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Arjadi, Retha; Nauta, Maaïke; Bockting, Claudi

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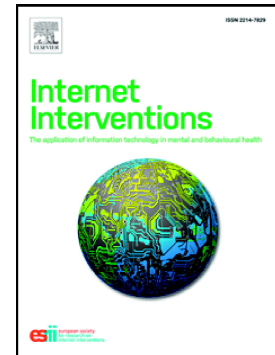
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## Accepted Manuscript

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Retha Arjadi, Maaïke H. Nauta, Claudi L.H. Bockting



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## MANUSCRIPT

**Title**

Acceptability of internet-based interventions for depression in Indonesia

**Authors**

Retha Arjadi<sup>1,2</sup>, Maaïke H. Nauta<sup>2</sup>, Claudi L. H. Bockting<sup>2,3</sup>

<sup>1</sup>Faculty of Psychology, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia (Jl. Jendral Sudirman No.51, Jakarta Selatan, 12930, DKI Jakarta, Indonesia)

<sup>2</sup>Department of Clinical Psychology and Experimental Psychopathology, University of Groningen, The Netherlands (Grote Kruisstraat 2/1, 9712 TS, Groningen, The Netherlands)

<sup>3</sup>Department of Psychiatry, Academic Medical Center, University of Amsterdam, The Netherlands (Meibergdreef 9, 1105 AZ, Amsterdam, The Netherlands)

**Correspondence to**

Claudi L. H. Bockting

Department of Psychiatry

Academic Medical Center

University of Amsterdam, The Netherlands

Meibergdreef 9, Amsterdam, The Netherlands

c.l.bockting@amc.uva.nl

## Abstract

### Background

In Indonesia, internet-based interventions may represent a promising strategy to reduce the mental health gap given that the level of internet usage in the country continues to increase. To check the acceptability of internet-based interventions, this study investigates factors that contribute to the use of internet-based interventions for depression in Indonesia.

### Method

The survey was conducted online and had 904 participants recruited from specific social networks on mental health and general social media (Mean age=27.07, 50.22% females). The three dependent variables were (1) behavioral intention to start using internet-based interventions for depression, (2) preference to use it as a substitute for regular treatments and (3) preference to use it to complement regular treatments. The predictor variables included sociodemographic characteristics, perceived mental health conditions, personal situational characteristics, personal innovativeness toward online services, and depression level.

### Results

A large majority reported to be open to using internet-based interventions for depression (73.7%), as well as to use it as a substitution (73.3%) or as a complementary (73%) to regular treatments. Personal innovativeness toward online services was the strongest significant predictor for all types of use, even when corrected for current depression level. When added to the analyses separately, depression level was the second strongest predictive factor for all dependent variables.

### Conclusion

The majority of Indonesians showed openness to use internet-based interventions for depression. To increase the adoption of internet-based interventions for depression, it is important to first promote internet usage to more people across the country, especially for those who are currently depressed.

*Keywords: internet-based interventions, online therapy, depression, mental health gap, Indonesia.*

**Abbreviations**

AVE: Average Variance Extracted

B.INT: Behavioral usage intention

COMP: Complementary use

DIST: Distance to mental health service facilities

EDU: Education level

HIC: High Income Country

HIST: History of mental health service usage

IDS-SR: Inventory of Depressive Symptomatology-Self Report

IIAQ-ID: Internet-based Interventions Acceptability Questionnaire-Indonesia

LMIC: Low-Middle Income Country

mhGAP: mental health Gap Action Programme

P.INNOV: Personal Innovativeness toward online services

PERC.MH: Perceived Mental Healthiness

PERC.MV: Perceived Mental Health Vulnerability

SES: Socioeconomic Status

SUBS: Substitutive use

ACCEPTED MANUSCRIPT

## **Introduction**

As a leading cause of disease burden, depression affects approximately 4.4% of the world population (Ferrari et al, 2013), and approximately 5% of the population (equal to more than 10 million) in Indonesia (Ferrari et al, 2013). There is a great imbalance between the number of depression cases and the availability of mental health professionals in low-middle income countries (LMICs), including in Indonesia (World Health Organization, 2015).

In the mental health Gap Action Programme (mhGAP), the World Health Organization (WHO) stated the importance of providing mental health interventions that can be widely distributed (WHO, 2008). The internet may be a potential medium to deliver low-cost interventions widely (Napolitano et al., 2003), which generally known as e-health. Within the field of clinical psychology, there is a form of e-health called internet-based interventions which refers to treatments that are mainly delivered via the internet, with at least some therapeutic tasks delegated to the computer (Andersson & Titov, 2014).

Many clinical trials conducted in high-income countries (HICs) have shown that internet-based interventions are effective for various mental health conditions, including depression (Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010). Internet-based intervention have also been evaluated as an acceptable form of psychological treatment in Australia (Gun, Titov, & Andrews, 2011; Spence et al, 2011). However, despite its potential, internet-based interventions have rarely been studied in LMICs, and no research on this topic has been reported from Indonesia (Arjadi, Nauta, Chowdhary, & Bockting, 2015).

In Indonesia, internet-based interventions may pose as a promising strategy to reduce the mental health gap, since the level of internet usage in the country is expected to increase to 50% of the population (120 million people) by 2018 (Asosiasi Penyedia Jasa Internet Indonesia, 2015; Noviardari, 2014). On the other hand, implementing internet-based interventions as a new type of mental health service particularly for depression in such country may also be challenging. For example, a recent study done in India, another LMIC, stressed the importance of evaluating the contextual acceptability and feasibility prior to the implementation (Chowdhary et al., 2016). Although that study was done for a face-to-face treatment context, the approach is highly relevant in terms of implementing various psychological treatments in LMICs. Therefore, prior to the implementation, it is

important to examine the acceptability of internet-based interventions for depression among Indonesian population by investigating factors that contribute to the use of it.

The most widely used theory of technology acceptance is the Technology Acceptance Model which states that the behavioral intention to use new technology is determined by the perceived ease of use (the degree to which a person believes that using a particular system would be free from effort) and the perceived usefulness (the degree to which a person believes that using particular system would enhance his or her job performance) (Davis, 1989). Previous studies on the Technology Acceptance Model on e-health in LMICs showed that both perceived ease of use and perceived usefulness were important factors of e-health acceptance in the context of mental health (e.g. (Hoque, Bao, & Sorwar, 2017; Sobowale, Nguyen, Weiss, Van, & Trung, 2016). Those studies provide evidence that e-health is acceptable to potential users in LMICs.

Next to this perspective on the acceptability of the technical system, it is also considered important to investigate the acceptability from an individual variables perspective (Arning & Ziefle, 2009; Berry, Lobban, Emsley, & Bucci, 2016). These individual variables may be crucial in predicting the actual use of such interventions for mental health problems in LMICs. We will use this perspective for the current study. The relevant individual factors reported from various studies involve sociodemographic characteristics (e.g. Dickerson et al., 2004; Mead, Varnam, Rogers, & Roland, 2003), perceived health conditions (e.g. Rai, Chen, Pye, & Baird, 2013; Wilson & Lankton, 2004), personal situational characteristics (e.g. Duplaga, 2012; Mead et al., 2003), and psychological characteristics related to technology (e.g. Huang, 2013; Rockmann & Gewald, 2016). A recent study (Rai et al., 2013) in the context of mobile health service as one type of e-health reported results on how those various factors can predict the acceptability of mobile health service. The study (Rai et al., 2013) also proposed the importance of not only assessing those factors to determine the behavioral intention to start using mobile health service, but also to determine the assimilation (awareness and frequency level of using it), and the preferences to adopt it as a substitutive use (replacement for regular face-to-face treatments) and a complementary use (addition to regular face-to-face treatments). In the results, they reported that some predictive factors for the behavioral intention to start using mobile health service and for the preferences to use it as a substitutive use and a complementary use were different (Rai et al., 2013). Assimilation is not relevant in the current study because

internet-based intervention is rarely found and used in Indonesia at the moment. More than 95% of our participants reported that they are not aware of the availability of any internet-based interventions for mental health problems, and those who are aware indicated they were referring to counseling via email or chat, and internet-based interventions provided in countries outside Indonesia.

In this current study, we report the general acceptability of internet-based interventions for depression in Indonesia and investigate factors that predict the use of it. The predictive factors include sociodemographic characteristics (age, sex, education, and socioeconomic status), perceived mental health conditions (perceived current mental healthiness and perceived mental health vulnerability of severe mental health problem in the future), personal situational characteristics (distance to mental health service facilities and history of mental health service usage), and psychological characteristics related to technology (personal innovativeness toward online services which represents the degree of one's willingness to try new online services). Furthermore, since we focus on the topic of internet-based interventions for depression in this study, depression level will be added as an additional predictive factor. We examine how all of these factors contribute to the Indonesians' intention to start using internet-based interventions for depression as well as to adopt it both for substitutive use and for complementary use to regular treatments.

## Methods

### Participants

The survey was conducted online. The first page of the survey was viewed by 1622 individuals, and 904 participants (55.73%) subsequently completed the survey. The participants' age ranged from 16-61 years ( $M=27.07$ ,  $SD=7.06$ ) with 454 females (50.22%). Based on the participants' score on the Inventory of Depressive Symptomatology-Self Report (IDS-SR), and according to the internationally used cut-off of 14 as an indication of being depressed (Rush et al., 2003), 43.6% participants were categorized as not depressed (total score 0-13), 31.4% were mildly depressed (total score 14-25) and, 25% were moderately to very severely depressed (total score 26-84).



## Procedure

The data were collected via Qualtrics, an internet-based platform for surveys). We recruited participants via invitations on our website (www.actandfeel.com), two other websites on mental health, online forums on mental health, social media, and by word of mouth. Participants provided consent at the beginning of the online survey page by ticking an “agree” button to indicate their agreement to join the study.

## Ethical approval

The ethical approval for this study was obtained from the Tarumanagara University Human Research Ethics Committee, Indonesia (project number PPZ20142001).

## Measures

### *Internet-based Interventions Acceptability Questionnaire-Indonesia (IIAQ-ID)*

This research followed the line of research by Rai et al. (2013) and thus used the items from that study, aggregated into a 20-item measure called the “Internet-based Interventions Acceptability Questionnaire-Indonesia” (IIAQ-ID). The final questionnaire was derived from discussion within the authors in two languages (English and Bahasa Indonesia). The final questionnaire was then reviewed by three bilingual Indonesian clinical psychologists to check the cultural expression.

For the dependent variables, there were 3 items to measure behavioral intention to start using internet-based interventions for depression (e.g. “Assuming I have access to internet-based interventions for depression, I intend to use it”), 3 items to measure preference to use it as a substitute for regular treatments (e.g. “I am willing to use internet-based interventions for depression to obtain relevant advice instead of going for a regular face-to-face treatments”), and 3 items to measure preference to use it to complement regular treatments (e.g. I am willing to use internet-based interventions for depression to obtain relevant advice in addition to a regular face-to-face treatments”). For each item, participants were asked to rate on a 7-point Likert scale from 1 ‘strongly disagree’ to 7 ‘strongly agree’ (score 4 is indicated as neutral). If the mean item-score on the three items of each dependent

variable scale was above 4 (or  $\geq 13$  in total), this was regarded as a positive attitude toward the use of online interventions for depression.

### *Predictor variables*

There were several predictor variables used in the study, including four items on the sociodemographic characteristics (age, sex, education, and socioeconomic status). A single item was used to measure perceived healthiness in mental health context (“In terms of mental health condition, I feel I am.....”) with 7-point Likert scale from ‘very unhealthy’ to ‘very healthy’ and another single item was used to measure perceived vulnerability for the same context in the future (“I feel vulnerable to severe mental health problems (i.e., severe depression) in the next five years”) with 7-point Likert scale from ‘strongly disagree’ to ‘strongly agree’. Distance to mental health service facilities was measured using a single multiple-choice question with higher score represents higher distance, and the answer “do not know” was given the highest score. History of mental health service usage were measured using another single multiple-choice question with yes or no answer. There were 3 items on the personal innovativeness toward online services (e.g. “I like to experiment with new online services”) with 7-point Likert scale from ‘strongly disagree’ to ‘strongly agree’. Lastly, the Inventory of Depressive Symptomatology Self Report (IDS-SR) was used as a valid and reliable tool to measure depression level (Rush, Gullion, Basco, Jarrett, & Trivedi, 1996; Rush et al., 1986) as a specific illness characteristic in this study. In the current study, we used the Indonesian version of the IDS-SR (Arjadi, Nauta, Utoyo, & Bockting, 2017).

In the survey, we also presented some screenshots as an example of how an internet-based intervention may look. The screenshots were made from the internet-based intervention for relapse depression developed in The Netherlands called *Depressievrij*, with the content already translated into Bahasa Indonesia specifically for the purpose of this current study. The three clinical psychologists who reviewed the questionnaire also reviewed the content of the screenshots. See Figure 1 for screenshot example.

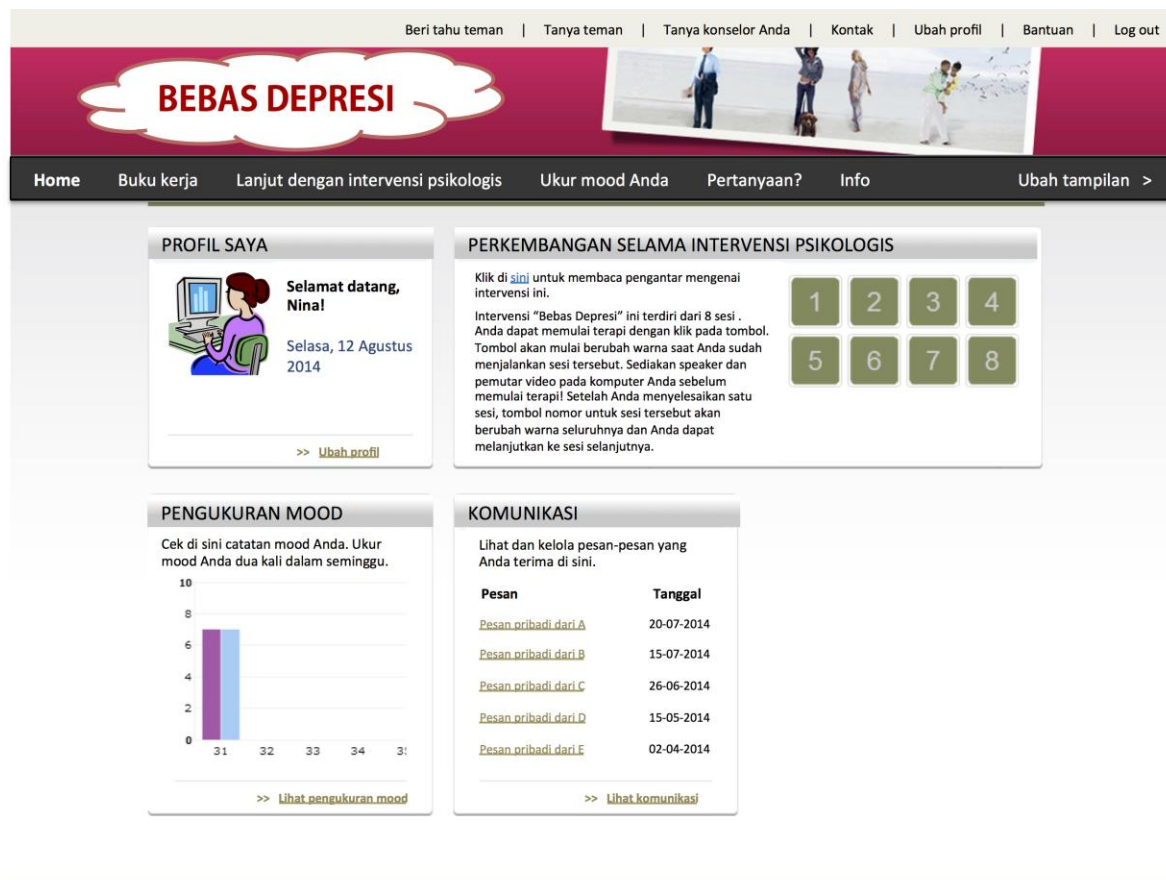


Figure 1. Screenshot example of an internet-based intervention presented in Bahasa Indonesia

## Statistical analysis

First of all, we assessed the measurement quality of the IIAQ-ID by reports on the Confirmatory Factor Analysis (CFA), Cronbach's Alpha reliability, and convergent validity (Average Variance Extracted/AVE). Furthermore, we calculated the percentage of participants who had a total score  $\geq 13$  for each dependent variable.

We conducted different analyses for each dependent variable of 1) behavioral intention to use internet-based interventions for depression, 2) preferences to use internet-based interventions to substitute for regular treatments or 3) to complement regular treatments. The predictors for each analysis included sociodemographic characteristics (age, sex, education, and socioeconomic status), perceived mental health conditions (perceived

current mental healthiness and perceived mental health vulnerability in the future), personal situational characteristics (distance to mental health service facilities and history of mental health service usage), psychological characteristic related to technology (personal innovativeness toward online services which represent degree of one's willingness to try new online services), and depression level which represents the focus of the illness characteristic in this study.

Each evaluation was done using stepwise regression. Evaluation for each dependent variable was done twice, firstly without depression level and the later with depression level at first entry. The aim was to examine whether depression level as the illness characteristic may change the predictive power of other factors in the regression analysis of the three dependent variables. We applied Bonferroni correction for Alpha level to control for Type I error rate when interpreting predictive power of each predictive factor. Prior to interpretation, collinearity assumption was tested. All analyses were performed using R and SPSS 23.

## Results

### Measurement quality

We performed CFA and assessed Cronbach's Alpha reliability as well as AVE of the three dependent variables (behavioral usage intention, substitutive use, and complementary use) and one predictor with multi-item (personal innovativeness toward online services) in the IIAQ-ID. Each construct reported good model fit with  $CFI > .9$ ,  $RMSEA < .05$ , and  $SRMR < .05$  (Hu & Bentler, 1999), and each indicator had adequate factor loading above 0.70 and significant at  $p < .05$ . The convergent validity of each construct was good with average variance extracted (AVE) greater than 0.5 (Fornell & Larcker, 1981). Moreover, for the reliability, the Cronbach's Alpha reliability of all 4 constructs were good, higher than 0.70 (Nunnally & Bernstein, 1994). See Table 1 for the details of descriptives, reliability and validity of each construct.

Table 1. Descriptives, Reliability, Validity of IIAQ-ID and IDS-SR

Constructs	Possible Range	Mean / N	SD / %	Cronbach's Alpha	AVE (convergent validity)
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<i>Dependent variables</i>						
Behavioral usage intention	3-21	15.46	4.12	0.96	0.89	
Substitutive use	3-21	15.11	3.98	0.89	0.74	
Complementary use	3-21	15.27	4.20	0.95	0.87	
<i>Independent variables</i>						
<i>Demographic characteristics</i>						
Age	16-61	27.07	7.06	-	-	
Sex						
Male	-	450	49.78%	-	-	
Female	-	454	50.22%	-	-	
Education						
Below senior high	-	23	2.54%	-	-	
Senior high	-	266	29.42%	-	-	
Vocational	-	78	8.63%	-	-	
Bachelor	-	476	52.66%	-	-	
Master	-	61	6.75%	-	-	
Socioeconomic status						
Low	-	194	21.46%	-	-	
Middle	-	525	58.08%	-	-	
High	-	185	20.46%	-	-	
<i>Perceived mental health conditions</i>						
Perceived mental healthiness	1-7	5.05	1.53	-	-	
Perceived mental health vulnerability	1-7	3.29	1.72	-	-	
<i>Personal situational characteristics</i>						
Distance to mental health service facilities						
<5 km	-	236	26.11%	-	-	
6 km – 15 km	-	269	29.75%	-	-	
16 km – 25 km	-	76	8.41%	-	-	
26 km – 35 km	-	30	3.32%	-	-	
>35 km	-	44	4.87%	-	-	
Do not know	-	249	27.54%	-	-	
History of mental health service usage						
Yes	-	78	8.63%	-	-	
No	-	826	91.37%	-	-	
<i>Psychological characteristic related to technology</i>						
Personal innovativeness toward online services	3-21	14.86	4.09	0.88	0.72	
<i>Illness characteristic</i>						
Depression level (IDS-SR)	0-74	18.42	13.00	0.92*	-	

\*Reliability of the Indonesian version of the IDS-SR from the original paper (Arjadi, Nauta, Utoyo, & Bockting, 2017)

### General acceptability of internet-based interventions for depression

Most participants reported to be open to online interventions, with 73.7% being open to start using internet-based interventions for depression. Moreover, 73.3% and 73% of the participants showed willingness to use it as a substitute for regular treatments and to complement regular treatments respectively.

### Factors predicting the use of internet-based interventions for depression

The predictive factors will be presented for behavioral usage intention, substitutive use, and complementary use separately. Table 2 presents the intercorrelations of all variables.

Table 2. Correlations

Variable	B.INT	SUBS	COMP	AGE	SEX	EDU	SES	PERC. MH	PERC. MV	DIST	HIST	P.INNO V	IDS-SR
Behavioral usage intention (B.INT)	-	0.56*	0.54*	-0.00	0.17*	0.02	0.00	-0.12*	0.19*	0.05	0.09*	0.47*	0.29*
Substitutive use (SUBS)	-	-	0.62*	0.00	0.05	-0.03	0.01	-0.04	0.19*	0.09*	-0.01	0.49*	0.24*
Complementary use (COMP)	-	-	-	-0.04	0.03	-0.01	-0.01	-0.04	0.17*	0.01	0.08*	0.49*	0.19*
Age (AGE)	-	-	-	-	-0.20*	0.35*	0.39*	0.19*	-0.11*	-0.18*	0.15*	-0.05	-0.19*
Sex (SEX)	-	-	-	-	-	0.05	0.01	-0.14*	0.03	0.11*	-0.00	-0.01	0.20*
Education (EDU)	-	-	-	-	-	-	0.36*	0.15*	-0.10*	-0.15*	0.06	0.01	-0.21*
Socioeconomic status (SES)	-	-	-	-	-	-	-	0.10*	-0.05	-0.08*	0.05	0.02	-0.12*
Perceived mental healthiness (PERC.MH)	-	-	-	-	-	-	-	-	-0.43*	-0.22*	0.02	0.03	-0.60*
Perceived mental health vulnerability (PERC.MV)	-	-	-	-	-	-	-	-	-	0.11*	-0.02	0.19*	0.41*
Distance to mental health service facilities (DIST)	-	-	-	-	-	-	-	-	-	-	-0.07*	-0.03	0.29*
History of mental health service usage (HIST)	-	-	-	-	-	-	-	-	-	-	-	0.01	0.04
Personal innovativeness toward online services (P.INNOV)	-	-	-	-	-	-	-	-	-	-	-	-	0.13*

\*significant at  $p < .05$

*Behavioral usage intention (B.INT), Substitutive use (SUBS), Complementary use (COMP), Age (AGE), Sex (SEX), Education (EDU), Socioeconomic status (SES), Perceived mental healthiness (PERC.MH), Perceived mental health vulnerability (PERC.MV), Distance to mental health service facilities (DIST), History of mental health service usage (HIST), Personal innovativeness toward online services (P.INNOV), Depression level (IDS-SR).*

### Stepwise regression results

#### Preliminary analyses

For each analysis, the Tolerance was higher than 0.2 and the *VIF* was less than 10, indicated the absence of multicollinearity (Bowerman & O'Connell, 1990; Menard, 2002).

#### Factors predicting behavioral usage intention

For the first analysis without including depression level, the results were  $R^2=0.277$ ,  $F(5,898)=68.94$ ,  $p < .001$ . We used Bonferroni corrected alpha level of .0055 (.05/9) in the analysis. Personal innovativeness toward online services revealed as the strongest predictor, followed by sex and perceived mental healthiness. Age and history of mental health service usage were not significant predictors based on the Bonferroni corrected Alpha level. See Table 3a for the details.

Table 3a. Regression results for behavioral usage intention (without depression level)

Variable	$\Delta R^2$	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
(Constant)		6.66	0.86		7.73*
Personal innovativeness toward online services	0.222	0.48	0.03	0.48	16.86*
Sex	0.032	1.44	0.24	0.18	6.00*
Perceived mental healthiness	0.012	-0.33	0.08	-0.12	-4.27*
<i>History of mental health service usage</i>	<i>0.007</i>	<i>1.07</i>	<i>0.42</i>	<i>0.07</i>	<i>2.55</i>
<i>Age</i>	<i>0.004</i>	<i>0.04</i>	<i>0.02</i>	<i>0.07</i>	<i>2.23</i>

\* $p < .0055$ . The alpha level was adjusted using a Bonferroni correction ( $\alpha = .0055$ ). Variables excluded when Bonferroni corrected Alpha level applied: history of mental health service usage, age (in italic on Table 3a).

Variables excluded from the original regression analysis: education, socioeconomic status, perceived mental health vulnerability, distance to mental health service facilities.

When depression level was included in the analysis at first entry, the results changed into  $R^2=0.304$ ,  $F(5,898)=78.43$ ,  $p < .001$ . We used Bonferroni corrected alpha level of .005 (.05/10) which resulted in three significant predictors, namely depression level, personal innovativeness toward online services, and sex. Like in

the previous analysis, personal innovativeness toward online services still came up as the strongest predictor followed by depression level. Two predictors (age and history of mental health service usage) which came up from the original results became not significant as we applied the Bonferroni corrected Alpha level (see table 3b).

Table 3b. Regression results for behavioral usage intention (depression level at first entry)

Variable	$\Delta R^2$	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
(Constant)		4.32	0.79		5.48*
Depression level	0.084	0.07	0.01	0.21	7.30*
Personal innovativeness toward online services	0.191	0.45	0.03	0.45	15.95*
Sex	0.018	1.24	0.24	0.15	5.23*
<i>Age</i>	<i>0.007</i>	<i>0.05</i>	<i>0.02</i>	<i>0.08</i>	<i>2.69</i>
<i>History of mental health service usage</i>	<i>0.004</i>	<i>0.89</i>	<i>0.41</i>	<i>0.06</i>	<i>2.15</i>

\* $p < .005$ . The alpha level was adjusted using a Bonferroni correction ( $\alpha = .005$ ). Variables excluded when Bonferroni corrected Alpha level applied: age, history of mental health service usage (in italic on Table 3b).

Variables excluded from the original regression analysis: education, socioeconomic status, perceived mental healthiness, perceived mental health vulnerability, distance to mental health service facilities.

#### *Factors predicting channel preference substitutive use*

In the results of analysis without depression level included, personal innovativeness toward online services, distance to mental health service facilities, and perceived mental health vulnerability came up as three significant predictors of the dependent variable substitutive use ( $R^2 = 0.256$ ,  $F(3,900) = 103.36$ ,  $p < .001$ ). Bonferroni corrected Alpha level of .0055 (.05/9) was used in this analysis and there was no variable excluded based on the Bonferroni corrected Alpha level (see table 4a).

Table 4a. Regression results for substitutive use (without depression level)

Variable	$\Delta R^2$	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
(Constant)		6.98	0.49		14.31*
Personal innovativeness toward online services	0.238	0.46	0.03	0.47	16.18*
Distance to mental health service facilities	0.011	0.19	0.06	0.10	3.36*
Perceived mental health vulnerability	0.007	0.20	0.07	0.09	2.95*

\* $p < .0055$ . The alpha level was adjusted using a Bonferroni correction ( $\alpha = .0055$ ). There was no variable excluded when Bonferroni corrected Alpha level applied.

Variables excluded from the original regression analysis: age, sex, education, socioeconomic status, perceived mental healthiness, history of mental health service usage.

Including depression level at first entry into the analysis changed the results:  $R^2 = 0.283$ ,  $F(5,898) = 70.86$ ,  $p < .001$ . Bonferroni corrected Alpha level of .005 (.05/10) was again applied. Depression level and personal



innovativeness toward online services reported as significant predictors based on the corrected Alpha level.

Personal innovativeness toward online services prevailed as the strongest predictor with depression level as the second strongest. Meanwhile, perceived mental healthiness, distance to mental health service facilities, and age were not significant when the Bonferroni corrected Alpha level applied (see Table 4b).

Table 4b. Regression results for substitutive use (depression level at first entry)

Variable	$\Delta R^2$	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
(Constant)		4.62	0.85		5.44*
Depression level	0.060	0.07	0.01	0.23	6.13*
Personal innovativeness toward online services	0.211	0.45	0.03	0.46	15.96*
<i>Perceived mental healthiness</i>	<i>0.004</i>	<i>0.22</i>	<i>0.09</i>	<i>0.08</i>	<i>2.36</i>
<i>Distance to mental health service facilities</i>	<i>0.004</i>	<i>0.14</i>	<i>0.06</i>	<i>0.07</i>	<i>2.36</i>
<i>Age</i>	<i>0.004</i>	<i>0.04</i>	<i>0.02</i>	<i>0.07</i>	<i>2.23</i>

\* $p < .005$ . The alpha level was adjusted using a Bonferroni correction ( $\alpha = .005$ ). Variables excluded when Bonferroni corrected Alpha level applied: perceived mental healthiness, distance to mental health service facilities, age (in italic on Table 4b).

Variables excluded from the original regression analysis: sex, education, socioeconomic status, perceived mental health vulnerability, history of mental health service usage.

#### *Factors predicting channel preference complementary use*

In the analysis excluding depression level, the results were as follows:  $R^2 = 0.249$ ,  $F(3,900) = 99.44$ ,  $p < .001$ . We used Bonferroni corrected alpha level of .0055 (.05/9). Personal innovativeness toward online services came up as the only significant predictor based on the Bonferroni corrected alpha level, meanwhile perceived mental health vulnerability and history of mental health service usage reported as not significant (see table 5a).

Table 5a. Regression results for complementary use (without depression level)

Variable	$\Delta R^2$	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
(Constant)		7.33	0.48		15.15*
Personal innovativeness toward online services	0.238	0.49	0.03	0.47	16.03*
<i>Perceived mental health vulnerability</i>	<i>0.006</i>	<i>0.20</i>	<i>0.07</i>	<i>0.08</i>	<i>2.77</i>
<i>History of mental health service usage</i>	<i>0.005</i>	<i>1.07</i>	<i>0.43</i>	<i>0.07</i>	<i>2.48</i>

\* $p < .0055$ . The alpha level was adjusted using a Bonferroni correction ( $\alpha = .0055$ ). Variables excluded when Bonferroni corrected Alpha level applied: perceived mental health vulnerability, history of mental health service usage (in italic on Table 5a).

Variables excluded from the original regression analysis: age, sex, education, socioeconomic status, perceived mental healthiness, distance to mental health service facilities.

When depression level was added to the analysis at first entry, the results changed into  $R^2 = 0.258$ ,

$F(3,900) = 104.41$ ,  $p < .001$ . Like all previous analyses, here we also used Bonferroni corrected Alpha level of .005

(.05/10), and found depression level and personal innovativeness toward online services as significant predictors. Like the previous results with the other two dependent variables, for dependent variable complementary use, personal innovativeness toward online services also remained as the strongest predictor followed by depression level. On the other hand, variable history of mental health service usage became not significant when Bonferroni correction applied. See Table 5b for the details.

Table 5b. Regression results for complementary use (depression level at first entry)

Variable	$R^2$	$B$	$SE$	$Beta$	$t$
(Constant)		7.26	0.47		15.45*
Depression level	0.036	0.04	0.01	0.13	4.35*
Personal innovativeness toward online services	0.218	0.48	0.03	0.47	16.24*
<i>History of mental health service usage</i>	<i>0.004</i>	<i>0.97</i>	<i>0.43</i>	<i>0.07</i>	<i>2.26</i>

\* $p < .005$ . The alpha level was adjusted using a Bonferroni correction ( $\alpha = .005$ ). Variables excluded when Bonferroni corrected Alpha level applied: history of mental health service usage (in italic on Table 5b).

Variables excluded from the original regression analysis: age, sex, education, socioeconomic status, perceived mental healthiness, perceived mental health vulnerability, distance to mental health service facilities.

## Discussion

This study was designed to examine the acceptability of internet-based interventions for depression in an Indonesian sample. The findings showed that the majority of participants (73.7%) indicated they were open to using internet-based interventions for depression. Most participants are also willing to use it as a substitute for regular treatments (73.3%) and to complement regular treatments (73%) respectively. Among all predictors, personal innovativeness toward online services was revealed as the strongest significant predictor for behavioral intention, as well as preferences to use internet-based interventions as a substitute and a complement to regular face-to-face mental health services in Indonesia. Personal innovativeness towards online services remained the strongest predictor when taking into account the current depression level. Previous research has shown that in general, innovativeness toward technology can strongly predict the technology usage (Lu, Yao, & Yu, 2005; Rai et al., 2013), in line with the results of this study. Therefore, to promote the use of internet-based interventions for depression in Indonesia, it may be a good start to target those who are already currently active as online service users. Via these channels, one may reach people who are innovative and open to new online services offered via the internet. Such promotion of access to internet-based interventions is in line with a previous study reporting

that once an individual becomes a user of an internet-based intervention, the person tends to perceive it as more acceptable than non-previous users (Gun, Titov, & Andrews, 2011).

Other research (in Vietnam) has shown that although people are not aware of the availability of internet-based interventions, they do express that such intervention would be useful, especially when incorporating psychoeducation and the possibility of sharing of information (Sobowale et al., 2016). The same challenge also applied in our study in Indonesia, in that 95% of our participants were unaware of existing internet-based interventions but were willing to try using it. Therefore, promoting internet use in general, followed by promoting access to internet-based interventions, may be a good strategy to stimulate Indonesian people to engage in internet-based interventions for depression and benefit from it.

A recent survey conducted in Europe on the attitudes toward digital treatment for depression reported that digital treatments, including internet-based interventions, were more acceptable for milder forms of depression (Topooco et al., 2017). Unlike the survey results, in this study, higher depression level predicted higher willingness to use the internet-based intervention. Previous research has shown that individuals with current mental health problems tend to be more willing to seek help through the internet even if they do not seek help through regular face-to-face services (Cunningham, Humphreys, Kypri, & van Mierlo, 2006). Such findings may possibly explain why participants with higher depression levels in the current study tended to have higher intention to start using the internet-based interventions and to use it as a substitute and complement to regular treatments. In line with this idea, when controlling for depression, those who perceived themselves as currently healthy in terms of mental health reported less likelihood to use internet-based interventions. Related, those who reported themselves as vulnerable to experience serious mental health problems in the future reported greater willingness to use internet-based interventions for depression as a substitute for regular treatments.

It is important to note that some participants were unfavorable about the idea of using internet-based interventions for depression. Overall, about a quarter of the sample reported that they were not willing to try using an internet-based intervention or to use it as a substitution for or complement to regular treatments. There are some possible reasons for these findings. From personal situational characteristics, distance to mental health service facilities significantly predicts Indonesian people's willingness to use internet-based interventions for

depression as a substitute for regular treatments, but not for the other two dependent variables. These findings suggest that in general, Indonesian people are open to the use of internet-based interventions for depression, but still consider face-to-face contact in mental health services for depression as important, especially when they know where to find them nearby. If they can have access to regular face-to-face treatments, they will choose it over internet-based interventions. This is also in line with previous findings suggesting that health related help via the internet is acceptable but face-to-face contact is still valued as imperative (Sillence, Briggs, Harris, & Fishwick, 2007). Obviously, regular face-to-face treatments remain important to reach more people in Indonesia, first and foremost for those who are not familiar with the internet, but evidently also for some of the people who are actively using the internet like all participants of this study. This means, from the perspective of potential advantages of utilizing e-health in LMICs like Indonesia, regular face-to-face treatments remain necessary, but the availability of internet-based interventions for depression would be acceptable and could improve access to effective treatments for people who are not able to access regular treatments due to the mental health gap.

Of all demographic characteristics, sex was the only independent variable that significantly predicted intention to use internet-based interventions for depression in Indonesia, both when the analyses were and were not controlled for depression level. Female participants reported a higher level of intention to use internet-based interventions for depression than male participants. This can be explained by what has been discussed in previous studies that in general women tend to have higher help seeking patterns than men when they experience mental health problems (Möller-Leimkühler, 2002; Oliver, Pearson, Coe, & Gunnell, 2005). However, sex does not appear as a significant predictor for the channel preferences (substitutive use and complementary use), meaning that sex tends to only affect the first decision to start using the internet-based interventions. Therefore, it might be essential to intentionally do more promotion of internet-based interventions to male population in Indonesia.

This study involved limitations that should be addressed in future research. First, there may be a bias in the sample because we conducted the survey online and thus we cannot generalize the results to people without online access. Nevertheless, even in this group, the level of personal innovativeness toward online services seemed important. Second, the variance of the sample characteristics in this study was not diverse by demographic standards. Most of the participants were young adults, had a relatively high education level, came

from middle socioeconomic status, and did not have a history of mental health service usage. This lack of diversity could be the reason why age, education, socioeconomic status, and history of mental health service usage did not emerge as significant predictors. Therefore, we suggest future research to include a more diverse sample, thus providing the opportunity to see if these characteristics do matter in the context of acceptability of internet-based interventions.

## Conclusion

To conclude, although it is certain that regular face-to-face treatments are valued, the majority of Indonesians reported being open to using internet-based interventions for depression. There are two main predictors of intention to start using internet-based interventions for depression in Indonesia, as well as to use it as a substitute for regular treatments and to complement regular treatments. These predictors include individual disposition of personal innovativeness toward online services and illness characteristics, i.e. higher depression levels. Therefore, to achieve greater adoption of internet-based interventions for depression in Indonesia, it is important to incorporate those aspects during the implementation and dissemination. The hope is that it may eventually increase the potentials of internet-based interventions for depression in Indonesia and reduce the mental health gap in the country.

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**Authors' contributions**

RA, MN, and CB made the design of this study. RA translated and adapted the questionnaire and conducted the survey. RA performed the statistical analyses. RA, MN, and CB worked on the final analyses together. All authors approved the final version of the manuscript.

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## Conflict of interest

MN is an associate professor of clinical psychology at the University of Groningen in The Netherlands. She is a member of the task force of the Dutch National Care Standard for anxiety disorders (*Zorgstandaard Angststoornissen*), for which she received travel expenses and some subsistence. MN receives travels expenses, some subsistence and sometimes an associated speaker honorarium for lectures or clinical training workshops. MN has received grants from ZonMW (The Netherlands Organisation for Health Research and Development) unrelated to the current project. MN is a member of the Dutch Association of Behavioural and Cognitive Therapies and receives no remuneration for this role. She developed and translated CBT treatment manuals, including a blended internet-based treatment program, for which she receives no personal fees.

CB is a professor of clinical psychology at the Department of Psychiatry, Academic Medical Center, University of Amsterdam in The Netherlands (primary affiliation) and University of Groningen. She is also a guest professor at the Faculty of Psychology and Pedagogy at Ghent University in Belgium. CB is a member of the Dutch multi-disciplinary guideline for anxiety and depression. She receives no remuneration for this role. CB is a co-editor of *'PlosOne'* and receives no honorarium for this role. She is an advisor for the Minister of Health for inclusion in the statutory insured package (*Advies Pakket Commissie, ZIN*). She receives honorarium for this role and this role has no direct relation to the current contribution. CB has presented keynote addresses at conferences such as EABCT, the European Psychiatry Association and the European Conference Association and receives sometimes an honorarium. She has presented clinical training workshops, some of which include a fee. CB receives royalties from her books and co-edited books and she developed the intervention used in this study, but she does not receive any direct payment from it.

**Highlights**

- Indonesians seem to be open to use internet-based interventions for depression.
- Personal innovativeness toward online services is the strongest usage predictor.
- Depression level is the second strongest usage predictor.

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