

# Adaptation of the Indonesian version of the online cognition scale to measure problematic internet use

Dhia Ulfah Purwati<sup>1\*</sup> and Hanifah Hanifah<sup>1</sup>

## Abstract

The internet can make everyday life more accessible; however, it can also cause problematic behavior. It is essential to prevent the negative impact of problematic internet use on daily activities, whether in educational settings, work, social life, or general functioning. This research aims to adapt the Online Cognition Scale (OCS) to the Indonesian language. The number of samples involved in this research was 195 people between the ages of 18-25 years old. This study tested the psychometric properties through content validity tests and obtained S-CVI/Ave results of 0.92. The CFA model fit test index results are within the acceptable value for all goodness of fit indices, with factor loadings between 0.752 - 0.912 for each dimension and 0.318 - 0.882 for each item. There is one invalid item that is eliminated in the Indonesian version of OCS. The coefficient  $\alpha$  is 1.057, and the coefficient for the four dimensions ranges from 0.770 to 0.878. The  $\omega$  coefficient for the four dimensions also moves from 0.792 to 0.881, and the item-total correlation correction test is within the range of 0.427 - 0.702. This measuring tool is used to get an overview of problematic internet usage behavior in Indonesia.

## Keywords

Internet use, problematic internet use, scale adaptation.

## Introduction

In recent years, the development of internet-accessible services has proliferated. This condition has a significant impact on several aspects of life, such as economics and business, education, manufacturing, health and social life. In line with this situation, the use of the internet has increased significantly during Covid-19 in the last three years. In Indonesia, based on the *Asosiasi Penyelenggara Jasa Internet Indonesia* (APJII) data, stated that in 2018, internet users in Indonesia reached 175 million people, and during 2021-2022 reached 210 million people (Andangsari et al., 2019). APJII also surveyed 7,568 respondents throughout Indonesia, which was conducted in early 2022 and showed that 98.02% people used the internet to access social media, 92.21% to access news/information, 90.21% to work and study from home, 84.90% to access public services and 77.25% to access entertainment content. The presence of the Internet in daily activities certainly has an impact on individual behavior (Andangsari et al., 2019).

The high demand for internet access makes people dependent on the internet itself. Apart from providing various benefits, the use of the internet can also have various negative consequences for its users. This phenomenon eventually causes some individuals to show problematic behavior known as Problematic Internet Use (PIU). PIU is defined as a pattern of maladaptive use of the internet, characterized by excessive use that leads to psychosocial and behavioral problems (Davis, 2001). One model that explains PIU is the cognitive behavioral model developed by Davis (2001). This model states that PIU is caused by problematic cognitions associated with behaviors that intensify or maintain maladaptive responses (Davis, 2001).

This PIU theory develops from other theories that emphasize individual cognition (or thoughts) as the primary source of abnormal behavior. Furthermore, PIU is categorized into two forms of behavior. One is specific problematic internet use, which includes those people dependent on specific functions of the internet, such as online sexual services or online gambling; the other one is generalized problematic internet use, associated with excessive internet use in general, including wasting time accessing the internet aimlessly (Davis, 2001).

Studies on PIU are often associated with depression, loneliness, low self-esteem, social anxiety, and so on (Costa et al., 2019; Wongpakaran et al., 2021). PIU is also widely associated with psychosocial well-being, where excessive and problematic internet use shows a negative influence on the individual's psychosocial and personality (Casale et al., 2016). In Indonesia, the study shows that PIU correlates with loneliness (Harlendea & Kartasasmita, 2021; Rini et al., 2020; Yashinta & Hurriyati, 2020), and there is a negative correlation between PIU and psychological well-being, meaning that the higher the PIU, the lower the subjective well-being (Syihab et al., 2020; Putri & Wahyudi, 2022). Excessive internet use also has a negative effect on development, damaging mental health and social functioning and causing addiction (Chao et al., 2020).

<sup>1</sup> Faculty of Psychology, University of Padjadjaran, Sumedang, Indonesia.

## \*Corresponding author:

Dhia Ulfah Purwati, Faculty of Psychology, Universitas Padjadjaran, Jl. Raya Bandung Sumedang KM 21, Kabupaten Sumedang, Jawa Barat 45363, Indonesia.

Email: dhia22003@mail.unpad.ac.id

The role of maladaptive cognition is an important factor in measuring PIU because the study shows a positive association between maladaptive behavior patterns and PIU (Nwifo et al., 2022). This maladaptive behavior makes individuals believe that accessing the internet can help them to have social relationships that they do not have in real life. It will give them a strong desire to continue accessing the internet. Besides that, the use of the Internet can be seen as a form of coping with emotions and social problems (Bernardi & Pallanti, 2009; Li et al., 2016) or to relieve stress (Han & Chen). When excessive use of the internet is used to overcome negative emotions (stress, anxiety, or depression), it will make them rely on the internet and can lead to addictive behavior. The study also found that individuals with PIU show a form of maladaptive cognition that causes certain symptoms related to PIU (Davis, 2001).

Several prior studies recommend interventions to help individuals have a healthier mindset, especially associated with Internet use. In this case, cognitive behavioral therapy is widely used. Study shows this approach is effective for overcoming PIU problems since it focuses on helping someone understand the relationship between their beliefs, thoughts, and feelings, which lead them to have certain behaviors or actions (Agbaria, 2022; Kim et al., 2018; Roberts et al., 2022; Wöfling & Dominick, 2022). This will make individuals learn that their perceptions will influence their response or, in other words, the process of thinking associated with their behavior and actions (Malak, 2017). This is the basis for why many researchers recommend a cognitive-behavioral model to address PIU.

Based on the previous explanation, researchers assume that it would be more helpful if the instrument used to determine a person's PIU symptoms also used a cognitive behavioral model. The aim is to make it easier for therapists to identify and understand client problems. These results will be the basis for therapists to set appropriate targets for the interventions (Komnenić et al., 2015). The cognitive-behavioral model of PIU has also been widely used in diagnosis and therapy with a cognitive behavioral approach (Przepiorka et al., 2014) (Przepiorka et al., 2014).

The other model that addresses PIU is focused on generalized problematic internet use (GPIU) (Caplan, 2002). This model views PIU as a communication problem on the internet, which is related to social anxiety and the preference for having online relationships (Caplan, 2010). This research then developed the Generalized problematic Internet Use Scale (GPIUS) measuring instrument (Caplan, 2002) and was updated to GPIUS 2 (Caplan, 2010). GPIUS 2 consists of the following dimensions: preference for online social interaction (POSI), mood regulation, deficient self-regulation (cognitive preoccupation and compulsive internet use), and negative outcomes. In Indonesia, there is a modified version of Caplan's PIU model 2010, which was adapted to Indonesian social conditions by adding aspects of escaping and emotional reactivity Andangsari et al. (2019). This model was later developed into a measurement tool called the Indonesia Problematic Internet Use Scale (IPIUS). IPIUS involves six dimensions, which are represented through 63 statement items. IPIUS is still rarely used, although, in its development, it has been adapted to the culture and conditions in Indonesia. One of the reasons may be the number of items being quite large

and considerations regarding the quality of the items that still need to be reviewed (Natanael, 2021).

A measurement tool that can represent a cognitive focus of PIU is the Online Cognition Scale (OCS) (Davis & Besser, 2002). OCS has constructed assumptions derived from the cognitive-behavioral model. That is, OCS focuses on how maladaptive cognition related to internet use (distorted thinking) is the main cause and can also be used as an etiology and therapy for PIU (Silva et al., 2017). This is different from GPIUS 2, which was developed by (Caplan, 2010), which only involves social and emotional aspects. OCS consists of 36 items with four sub-dimensions, namely loneliness/depression, diminished impulse control, social comfort, and distraction. OCS was also adapted from several related measurement tools, such as procrastination, depression, impulsivity, and gambling addiction.

The OCS has adequate construct validity (Davis & Besser, 2002). This has led to the OCS being adapted into several different languages, and there have been checks on the psychometric qualities (Davis & Besser, 2002; Jia & Jia, 2009). Some adaptations include Turkish (Özcan & Buzlu, 2005), Polish Błachnio et al. (2015), and Brazilian (Silva et al., 2017). In practice, OCS can be used for clinical assessment purposes as a basis for establishing diagnostic and therapeutic goals. This has been done in research conducted on a group of early adults, where OCS was used as an assessment and therapy instrument to determine the description of depression and anxiety related to social media use (Bettmann et al., 2021). OCS is also widely used in selection activities in several fields, such as employee selection in companies or student selection in schools. The aim is to find out the candidate's possibility of maladaptive use of the internet (Komnenić et al., 2015).

Based on the description above and the consideration that a cognitive approach is also needed in discussing PIU, it is necessary to adopt a measurement tool that can also determine the tendency for problematic internet use with a cognitive-behavioral approach. Mental health professionals can use this for early detection of the emergence of problematic internet use, and it can also be considered in the implementation of therapy. In addition, OCS can also be used by companies and education to find an overview of individual internet use when making selections. This study aims to adapt the Online Cognition Scale (OCS) measurement tool into Indonesian and determine its psychometric properties. The purpose of the study is to help various sectors that use OCS, such as schools, companies, or the mental health field, understand the aim of its use, as well as the quality of the measurement tool.

## Method

### Participants

In this research, convenience sampling was adopted, and inclusion criteria were set as follows: (1) individuals of any gender, (2) young adults aged 18-25 years, and (3) actively using the internet, showing subjective experience with online activities. The age criteria were based on the demographic distribution of internet users in Indonesia, where 98.64% fell in the young adult category (APJII, 2022). This choice was in line with the analysis of the Online Cognition Scale (OCS) consisting of participants ranging from adolescents to adults (Błachnio et al., 2015; Davis & Besser, 2002; Özcan & Buzlu,

2005; Silva et al., 2017). Data collection occurred online for ten days through Google Forms shared on various social media platforms, including WhatsApp, Instagram, Telegram, and Twitter. During that period, 200 participants completed the research form. However, 5 participants did not meet the criteria, resulting in 195 participants in the current analysis. They had an average age of 22.5 years, with 151 (77.4%) females and 44 (22.6%) males. Participants aged 18-20 constituted 11.9%, while those aged 21-25 were 88.1%. Regarding internet usage, 5.1% accessed the internet for 1-4 hours, 64.6% for 5-12 hours, and the remaining 30.5% for over 13 hours per day.

The use of Google Forms in the research had several limitations, particularly the absence of direct supervision during form completion. This might have led to participants' difficulties in comprehending instructions or questions. To address such a situation, the contact information was provided at multiple points, including on the distributed posters, the form homepage, and the questionnaire start and final pages. Participants encountering challenges or unclear aspects were encouraged to reach out directly to the researcher.

### Research Instruments

The measurement tool adopted in the Indonesian version was OCS (Davis & Besser, 2002), which assessed problematic internet use (PIU). OCS was grouped into 36 items measuring four different dimensions, consisting of impulsivity, loneliness/depression, distraction, and social comfort. Responses used a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Sample items for impulsivity, loneliness, distraction, and social comfort included "People complained that I used the Internet too much," "I did not feel too lonely when I was online," "I sometimes used the Internet to procrastinate," and "I could be myself online," respectively. Participants' scores ranged from 35 to 252 points, correlating directly with the level of PIU (Silva et al., 2017). It was observed that a higher score showed a heightened level of PIU.

### Data Analysis Technique

The adaptation procedure of OCS in the Indonesian version adhered to the (Hu & Bentler, 1999) Guidelines for Translating and Adapting. The first step, which was Pre-Condition, consisted of securing permission and approval for the adaptation from the original OCS compiler (Davis & Besser, 2002). This step also included clarifying the construct of PIU and considering cultural and language factors.

In the second step, the test development guidelines centered on the test adaptation process. The process included the forward translation of the original OCS (English) into Indonesian by two independent translators. The translators were proficient in both English and Indonesian, had a psychology background, and understood the tools construction concept. Subsequently, adjustments were made by the translators, followed by the backward translation process. Two translators with qualifications in psychology and measurement, a grasp of cultural contexts, and fluency in both English and Indonesian were engaged. The final translation was reached through agreement, taking into account the cultural context of Indonesia.

The third step comprised Confirmation Guidelines, which were empirical evidence from the reliability and validity assessment of the full scale. This started by identifying relevant sample characteristics in line with the observation of (Davis, 2001), followed by an exploration of validity and reliability.

### Procedure

The data analysis covered content validity testing through the Content Validity Index (CVI), which comprised item-level CVI (I-CVI) and scale-level CVI (S-CVI). However, construct validity was evaluated using Confirmatory Factor Analysis (CFA) to determine factor loadings that represented the correlation between items and dimensions. Factor loadings  $\geq 0.3$  generally showed a moderate correlation between items and the dimensions (Tavakol & Wetzel, 2020). A sound definition of a dimension as a theoretical construct was observed through factor loading values. The research also conducted model fit tests based on the goodness-of-fit index criteria. Additionally, reliability testing adopted Cronbach's Alpha and Corrected Item-total Correlation, using items from the previously CFA-tested Indonesian version of OCS. All data analysis was performed using JASP version 0.16.4.0.

## Result

### Content Validity

This research used two practicing psychologists with expertise in constructing measurement tools to test content validity. In the expert review process, a minimum of two reviewers should be specialists in the field being measured, with one possessing knowledge of the measurement tools construction (Waltz et al., 1991). During the content validity testing, Lynn (1986) recommended using a rating scale from 1 to 4 in expert reviews, where 1 = not relevant, 2 = relatively relevant, 3 = quite relevant, and 4 = very relevant. Each item with an ordinal scale was reorganized into a dichotomous scale of relevant and not relevant, then divided by the total number of expert reviews (Polit & Beck, 2006). This method calculated the average I-CVI item level or S-CVI/Ave, where values 4 and 3 were combined into the relevant category, and values 2 and 1 were grouped into another category (Zamanzadeh et al., 2015).

Based on the categorization results, nearly all I-CVI items were considered relevant, except for items 23 and 35 in the loneliness dimension and item 31 representing the distraction dimension. Using the S-CVI/Ave method, the average I-CVI for the 36 items of the Indonesian version of OCS was 0.92. Expert agreement had to reach 80% to meet acceptability criteria (Davis, 1992). This standard asserted that the Indonesian version of OCS had satisfactory content validity (S-CVI/Ave = 0.92). The three items, including 23, 35, and 31, categorized as not relevant, were revised but remained in this research. Furthermore, both expert reviews provided final recommendations on the feasibility of using the Indonesian version of OCS. Both expert reviews concluded that the Indonesian version of OCS was suitable but required revision.



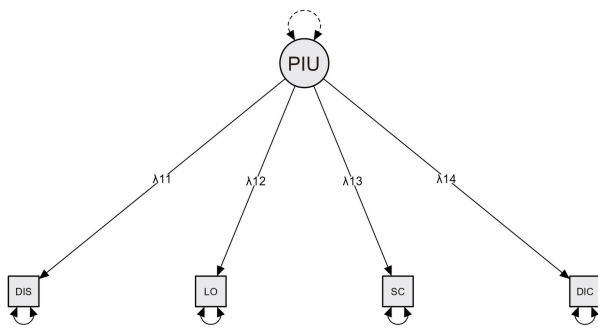


Figure 1. CFA construct of Indonesian version OCS

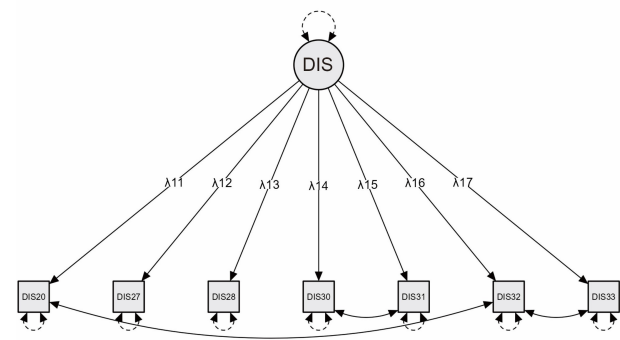


Figure 3. CFA construct of Distraction dimension

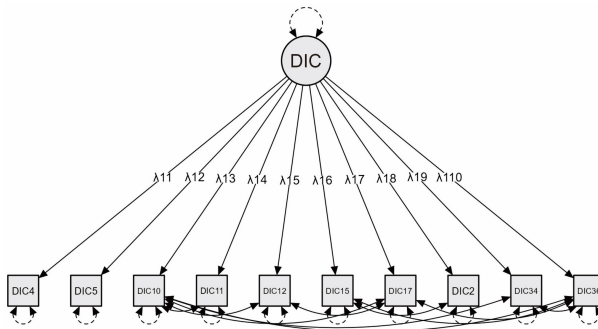


Figure 2. CFA construct of Diminished impulse control dimension

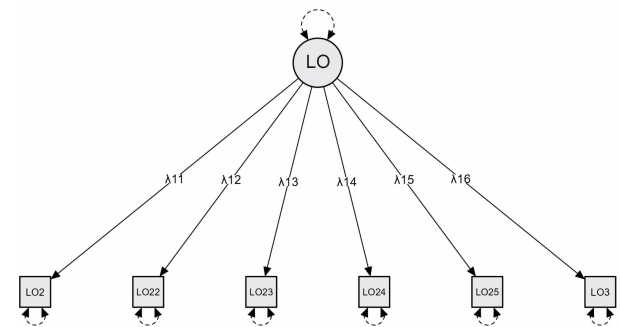


Figure 4. CFA construct of Loneliness/Depression dimension

### Confirmatory Factor Analysis (CFA)

CFA aims to examine the construct of OCS in measuring PIU, examining the constituent dimensions and the item pattern relationships (Brown, 2015). It was conducted using JASP 0.16.4.0 software, and model fit tests were conducted before assessing the validity to ensure that the selected model was in line with the assumed CFA model. This research adopted the first-order CFA, using a single latent analysis level to show both dimensions and related variables.

The CFA model test was conducted twice, and during the initial model assessment, the Goodness of Fit measures showed unsatisfactory values, with the majority falling short of expected standards. Subsequently, a model redesign was performed, maintaining the first-order CFA model but introducing modification indices to enhance the goodness-of-fit values. Index modifications consisted of correlating residuals from certain dimensions with relatively high modification indices, and the model was visualized in Figure 1, 2, 3, 4, 5. The model test results showed that all fit criteria were within acceptable values, except for the chi-square measure, which fell into a non-fit category. This implied that the model was suitable for analysis and could proceed with validity testing for each dimension.

In this research, the validity testing also considered factor loading values. Acceptance of a dimension in measuring the related variable relied on a factor loading value of  $\geq 0.3$  (Özcan & Buzlu, 2005). The testing commenced with the validation of each dimension of the Indonesian version of OCS. The results showed that all dimensions had factor loading values  $> 0.3$ , establishing the validity in measuring PIU. These values were relatively high, ranging from 0.752 to 0.912, signifying the robust validity of the dimensions in

measuring the respective constructs. The subsequent analysis consisted of testing the item validity for each dimension.

The results in Table 3 showed that almost all items were valid, suggesting they measured the related dimensions. Meanwhile, one item in the diminished impulse control dimension (item 12) did not meet the criteria ( $\leq 0.3$ ). This research, therefore, reanalyzed the CFA model without including item 12, showing that all model fit criteria were in acceptable values, except for chi-square. Factor loading values for all dimensions of the Indonesian version of OCS remained acceptable ( $\geq 0.3$ ), with values for each dimension as DIS = 0.796, LO = 0.813, SC = 0.733, and DIC = 0.916.

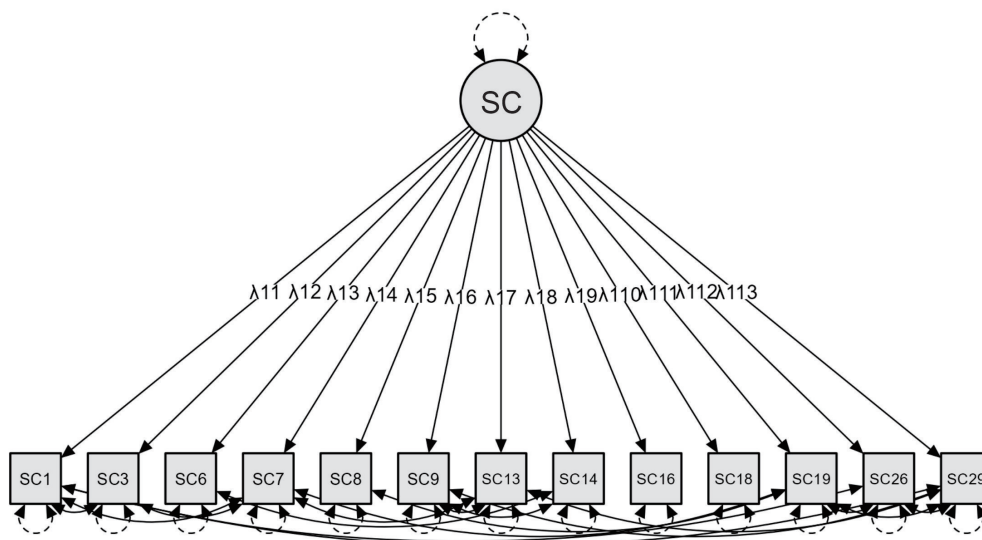
### Reliability Testing

Reliability testing was conducted to assess the consistency or stability of the Indonesian version of OCS in measuring PIU across four dimensions, including impulsivity, loneliness/depression, distraction, and social comfort. The analysis used Cronbach's Alpha Coefficient and omega to determine internal consistency and measure construct reliability. The minimum acceptable value for construct reliability was at least 0.7 (Chinn, 1998). Cronbach's Alpha coefficients were categorized as  $\geq 0.9$  = high internal consistency,  $0.7 \leq \alpha < 0.9$  = moderate internal consistency,  $0.6 \leq \alpha < 0.7$  = acceptable internal consistency,  $0.5 \leq \alpha < 0.6$  = weak internal consistency, and  $\alpha < 0.5$  = no internal consistency (Sürücü & Maslakçı, 2020). The results showed that the Indonesian version of OCS had good reliability based on both omega and Cronbach's Alpha coefficients. Moreover, Cronbach's Alpha value stratum indicated an extremely high value of 1.057, suggesting an increase in internal consistency for all items in this measurement tool.

**Table 1.** Goodness of Fit

GoF	Acceptable Value	DIC	DIS	LO	SC
<b>Absolute Fit Indices</b>					
Chi Square/DF	<5	2.16	1.78	0.88	2.10
GFI	>0.90	0.99	1.00	1.00	0.99
Hoelter's CN	>200	203.33	397.10	858.91	194.16
SRMR	<0.05	0.05	0.03	0.03	0.05
<b>Relative Fit Indices</b>					
IFI	>0.90	0.98	0.99	1.00	0.98
TLI	>0.95	0.96	0.98	1.00	0.97
NFI	>0.90	0.96	0.98	0.99	0.96
RFI	>0.90	0.94	0.95	0.98	0.94
<b>Noncentrality-based Indices</b>					
RMSEA	<0.08	0.08	0.06	0.00	0.08
CFI	>0.95	0.98	0.99	1.00	0.98
RNI	>0.90	0.98	0.99	1.00	0.98

Note: Acceptable value recommendations are based on Byrne & Campbell (1999), Baumgartner & Homburg (1996), and Hu & Bentler (1999). LO = Loneliness/Depression, DIC = Diminished Impulse Control, SC = Social Comfort, and DIS = Distraction.



**Figure 5.** CFA construct of Social Comfort dimension

**Table 2.** Factor loading of the Indonesian version of OCS dimensions

Dimension	Factor loading	Note
Diminished impulse control	0.91**	valid
Distraction	0.79**	valid
Loneliness/depression	0.80**	valid
Social comfort	0.75**	valid

**Corrected item - total correlations**

Further analysis included corrected item-total correlation to show the relationship between each item and the total score calculated from the remaining items in the scale (Hobart & Cano, 2009). Values exceeding 0.2 showed a good level of correlation (Streiner & Norman, 2003). The results showed a range of values from 0.453 to 0.685, 0.456 to 0.577, 0.481 to 0.593, and 0.427 to 0.702 for the diminished impulse control, distraction, loneliness, and social comfort dimensions,

respectively. Table 5 presents the results of the corrected item-total correlation in the Indonesian version of OCS without item 12.

**Discussion**

This research aimed to adapt OCS into the Indonesian version and examine the extent to which the constructs, indicators, and items could measure PIU. Based on expert reviews and other statistical analyses, the tool proved relevant in measuring PIU in the young adult population in Indonesia. Content validity analysis showed that the items in OCS were important and relevant for measuring PIU, with S-CVI/Ave reaching 0.92. Three items, including items 23, 35, and 31, were considered irrelevant by both expert reviews and were revised for appropriateness.

The results of the model test showed a good fit between the model and the data, consistent with the established theory of problematic internet use, where PIU could be delineated

**Table 3.** Factor loading of the Indonesian version of OCS items

Dimension	Item	p	Factor loading	Note
Diminished impulse control	DIC4	< 0.00	0.70	valid
	DIC5	< 0.00	0.68	valid
	DIC10	< 0.00	0.55	valid
	DIC11	< 0.00	0.53	valid
	DIC12	< 0.00	-0.12	not valid
	DIC15	< 0.00	0.81	valid
	DIC17	< 0.00	0.46	valid
	DIC21	< 0.00	0.73	valid
	DIC34	< 0.00	0.53	valid
Distraction	DIC36	< 0.00	0.59	valid
	DIS20	< 0.00	0.67	valid
	DIS27	< 0.00	0.52	valid
	DIS28	< 0.00	0.61	valid
	DIS30	< 0.00	0.73	valid
	DIS31	< 0.00	0.68	valid
	DIS32	< 0.00	0.60	valid
Loneliness /depression	DIS33	< 0.00	0.70	valid
	LO2	< 0.00	0.32	valid
	LO22	< 0.00	0.67	valid
	LO23	< 0.00	0.88	valid
	LO24	< 0.00	0.81	valid
	LO25	< 0.00	0.70	valid
Social comfort	LO35	< 0.00	0.42	valid
	SC1	< 0.00	0.46	valid
	SC3	< 0.00	0.54	valid
	SC6	< 0.00	0.51	valid
	SC7	< 0.00	0.65	valid
	SC8	< 0.00	0.56	valid
	SC9	< 0.00	0.68	valid
	SC13	< 0.00	0.72	valid
	SC14	< 0.00	0.60	valid
	SC16	< 0.00	0.78	valid
	SC18	< 0.00	0.59	valid
	SC19	< 0.00	0.86	valid
SC26	< 0.00	0.48	valid	
SC29	< 0.00	0.74	valid	

through the Indonesian version of OCS. The measurement tool featured four dimensions, comprising diminished impulse control, loneliness/depression, distraction, and social comfort (Davis & Besser, 2002). The model fit test, consisting of absolute fit indices, relative fit indices, and noncentrality-based indices, showed satisfactory values that met acceptable criteria after being subjected to several modifications, except for the chi-square value. Chi-square was not frequently used as the sole model fit index because it was sensitive to sample size (Bishop & Hertenstein, 2004; Xia & Yang, 2019). The model fit for OCS was also in line with the adapted versions in Brazilian (Silva et al., 2017) and Polish version (Błachnio et al., 2015).

The validity test proceeded by examining factor loading values for each dimension and item in the Indonesian language version of OCS. Factor loading values for all four dimensions exceeded the set criteria of  $\leq 0.3$  (Pauls & Daseking, 2021), ranging from 0.752 to 0.912. This was in line with previous research showing that factor loading values in OCS significantly measured PIU (Błachnio et al., 2015; Silva et al., 2017). Further analysis of factor loading values showed that item 12 in the diminished impulse control dimension

had a value of -0.121. The value did not meet the criteria, and the negative value showed a negative relationship with the forming dimension (DiStefano et al., 2009). The item was eliminated, and a retest of construct validity showed an improvement in the model fit, with all criteria falling in acceptable ranges and increased factor loading values for the dimensions of DIS = 0.796, LO = 0.813, SC = 0.733, and DIC = 0.916.

The research showed that the largest factor loading value was in the diminished impulse control (DIC) dimension. The observation was in line with Błachnio et al. (2015), suggesting that the diminished impulse control dimension had a value of 0.93. According to Davis & Besser (2002), the dimension had the highest correlation because diminishing control over internet use was associated with obsession and the inability to reduce the use. Therefore, the diminished impulse control dimension became a strong indicator in measuring PIU.

The reliability test for the Indonesian version of OCS showed strong reliability, suggesting consistent results across different applications. The results showed that the internal consistency of such a version was high, with Cronbach's Alpha coefficient of 1.057. Each dimension in the Indonesian version of OCS also had internal consistency, with  $\alpha$  coefficient ranging from 0.770 to 0.878. The results were in line with the observation of Davis & Besser (2002) and also with the student population in Poland, suggesting the reliability of the measurement tool (Błachnio et al., 2015). Furthermore, the omega coefficient ( $\omega$ ) for all four dimensions ranged from 0.792 to 0.881, showing that the Indonesian version of OCS had good construct reliability. All items in the version, except for item 12, were subjected to corrected item-total correlation testing, suggesting that all items consistently measured PIU. The obtained results fell in the range of 0.427 to 0.702, showing the acceptance of all items.

The Indonesian version of OCS had four dimensions represented by 35 items in measuring PIU. The measurement tool showed good validity and reliability, making it suitable for assessing the level of PIU in individuals. OCS could be used for educational or occupational selection purposes, as well as for early screening in mental health professional interventions. The results of validity and reliability testing were in line with previous reviews that adapted OCS to Brazilian (Silva et al., 2017) and Polish (Błachnio et al., 2015). Both research showed that OCS had good validity and reliability and was suitable for use. OCS was also adapted and developed to measure maladaptive cognition related to online gaming. The analysis showed high reliability and Exploratory Factor Analysis (EFA) testing that formed six factors, including Diminished Impulse Control, Distraction, Immersion/Escapism, Social Comfort, General Sense of Comfort, and Online Games Appreciation (Komnenić et al., 2015).

OCS was compared with the Internet Addiction Test (IAT) in Brazil to assess the prevalence of Internet addiction. The results showed that OCS was more sensitive in identifying individuals with internet addiction (Quirino et al., 2019). The heightened sensitivity might have developed because OCS had a strong theoretical foundation and provided robust evidence of construct validity, considering it as a measurement tool with the most extensive analysis of PIU construct (Quirino et al., 2019). This aspect could explain the continued use of OCS.

**Table 4.** Reliability of the Indonesian version of OCS

	Construct Reliability		Internal Consistency	
	Coefficient $\omega$	Note	Coefficient $\alpha$	Note
Diminished impulse control	0.79	Reliable	0.80	high internal consistency
Distraction	0.82	Reliable	0.80	moderate internal consistency
Loneliness/Depression	0.79	Reliable	0.77	moderate internal consistency
Social comfort	0.88	Reliable	0.88	moderate internal consistency

**Table 5.** Factor loading of the Indonesian version of OCS items

Dimension	No. Item	Index	Note
Social comfort	1	0.53	Accepted
	3	0.51	Accepted
	6	0.43	Accepted
	7	0.57	Accepted
	8	0.40	Accepted
	9	0.47	Accepted
	13	0.50	Accepted
	14	0.49	Accepted
	16	0.63	Accepted
	18	0.51	Accepted
	19	0.53	Accepted
	26	0.55	Accepted
Loneliness/depression	2	0.49	Accepted
	22	0.56	Accepted
	23	0.59	Accepted
	24	0.53	Accepted
	25	0.51	Accepted
	35	0.48	Accepted
Diminished impulse control	4	0.58	Accepted
	5	0.61	Accepted
	10	0.52	Accepted
	11	0.50	Accepted
	15	0.69	Accepted
	17	0.49	Accepted
	21	0.69	Accepted
	34	0.55	Accepted
Distraction	36	0.45	Accepted
	20	0.51	Accepted
	27	0.53	Accepted
	28	0.51	Accepted
	31	0.46	Accepted
	30	0.53	Accepted
	32	0.58	Accepted
33	0.52	Accepted	

In the future, the Indonesian version of OCS could serve as an alternative for measuring PIU, whether for clinical purposes, school and job selection, or research on PIU. The limitation of this research was the unbalanced distribution of male and female participants, and additional demographic information would have enhanced the specificity of the results, providing a more accurate depiction of the population.

## Conclusion and Implications

This research shows that the Indonesian version of OCS can be said to be valid and reliable so that it can be used for the detection of problematic internet use conditions of individuals. The use of the Indonesian version of OCS, both in educational settings, organizations, and companies, as well

as in the mental health professional setting, can be a predictor of the emergence of PIU so that it can determine the treatment steps to overcome the problem and not disrupt the function of the individual itself. When the score obtained is still relatively low or moderate, treatment can be preventive so it does not develop into a disorder. For individuals with relatively high scores, curative treatment can be carried out by providing clinical assistance or therapy.

Considering that the use of the internet can currently be accessed from various levels of society, future research can involve participants with different backgrounds to be able to find out how far the OCS measures PIU in other participant groups, such as different age ranges, education, work background, residential location, and others. Based on the findings, a suggestion can be made to revise the Indonesian version of the OCS items with poor quality based on their validity and reliability, that is, item 12.

## Declaration

### Acknowledgement

The authors would like to thank all participants involved in this research.

### Author contributions

DUP: designed the study, wrote the manuscript, performed the analysis, and interpreted the result. H: Involved in planning, discussing the result supervising the work, writing reviews, and editing.

### Conflict of interest

The authors declare there is no conflict of interest.

### Funding

This research received no external funding.

### Orchid ID

Dhia Ulfah Purwati:  0009-0009-6486-9390  
Hanifah:  0009-0001-6426-8327

## Article history

Submissions: 2023-07-27

Review Process: 2023-11-13

Revised: 2023-11-20

Accepted: 2023-12-06

Published: 2024-01-31



## References

- Agbaria, Q. (2022). Cognitive behavioral intervention in dealing with internet addiction among Arab teenagers in Israel. *International Journal of Mental Health and Addiction*, 0123456789. <https://doi.org/10.1007/s11469-021-00733-6>
- Andangsari, E. W., Djunaidi, A., Fitriana, E., & Harding, D. (2019). Indonesia's problematic Internet use scale. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012239>
- APJII. (2022). Internet survey report APJII 2021 – 2022. *Association of Indonesian Internet Service Providers*. Retrived from <https://apjii.or.id/survei>
- Baumgartner, H., & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing*, 13(2), 139–161. [https://doi.org/https://doi.org/10.1016/0167-8116\(95\)00038-0](https://doi.org/https://doi.org/10.1016/0167-8116(95)00038-0)
- Bernardi, S., & Pallanti, S. (2009). Internet addiction: A descriptive clinical study focusing on comorbidities and dissociative symptoms. *Comprehensive Psychiatry*, 50(6), 510–516. <https://doi.org/10.1016/j.comppsy.2008.11.011>
- Bettmann, J. E., Anstadt, G., Casselman, B., & Ganesh, K. (2021). Young adult depression and anxiety linked to social media use: Assessment and treatment. *Clinical Social Work Journal*, 49(3), 368–379. <https://doi.org/10.1007/s10615-020-00752-1>
- Bishop, D. I., & Hertenstein, M. J. (2004). A confirmatory factor analysis of the structure of temperament questionnaire. *Educational and Psychological Measurement*, 64(6), 1019–1029. <https://doi.org/10.1177/0013164404264843>
- Błachnio, A., Przepiórka, A., & Hawi, N. S. (2015). Exploring the online cognition scale in a Polish sample. *Computers in Human Behavior*, 51(PA), 470–475. <https://doi.org/10.1016/j.chb.2015.05.028>
- Brown, T. (2015). *Confirmatory factor analysis for applied research second edition*. The Guilford Press.
- Byrne, B., & Campbell, T. (1999). Cross-cultural comparisons and the presumption of equivalent measurement and theoretical structure: A look beneath the surface. *Journal of Cross-Cultural Psychology*, 30(5), 555–574.
- Caplan, S. E. (2002). Problematic internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior*, 18(5), 553–575. [https://doi.org/https://doi.org/10.1016/S0747-5632\(02\)00004-3](https://doi.org/https://doi.org/10.1016/S0747-5632(02)00004-3)
- Caplan, S. E. (2010). Theory and measurement of generalized problematic internet use: A two-step approach. *Computers in Human Behavior*, 26(5), 1089–1097. <https://doi.org/10.1016/j.chb.2010.03.012>
- Casale, S., Primi, C., & Fioravanti, G. (2016). Generalized problematic internet uses Sscale 2: Update on the psychometric properties among Italian young adults. *The Psychology of Social Networking*, 2, 202–216. <https://doi.org/10.1515/9783110473858-016>
- Chao, C. M., Kao, K. Y., & Yu, T. K. (2020). Reactions to problematic internet use among adolescents: Inappropriate physical and mental health perspectives. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.01782>
- Chinn, W. (1998). *The partial least squares approach to structural equation modelling*. Modern Methods for Business Research (pp. 295–336). Lawrence Erlbaum Associates Publishers.
- Costa, R. M., Patrão, I., & Machado, M. (2019). Problematic internet use and feelings of loneliness. *International Journal of Psychiatry in Clinical Practice*, 23(2), 160–162. <https://doi.org/10.1080/13651501.2018.1539180>
- Davis, L. (1992). Instrument review: Getting the most from your panel of experts. *Applied Nursing Research*, 5, 194–197. [https://doi.org/10.1016/S0897-1897\(05\)80008-4](https://doi.org/10.1016/S0897-1897(05)80008-4)
- Davis, R. A. (2001). Cognitive-behavioral model of pathological internet use. *Computers in Human Behavior*, 17(2), 187–195. [https://doi.org/10.1016/S0747-5632\(00\)00041-8](https://doi.org/10.1016/S0747-5632(00)00041-8)
- Davis, R. A., Flett, G. L., & Besser, A. (2002). Validation of a new scale for measuring problematic internet use: Implications for pre-employment screening. *Cyberpsychology and Behavior*, 5(4), 331–345. <https://doi.org/10.1089/109493102760275581>
- DiStefano, C., Zhu, M., & Mîndrilă, D. (2009). Understanding and using factor scores: Considerations for the applied researcher. *Practical Assessment, Research & Evaluation*, 14(20), 1–11. <https://doi.org/10.7275/da8t-4g52>
- Harlendea, C. Z., & Kartasasmita, S. (2021). *The Relationship Between Loneliness and Problematic Internet Use Among Young Adults Who Are Social Media Users*. In S. Kartasasmita (Ed.), *Advances in Social Science, Education and Humanities Research*, 570, pp. 365–370). Atlantis Press SARL.
- Han, P., Wang, P., Lin, Q., Tian, Y., Gao, F., & Chen, Y. (2017). Reciprocal relationship between internet addiction and network-related maladaptive cognition among Chinese college freshmen: A longitudinal cross-lagged analysis. *Frontiers in Psychology*, 8(JUN), 1–9. <https://doi.org/10.3389/fpsyg.2017.01047>
- Hobart, J., & Cano, S. (2009). Improving the evaluation of therapeutic interventions in multiple sclerosis: The role of new psychometric methods. *Health Technology Assessment*, 13(12). <https://doi.org/10.3310/hta13120>
- Hu, L. & Bentler, P. . (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- International Test Commission. (2016). ITC Guidelines for Translating and Adapting Tests. Retrived from <http://www.intestcom.org>
- Jia, R., & Jia, H. . (2009). Factorial validity of problematic internet use scales. *Computers in Human Behavior*, 25(6), 1335–1342. <https://doi.org/https://doi.org/10.1016/j.chb.2009.06.004>
- Kim, S.-H., Yim, H.-W., Jo, S.-J., Jung, K.-I., Lee, K., & Park, M.-H. (2018). The effects of group cognitive behavioral therapy on the improvement of depression and anxiety in adolescents with problematic internet use. *Journal of the Korean Academy of Child and Adolescent Psychiatry*, 29(2), 73–79. <https://doi.org/10.5765/jkacap.2018.29.2.73>
- Komnenić, D., Filipović, S., & Vukosavljević-Gvozden, T. (2015). Assessing maladaptive cognitions related to online gaming: Proposing an adaptation of online cognitions scale. *Computers in Human Behavior*, 51(PA), 131–139. <https://doi.org/10.1016/j.chb.2015.04.051>
- Li, W., O'Brien, J. E., Snyder, S. M., & Howard, M. O. (2016). Diagnostic criteria for problematic internet use among U.S. university students: A mixed-methods evaluation. *PLoS ONE*, 11(1), 1–14. <https://doi.org/10.1371/journal.pone.0145981>



- Lynn, M. (1986). Determination and quantification of content validity index. *Nursing Research*, 35, 382–386. <https://doi.org/https://doi.org/10.1097/00006199-198611000-00017>
- Malak, M. . (2017). Internet addiction and cognitive behavioral therapy. *Intechopen Journal*, 5(3), 141–150. <https://doi.org/10.5772/intechopen.71277>
- Natanael, Y. (2021). Rasch model analysis of the scale of problematic internet use in Indonesia (IPIUS). *Persona:Jurnal Psikologi Indonesia*, 10(1), 167–186. <https://doi.org/10.30996/persona.v10i1.4827>
- Nwufo, J. I., Ike, O. O., Chidozie, O. E., Nnadozie, E. E., & Nwufo, C. L. (2022). Maladaptive cognition and problematic internet use among Nigerian adolescent students: Role of social anxiety. *Journal of Psychology in Africa*, 32(4), 353–358. <https://doi.org/DOI:10.1080/14330237.2022.2066365>
- Özcan, N. K., & Buzlu, S. (2005). A tool to determine problematic internet use: Validity and reliability of the 'Internet Cognitive State Scale' in university students. *Journal of Dependence*, 6, 19–26.
- Pauls, F., & Daseking, M. (2021). Revisiting the factor structure of the German WISC-V for clinical interpretability: An exploratory and confirmatory approach on the 10 primary Subtests. *Frontiers in Psychology*, 12. <https://doi.org/https://doi.org/10.3389/fpsyg.2021.710929>
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's Being reported? Critique and recommendations. *Research in Nursing & Health*, 29, 489–497. <https://doi.org/DOI:10.1002/nur.20147>
- Przepiorka, A. M., Blachnio, A., Miziak, B., & Czuczwar, S. J. (2014). Clinical approaches to treatment of Internet addiction. *Pharmacological Reports*, 66(2), 187–191. <https://doi.org/10.1016/j.pharep.2013.10.001>
- Putri, B. A., & Wahyudi, H. (2022). The relationship between problematic internet use and the subjective well-being of children and adolescents. *Jurnal Riset Psikologi*, 2, 13–20. <https://doi.org/10.29313/jrp.v2i1.668>
- Quirino, P. A. F., Pininga, R. M. C., Barros, M. M., Costa, P. F. F. da, Rodrigues Priscila Maria de Barros, Machado, M. C. F. de P., Galvão, P. V. M., & Silva, H. R. S. e. (2019). Comparison of the prevalence of addiction internet in Brazilian university students: Online cognition scale versus internet addiction test. *Open Journal of Depression and Anxiety*, November, 09–19. <https://doi.org/10.36811/ojda.2019.110003>
- Rini, E. S., Abdullah, M., & Rinaldi, M. R. (2020). Loneliness and problematic internet use among university students. *Jurnal Psikologi*, 11(2), 228–238. <https://doi.org/10.24036/rapun.v11i2>
- Roberts, A., Sharman, S., & Bowden-Jones, H. (2022). Clinical services for problematic internet usage. *Current Opinion in Behavioral Sciences*, 46(July), 101180. <https://doi.org/10.1016/j.cobeha.2022.101180>
- Silva, H. R. de S. e., Areco, K. C. N., Bandiera-Paiva, P., Galvao, P. V. M., Garcia, A. N. de M., & Silveira, D. X. da. (2017). Reliability and construct validity of the online cognition scale in the Portuguese (Brazil) version (OCS-BR). *Jornal Brasileiro de Psiquiatria*, 66(1), 19–28. <https://doi.org/10.1590/0047-2085000000146>
- Streiner, D. L., & Norman, G. (2003). *Health measurement scales: A practical guide to their development and use*. Oxford University Press.
- Sürücü, L., & Maslakçı, A. (2020). Validity and reliability in quantitative research. *Business & management studies: An International Journal*, 8(3). <https://doi.org/https://doi.org/10.15295/bmij.v8i3.1540>
- Syihab, A., Rani, D., & Paramita, A. D. (2020). The relationship between psychological well-being and problematic internet use in emerging adults. *ANFUSINA: Journal of Psychology*, 3(1), 51–68. <https://doi.org/10.24042/ajp.v3i1.6116>
- Tavakol, M., & Wetzel, A. (2020). Factor Analysis: a means for theory and instrument development in support of construct validity. *International Journal of Medical Education*, 11, 245–247. <https://doi.org/10.5116/ijme.5f96.0f4a>
- Waltz, C., Strickland, O. & Lenz, E. (1991) *Measurement in Nursing Research*. 2nd Edition, F.A. Davis Company, Philadelphia.
- Wölfling, K., & Dominick, N. (2022). Using cognitive behavioral therapy as the select treatment approach for problematic internet usage. *Current Opinion in Behavioral Sciences*, 45, 101121. <https://doi.org/10.1016/j.cobeha.2022.101121>
- Wongpakaran, N., Wongpakaran, T., Pinyopornpanish, M., Simcharoen, S., & Kuntawong, P. (2021). Loneliness and problematic internet use: testing the role of interpersonal problems and motivation for internet use. *BMC Psychiatry*, 21(1), 1–11. <https://doi.org/10.1186/s12888-021-03457-y>
- Xia, Y., & Yang, Y. (2019). RMSEA, CFI, and TLI in structural equation modeling with ordered categorical data: The story they tell depends on the estimation methods. *Behavior Research Methods*, 51(1), 409–428. <https://doi.org/https://doi.org/10.3758/s13428-018-1055-2>
- Yashinta, Y., & Hurriyati, D. (2020). The Use of Problematic Internet Use in Addressing Adolescent Loneliness. *Jurnal Ilmiah Psyche*, 14, 45–60. <https://doi.org/10.33557/jpsyche.v14i1.983>
- Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H., & Nikanfar, A. (2015). Design and implementation content validity study: Development of an instrument for measuring patient-centered Communication. *J Caring Sci*, 4(2), 165–178. <https://doi.org/10.15171/jcs.2015.017>