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Exploring the acceptability of internet-based mental health mobile app services using network psychometrics analysis

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Abstract. The development of internet technology brings significant changes in human life, including its effects on mental health conditions. As one of the countries with the increase of internet users around the world, Indonesia has the potential to utilize this technology in psychological service. However, various studies show that the use of Internet intervention in mental health services primarily by utilizing mobile-based technology is still limited. It is also related to the conditions of acceptance of this intervention that is not clearly known. This study aims to explore the acceptability condition of Internet-based intervention with mobile-app for mental health service. This preliminary study consisted of 174 respondents spread throughout across Indonesia with diverse demographics. The data findings were analyzed by using network psychometrics analysis and Rasch analysis. The results show that respondents generally accept and open up with mental health services using mobile app, more than half of respondents feel that internet-based services will be more effective, especially for first aid, distance and time constraints could be overcome with mobile app based service technology. The analysis of network psychometrics showed that respondents' acceptance rate showed in high level and optimism of service success through this technology showed a significant result.

1. Introduction

Mental health conditions are an important aspect that is rarely noticed by the public and professionals. The exposure of World Health Organization (WHO) data about the mental health condition of Indonesian adolescents shows that 5% of the population experiences anxiety that interferes with daily activities, 7% experiences feelings of loneliness, 3% have no close friends, and as a manifestation of this condition, there are more than 20 % teenagers become victims of bullying [1]. The high gap between mental health conditions is disrupted by limited service and human resources becomes one of the determinants of mental health services that are not optimal, especially in Indonesia [2].

The unbalanced condition of health services (in this case physical illness) with mental health services becomes the trigger of the emergence of various alternative services by professionals. Internet technology as the medium with high connectivity becomes the greatest potential in bringing mental health services to a new phase, especially in the last decade [3,4]. This is evidenced by the development of various mental health interventions with internet-based, such as psychological intervention with the approach of Cognitive Behavior Therapy (CBT) with the distance method using Internet technology [5]. Some Internet-based interventions are reported to have significant results, such as treatment for stress and depressed individuals [6,7]. The next opportunity that makes the Internet as a major potential intervention in mental health services is a significant rise in Internet users,



especially in Smartphone platform. This fact is supported by data of world internet users who have increased more than 500% by 2015 when compared to the number of users in 2000. This increase also occurred in Indonesia, where more than 50% of the population (120 million) are active Internet users [2], and 95% of whom are Internet users using active smartphone and social media platforms [8]. However, the increase in internet users through mobile app smartphone has not been optimally utilized in the intervention of mental health services, especially in developing countries such as Indonesia.

The use of platforms on smartphones that connect to the Internet is a challenge for professional mental health service providers [9], such as counselors [10]. This condition is evidenced by the absence of the standard mental health intervention service, especially agreed by professional organization in Indonesia [11]. In addition, the acceptance of internet-based technology using platforms on smartphones is an aspect that has not been revealed through much research [12]. So it is important to know the condition of population acceptance of Indonesia to mental health intervention by using mobile app or platform on smartphone connected via the internet.

In response to the condition of mental health service challenges through the mobile app, the analysis of this research lies in two main aspects: exploring the respondent's mental health condition and revealing the condition of respondent's acceptability of internet media usage through mobile app on mental health service intervention. The findings of this research will reveal the general map of respondents' acceptability of mental health services by using mobile app and predicting the intensity of service optimization in reducing mental health disorders of their users.

2. Method

2.1. Participants

The sample in this preliminary study consisted of 174 people with diverse demographic distribution in Indonesia. This study involved respondents spread in various provinces in Indonesia, with the distribution of 25.85% men 74.14% women and 31.79% working, and the remaining 68.21% are respondents who have not worked.

2.2. Measuring

This study reveals two main aspects, that are mental health conditions and conditions of respondents' acceptability of mental health services based on mobile-app. Mental health is measured using Mental Health Inventory (MHI) [13] which has been translated and adapted into Indonesian in a shortened version, and has a Cronbach Alpha-KR20 value of 0.93. Measurements of respondents' acceptability of mental health services using mobile app were measured using inventory sourced from Consumer Mobile Health (mHealth) Usage [14] and have been modified with an approach to mental health, and resulted in an Acceptability of Mental-Health Mobile-App Survey (AMMS) with Cronbach Alpha-KR20 value of 0.89.

2.3. Data Analysis

The data findings were analyzed by using Network Psychometrics analysis [15] and Rasch analysis [16]. The data analysis using network analysis involves JASP Version 0.8.6.0 software and Rasch analysis involves the use of Winstep Version 3.72 applications [17] and data sets of research results can be accessed through the Open Science Framework [18].

3. Result and Discussion

The Rasch model analysis was performed to determine the mental health condition of respondent and acceptability of mental health service by using mobile app in general. At rescaling logit value of mental health shows the value 48.63 from 100 scales, it shows that mental health condition of respondent approaches middle scale and moderate level. While the value of acceptability of respondents to mental health service by using mobile app is at 0.99 logit points with rescaling of 49.49 logit, it can be said that there is a strong enough trend in respondents in receiving mental health

service using mobile-app. Furthermore variability of the data can be seen from the SD of each aspect, where the value of the variability of acceptability is higher, so that the search and the meaning of the results is needed in the next analysis

Table 1. Summary Statistics of Mental-Health Inventory (MHI) and Acceptability

| Estimation | Logit Value | | Rescaling Logit Value (0-100) | |
|---|-------------|-------|-------------------------------|-------|
| | MHI | AMMS | MHI | AMMS |
| Mean Person | .77 | .09 | 48.63 | 49.49 |
| SD Person | 1.49 | 1.61 | 8.77 | 12.34 |
| Max Measure | 4.84 | 5.36 | 72.59 | 90.03 |
| Min Measure | -3.84 | -4.27 | 21.56 | 15.99 |
| Separation Index Person | 3.37 | 2.50 | - | - |
| Person Reliability (Cronbach Alpha-KR20) | .93 | .89 | - | - |

The link between mental-health conditions and acceptability of mental health-mobile app intervention is seen in the network model estimation in Figure 1, a description of the datasets of this model can be seen in the Open Science Framework [18]. Generally, the strength of the relationship is shown from the line weight between the two variables. The tendency of depression (MH14) is known to be directly related and has a green line with the desire to use mental health intervention mobile-app (A2) and tend to have a negative interaction with mental health conditions with a well-being indicator, (MH4). This indicates that respondents tend to receive mobile service interventions related to their mental health condition, and the desire decreases if respondents feel the mental health condition has improved. This condition is also supported by A2 logit value in Table 2 located at point -0.01 with rescaling 48.76 indicating good reception from respondent if mobile-app service for mental health is available. The next condition that can be an indicator of respondent's acceptance of mental health mobile-app is a condition free of stress (MH6) that has a negative sign of the edge weight (red line) with the desire to contact the counselor if available online (A9). This became one of the important indicators of respondents' acceptance of mental health services with mobile-app based.

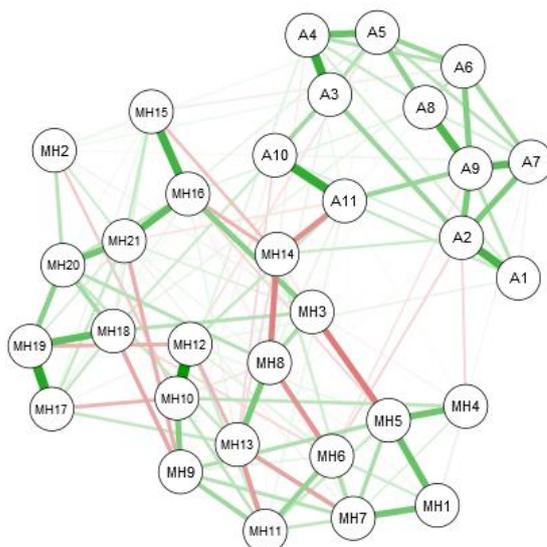


Figure 1. The network model structure of interaction between mental health condition and acceptability intervention using internet-based mobile-app

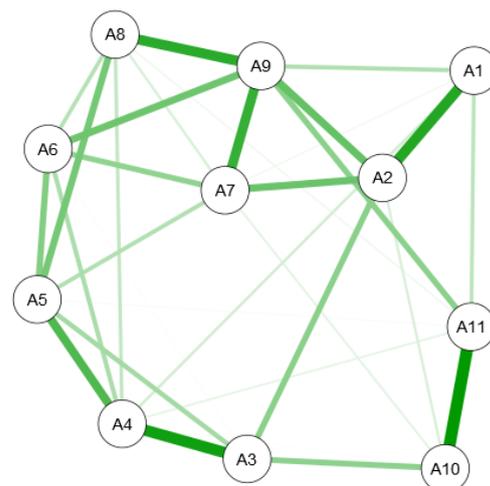


Figure 2. The network model structure of acceptability of mental health intervention using internet-based mobile-app

The conditions of the mobile-app acceptability for mental health interventions generally have mutual connectivity. The condition of the relationship with the strong weight line lies in the comfortable client condition to tell the problem through online sessions (A3) in the belief that the secrets will be more assured when it tells it first through an online session (A4). This fact becomes an important indicator of the main function of mental health intervention through mobile-app, that substitutive function in mobile-app use can replace the condition and atmosphere of counselor service to clients that usually in conventional territory through face-to-face. Both indicators (A3 and A4) also show a fairly high logit value in Table 2, which is 1.06 for A3 and 0.99 for A4, which is a decisive factor in explaining the acceptability of respondents to mobile-apps that provide mental health interventions.

The interaction of the relationship between the need to obtain mental health services and the acceptance of media that can accommodate these activities is presented in Figure 2. The network indicates a good reception by respondents to mobile-apps that provide mental health services. This is also indicated by the exposure data in Table 2 which shows a positive trend in the situation of using mobile-based mental health services, as evidenced by the value of rescaling logit of items that tend to be in the level of 50 logit.

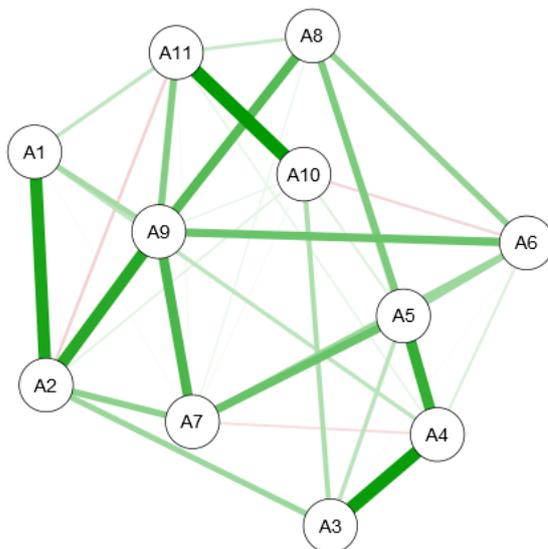


Figure 3. The acceptability network model of respondents who never received mental health intervention by internet

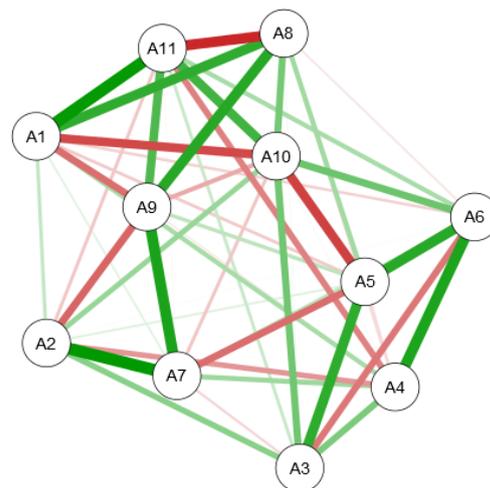


Figure 4. The acceptability network model of respondents who had received mental health intervention by internet

The striking difference was seen in respondents who had received mental health services online (Figure 4) and who never received (Figure 3). Based on the exposure of the network model, it appears that the interaction weight sign that is negative (red line) appears on the respondents who have received mental health service through online while the respondents who have never only have three red line that is not significant. The strong negative relation in Figure 4 is shown by item A8 (A few of my problems can be consulted through my counselor) with logit item 0.48 and item A11 (logged in person) item of -0.99 logit. Based on these facts, it can be interpreted that the respondents who consult the problem through online tend to be difficult to adapt to the development of mobile technology. This condition can be further deepened by conducting an analysis of respondents' demographics, whether by age, gender and other data distribution.

The facts indicated by the network analysis model of respondents who have never received mental health services through online indicate that respondents who want to consult their problems via mobile-app (A2) with a value of -0.01 logit tend to be respondents who are less able to adapt to the

latest mobile app developments (A11). The same thing is also shown by clients who want their psychological problems monitored by counselor (A6) with a value of 0.53 logit has negative connectivity with the ability of respondents in using the latest mobile app (A10) with a value of -0.25 logit. This implies that the design of developed mobile applications should be able to reach the respondent's ability to use, and also require depth of analysis by involving the demographics of mobile-app users.

Table 2. Acceptability of Internet-based Mobile-app Mental Health Intervention Analysis Using Rasch Measurements.

| Items | Construct | Logit Value | Rescaling Logit Value (0-100) | Outfit MNSQ | Code |
|--|-------------------------|-------------|-------------------------------|-------------|------|
| I want to access mental health services through the internet if I feel uncomfortable | Behavioral Intention | -0.94 | 41.63 | 1.2941 | A1 |
| If there is a smartphone app about mental health, I want to use it | Behavioral Intention | -0.01 | 48.76 | 1.0501 | A2 |
| I feel more comfortable to tell my problem through an app on a smartphone | Substitutive | 1.06 | 56.97 | 1.155 | A3 |
| By using the app on my smartphone, I feel my secrets will be more assured | Substitutive | 0.99 | 56.46 | 1.0286 | A4 |
| I want to consult via online first before meet my counselor | Complementary | 0.18 | 50.19 | 0.876 | A5 |
| I want my psychological condition monitored by counselor through online | Complementary | 0.53 | 52.9 | 0.8756 | A6 |
| I want to find mental health information that I experience through the internet | Complementary | -0.51 | 44.91 | 0.7573 | A7 |
| Some of my problems can be consulted only through online with my counselor | Substitutive | 0.48 | 52.51 | 0.8297 | A8 |
| If there is a way to contact an online counselor, I would like to do so | Personal Innovativeness | -0.54 | 44.64 | 0.5824 | A9 |
| I tend to try the latest apps on smartphones | Personal Innovativeness | -0.25 | 46.92 | 1.4401 | A10 |
| I am a person who is adaptable to the development of the app | Personal Innovativeness | -0.99 | 41.21 | 1.1858 | A11 |

Research findings show that respondents tend to feel comfortable and safe when telling the condition of problems experienced through online, this is evidenced by the achievement of logit item A3 (I feel more comfortable to tell my problem through an app on a smartphone) of 1.06 logit with rescaling of 56.97 logit. Respondents felt that mobile-app use could be substitutive with mental health services that are usually (conventional) in the form of face-to-face. This supports the exposure of previous research findings that mental health services by using online media can increase user confidence, coupled with anonymous abilities that can be performed in sessions. The assumption of this condition is based on the tendency of clients who feel more comfortable if the beginning of the meeting can be done through online. However, this certainly does not reduce the importance of mental health services through face-to-face, which is more effective in alleviating mental health problems [10,11].

4. Conclusion

Internet of things is a technology that became the main resource in the development of global industry since the era of industry 4.0. This technology allows for interaction by using a platform so that it can be used as a communication medium, and in this case used as a means of mental health intervention. The research findings show that respondents generally have a positive response to mobile-app presence as a mental health service medium. In the network model is also seen a strong interaction between the desire to use mobile-app on mental health services and the acceptability of this media as

an intermediary. The presence of mobile-app on mental health services can be a first aid tool on the conditions of client problems that require immediate assistance but are constrained to meet with counselors directly. The development of mobile apps for mental health services should also go through a consideration and need assessment of the user. The condition of the acceptability of respondents to the presence of mobile app for mental health services becomes the main capital of related application development, where the application is a medium of fast service assistance by not eliminating the importance of face-to-face in mental health services

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