that all his friends have evil traits) so it is appropriate to assisted with CBT. In CBT, individuals will be guided to see that their beliefs are not correct. Furthermore, individuals are also made aware that inappropriate beliefs will have very risky consequences. Therefore individuals are taught to convert irrational beliefs into rational beliefs. In guiding individuals with BPD, it is not enough just to have face-to-face counseling meetings with a psychologist. This is because the suicidal thoughts of a person with BPD can occur at any time. Therefore, it is necessary to do a virtual assistant from Technology Intervention which can be used by individuals anytime and anywhere. When individuals ask questions, they will automatically get an answer.

Van Spijker, Van Straten and Kerkhof conclude that a therapy uses technology to reduce suicide is effective [12]. This is due to the fact that individuals who want to commit suicide are often embarrassed to meet other people even though the urge to commit suicide can appear at any time. Technologies that are close to teens and easily accessible to them are applications that are inside smartphones. The technology can be a chat partner application or an additional application or feature in the existing chat application, for example, Line, Telegram, or Facebook Messenger.

In fact, the number of users of digital technology and its application also tends to increase as digital technology is

already user-friendly and there is a playing effect when used (gamification). Because of these conditions, digital technology can be used to give therapy to prevent suicide.

Creating a chat buddy in the form of a new application requires great efforts in promoting the application to its users and ensuring the application is re-installed in the smartphone when they use a new smartphone or when the smartphone is

Based on these considerations, creating chatting friends in the existing chat application will make it easier for users. Chatbot, a chat partner, will be a virtual assistant who is always ready when needed by individuals with BPD.

Based on the interviews with three teenagers aged 18-20 who had attempted suicide, they said that triggers of suicide attempts often arise when they got confused about problems but felt ashamed to ask for help from others. Another reason is that they feel sad when others know their sufferings and feelings of emptiness. If they have someone they can trust, they can ask for help and will not attempt to commit suicide.

A virtual assistant is needed for individuals with BPD so that individuals do not feel alone, have friends to complain, have a life expectancy and their emotions will be stable [13]. Thus, the individual will not attempt to commit suicide.

Participants in the study were selected by purposive sampling, they are individuals who have conducted self-trials as one of the criteria for BPD. To select participants, Borderline Personality Scale is used [13]. If an individual scores above 70, he can become a participant.

III. TECHNOLOGY INTERVENTION

Virtual Assistant is an artificial intelligence chatbot that aims to prevent suicidal behavior in teenagers. With this Virtual Assistant, individuals can feel personal support. To create a Virtual Assistant that can help individuals with BPD, there are some steps to prepare as follows 1) collecting a bank of questions that often appear to individuals who will commit suicide, 2) mapping the crucial responses of questions that might arise, 3) making responses for questions that do not have answers, among others by advising individuals to have counselling with a psychologist.

The function of the virtual assistant is not only as a friend for discussion or question-and-answer but also as an early warning system by giving suggestions to communicate with psychologists when questions have begun to lead to dangerous actions. Even with the initial agreement, the virtual assistant can contact the closest people or the psychologist who handle them by sending notifications when the individual has reached a dangerous level.

In some applications such as virtual assistant (VA) such as Wysa, Replika, and Botnet that have been tried as initial research, several components suit the needs of individuals with BPD, namely 1) can respond to emotions in accordance with CBT or DBT therapy 2) can help individuals, among others, have coping skills, positive thinking, stress management, and have subjective well-being. 3) the therapist is a professional human in psychology. It's just that the three VA's are

not intended for individuals who have self-injurious or suicidal behavior.

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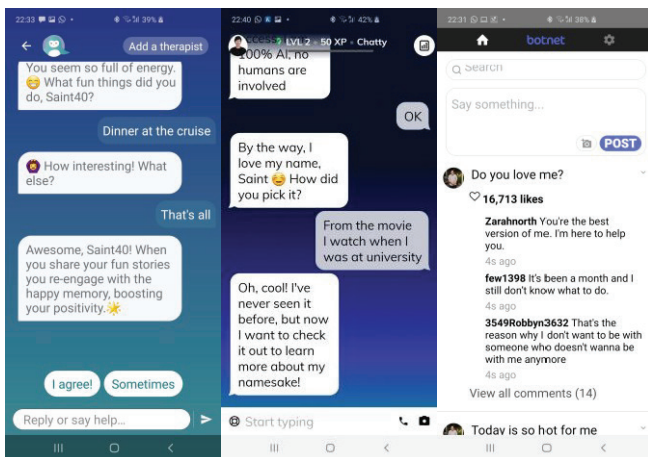


Fig. 2. Screenshot of Wysa, Replika, and Botnet virtual assistant

IV. TECHNICAL IMPLEMENTATION

Virtual Assistants made in Line, Telegram, and Facebook Messenger chat applications are generally not different from the genuine applications in presenting questions and answers interactively in the form of text [14]. The programming language to create chatbot is also free. Programmers can use PHP, Python, Java, C #, and other programming languages. The programmers must follow the Application Programming Interface (API) of Line chat application at <https://developers.line.biz/en/docs/messaging-api>.

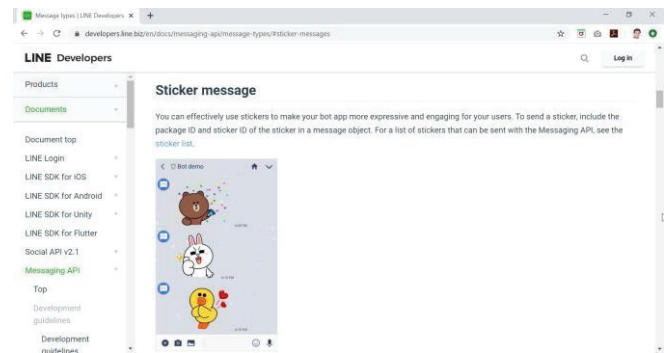


Fig. 3. Line API for the programmers

Even with the Program-O application, programmers who make chatbots do not have to be experts in artificial intelligence. As long as the program can direct the question to the O-Program, what is needed is the compilation of the question and answer keywords in the O-Program or the person who understands Artificial Intelligence Markup Language (AIML) which is the raw material of communication in the O-Program. Through Program-O, a psychologist with basic computer literacy can also easily arrange communication without involving the programmer.

Program-O is a web-based open-source application that can be downloaded via the URL <https://github.com/Program-O/Program-O>. After the Program-O source code is completely installed on a web server supported by PHP and MySQL, this application can be directly used by filling in keyword questions and answers or by importing AIML files containing the communication patterns needed by individuals with BPD.

When connected with the Line chat application, the text flow that occurs between Line Chat Application and Program-O can be seen in Figure 1 below.

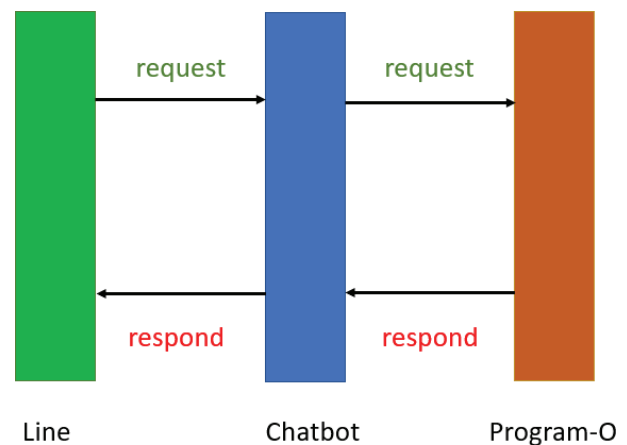


Fig. 4. Text Flow between Line Chat Application and Program-O

The early-warning system function for users is as a part of the response of keywords that lead to dangerous actions so that they can be included as part of the communication pattern in the O-Program. While notifications to the closest people can be integrated through the email sending function available as a feature in PHP connected to the email program on the webserver.

V. CONCLUSIONS

Virtual Assistant to Suicide Prevention in Individuals with Borderline Personality Disorder has not been applied to the wider community, but is still in the testing phase. Five participants who tried this VA said that they were helped by the automatic answers delivered by VA

The individuals needs of a Virtual Assistant are to prevent individuals with BPD from committing suicide, reducing the feelings of individuals with BPD such as being anxious, hopeless, hollow, unstable, and feeling of guilty, and to respond to CBT or DB therapy. To become an early warningsystem, the communication content in the Virtual Assistant is equipped with a suggestion to the user to communicate to the recommended psychologist when questions start to jeopardize, and to send via email to the closest people or trusted psychologists.

The use of Line chat application and Program-O is the easiest way to create a virtual assistant that facilitates psychologists with basic computer literacy to manage the question and answer content and to provide alternative communication, without depending on the programmer. The psychologists only need to prepare the possible interactions between the individual and his/her closest friend. The keywords will be the key to give the respond to the individual.

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Technology Intervention

- Virtual Assistant
 - The suicidal thoughts of a person with BPD can occur at any time.
 - Van Spijker, Van Straten and Kerkhof conclude that a therapy uses technology to reduce suicide is effective



- In fact, the number of users of digital technology and its application also tends to increase as digital technology is already user-friendly and there is a playing effect when used (gamification).



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