RESEARCH ARTICLE

# VALIDITY AND RELIABILITY TESTING OF INDONESIAN VERSION OF ORTO-15: AN INSTRUMENT FOR ORTHOREXIA NERVOSA ASSESSMENT

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## Abstract

Eating disorders are often underdiagnosed. Orthorexia nervosa (ON), a new type of eating disorder, is defined as excessive preoccupation with healthy eating, causing significant nutritional deficiencies and social and personal impairments. The ORTO-15 is a 15-item instrument widely used to evaluate orthorexia nervosa. It was developed by Donini et al (2005) in Italian and has been translated and adapted in other languages. In this study, the validity and reliability of the Indonesian version of ORTO-15 were assessed.

The Indonesian version of the instrument was then reviewed by experts after translation. The back-translation was assessed for consistency with the original instrument. The instrument was then statistically-tested for validity and reliability on 50 randomly selected subjects. The subjects were balanced in gender and the mean age was 19.4 + 0.8 years. The reliability was tested using Cronbach's alpha. The validity was tested using Pearson's product-moment correlation and confirmatory factor analyses (CFA).

The Pearson product moment verified good validity for the instrument (r = 0.369 – 0.881). CFA analyses confirmed good communalities (extraction > 0.5) and revealed three components construct (cumulative 73.5%). Reliability test confirmed that the instrument had good reliability (Cronbach's alpha = 0.915).

The ORTO-15 Indonesian version is a valid and reliable instrument for the assessment of ON.

**Keywords:** *eating disorder, orthorexia nervosa, instrument, validity, reliability*

## Introduction

Orthorexia nervosa (ON) was first coined by Bratman in the 1990s. ON is defined as a fixation on eating healthy food to avoid ill health and disease. It often starts as a desire to improve one's diet and/or eating habits or general health which turns into an obsession (Bratman & Knight, 2000; Håman et al, 2015).

People with ON follow strict dietary rules intended to promote health but eventually leading to possible health-detrimental consequences (Brytek-Materaet al, 2018). They follow a very rigid diet and reject many foods, due to their composition or elaboration (e.g. fat, sugar, salt, or other undesired components). They also become extremely selective about their choice of food in the context of its purity, origin, the presence of artificial ingredients or additives/preservatives. This dieting attitude may lead to nutritional deficits and medical complications (e.g. osteopenia, anemia, pancytopenia, hyponatremia, metabolic acidosis, and bradycardia). In extreme cases, an orthorexic person may even prefer to starve rather than eating foods they consider to be impure, unhealthy, and harmful to health (Bratman & Knight, 2000; Chaki, Pal, & Bandyopadhyay, 2013; Park et al., 2011).

Even though eating disorders are prevalent, they are often underdiagnosed. They are often diagnosed after physical complaints or complications occurred. Therefore, a valid and reliable instrument is required to screen for eating disorders.

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ON is not yet included in the Diagnostic and Statistical Manual of Mental Disorders (DSM–5); hence, no valid diagnostic criteria are available. Given the consequences of ON, a proper diagnostic tool is required for screening and diagnosis of ON. Therefore, the availability of a valid and reliable instrument is crucial for both the study and management of ON. ORTO-15 is an instrument developed based on two elements (obsession with healthy food and eating) and can be used as a diagnostic tool to determine the prevalence of ON (Håman et al., 2015).

Donini et al. (2005) developed the ORTO-15 instrument for the diagnosis of ON based on a brief 10-item orthorexia questionnaire by Bratman. The instrument was developed in Italy in 2001 and was reported to be valid and reliable in 2005 by Donini et al (2005). The subjects for the study were 525 Italian volunteers. They reported that ORTO-15 showed a good predictive capability with cut off point 40 (efficacy 73.8%; sensitivity 55.6%, and specificity 75.8%) (Bratman & Knight, 2000; Brytek-Matera, 2012; Donini et al, 2005).

Most studies in the field of ON have adapted the ORTO-15 instrument and it has been translated in other languages (Dunn & Bratman, 2016). In this study, we tested ORTO-15 for validity and reliability in the Indonesian language.

## Methodology

### Subjects

This study was a preliminary study for the study of ON. 211 subjects participated in this study. We randomly selected 50 subjects using a random number generator for the study of validity and reliability of the Indonesian version of ORTO-15. The subjects were gender-balanced with an average age of 19.4 $\pm$ 0.8 years.

### Instrument

ORTO-15 is made up of 15 multiple-choice items about the subject's eating behaviors answerable by *always*, *often*, *sometimes*, and *never*. It has a specific scoring for each item. For item 1 and 13, the pointing system is as follows: always = 2; often = 4; sometimes = 3; and never = 1. For item 2, 5, 8, and 9, the scores are always = 4; often = 3; sometimes = 2; and never = 1. For the rest of the items, the scores are always = 1; often = 2; sometimes = 3; and never = 4. A total score of below 40 is considered as having ON.

The validation process of the Indonesian version of ORTO-15 consisted of the following steps: a) translation to Indonesian language, b) expert review of the translated instrument, c) back translation into English, and d) checking for consistency after back translation.

The Indonesian version of the instrument was then reviewed by a psychiatrist from the Department of Psychiatry, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, and a psychometric expert from the Faculty of Psychology, Universitas Gadjah Mada. The back-translation was assessed for consistency with the original instrument.

### Statistical analysis

Validity was verified with Pearson's product-moment correlation and confirmatory factor analysis (CFA). CFA was conducted to confirm the structure of the Indonesian version of ORTO-15. Reliability was verified with Cronbach's Alpha measurement. Statistical analyses were performed using IBM SPSS ver. 20.

## Results

This study showed that the Indonesian version of ORTO-15 is a valid and reliable instrument for the assessment of ON. The analyses showed that the instrument has good internal consistency and reliability.

Pearson's product-moment analyses were used to check for content validity and internal consistency of the Indonesian version of ORTO-15. The result is presented in table 1.

Pearson's product-moment analyses showed that each item of the ORTO-15 correlated with the total score. All items were valid as shown in table 1 (r = 0.369 – 0.881). This result showed that the instrument has good content validity and internal consistency.

**Table 1.** *Results of Pearson's product-moment analyses of ORTO-15*

| No item | R | p | No item | r | P |
|---|---|---|---|---|---|
| Item 1 | 0.746 | < 0.001 | Item 9 | 0.718 | < 0.001 |
| Item 2 | 0.782 | < 0.001 | Item 10 | 0.445 | 0.001 |
| Item 3 | 0.720 | < 0.001 | Item 11 | 0.450 | 0.001 |
| Item 4 | 0.369 | 0.008 | Item 12 | 0.821 | < 0.001 |
| Item 5 | 0.881 | < 0.001 | Item 13 | 0.802 | < 0.001 |
| Item 6 | 0.414 | 0.003 | Item 14 | 0.774 | < 0.001 |
| Item 7 | 0.459 | 0.001 | Item 15 | 0.770 | < 0.001 |
| Item 8 | 0.836 | < 0.001 | | | |

Previous studies have shown the validity and reliability of ORTO-15 when translated into other languages. The Polish version of ORTO-15 was reported to be a valid and reliable instrument (Stochel et al, 2015). The Arabic version of the instrument was also validated in a sample of Lebanese population and was also found to be valid and reliable (Haddad et al, 2020).

However, some studies have also shown that some items were not consistently valid and reliable upon translation. An example of this is the German version of ORTO-15. They only found 9 out of the 15 items to be valid and reliable and opted for the shortened version (Missbach et al, 2015). The Spanish version also showed that only 11 of the items were valid and reliable (Roncero et al, 2017), similar to the Turkish version (Arusoglu et al, 2008).

Next, the CFA analyses were conducted. The Kaiser-Meyer-Olkin (KMO = 0.777) and Bartlett's test of sphericity (p = < 0.001) showed that the sample was sufficient to conduct CFA (table 2). The measure of sampling adequacy (MSA) with anti-image correlation showed to CFA applied to all question items in the instruments. All the MSA coefficients showed values > 0.5 (range 0.528 – 0.896; table 3). The results verified that all items satisfied the condition for CFA.

**Table 2.** *Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of sphericity*

| | | |
|---|---|---|
| KMO | | 0.777 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 566.041 |
| | df | 105 |
| | p | < 0.001 |

**Table 3.** *Measure of sampling adequacy with anti-image correlation*

| No item | Coefficients | No item | Coefficients |
|---|---|---|---|
| Item 1 | 0.829 | Item 9 | 0.798 |
| Item 2 | 0.852 | Item 10 | 0.896 |
| Item 3 | 0.692 | Item 11 | 0.528 |
| Item 4 | 0.634 | Item 12 | 0.764 |
| Item 5 | 0.788 | Item 13 | 0.831 |
| Item 6 | 0.659 | Item 14 | 0.786 |
| Item 7 | 0.773 | Item 15 | 0.816 |
| Item 8 | 0.821 | | |

The study showed that all 15 items of the instrument fit the model for CFA analyses. This result is in accordance with the study of Polish and Arabic versions of the instrument (Stochel et al, 2015; Haddad et al, 2020). The German version of the instrument only included 9 items in the CFA analyses, while the Spanish and Turkish versions included 11 items (Missbach et al, 2015; Roncero et al, 2017; Arusoglu et al, 2008).

The next step was then to conduct the communalities test to assess how each item can be explained by the whole construct. Communalities assess how well an item explains the proposed construct. In this study, it would be the detection of ON using the total score of ORTO-15. The initial should be 1 since it is expected that the items will perfectly explain the construct, but, a value greater than 0.5 (50%) is already considered good. The communalities test showed that each item satisfactorily explained the total construct, except for item 10. The item scores can predict the total score by more than 50% (extraction > 0.5; table 4), except for item 10.

**Table 4.** *Communalities test with principal component analyses*

| Items | Initial | Extraction |
|---|---|---|
| item 1 | 1.000 | 0.689 |
| item 2 | 1.000 | 0.784 |
| item 3 | 1.000 | 0.814 |
| item 4 | 1.000 | 0.765 |
| item 5 | 1.000 | 0.806 |
| item 6 | 1.000 | 0.810 |
| item 7 | 1.000 | 0.720 |
| item 8 | 1.000 | 0.793 |
| item 9 | 1.000 | 0.679 |
| item 10 | 1.000 | 0.498 |
| item 11 | 1.000 | 0.737 |
| item 12 | 1.000 | 0.704 |
| item 13 | 1.000 | 0.740 |
| item 14 | 1.000 | 0.749 |
| item 15 | 1.000 | 0.735 |

The previous study on the validity and reliability of ORTO-15 did not report this measure, but some studies decided to omit items from the instrument. In this study, it was conducted to decide whether some items could not explain the proposed construct. All the items satisfied the conditions except item 10. However, item 10 was still kept since its extraction is very close to 0.5.

The component extraction analysis (items with Eigenvalues > 1) verified 3 components that can explain 73.5% of the construct (table 5). Most of the construct can be explained with the first component (47.9%).

**Table 5.** *Component extraction of ORTO-15 with Eigenvalues > 1*

| Component | Extraction of sum squared loadings | | |
|---|---|---|---|
| | Total | % of variance | Cumulative |
| 1 | 7.190 | 47.931 | 47.931 |
| 2 | 2.233 | 14.887 | 62.818 |
| 3 | 1.599 | 10.660 | 73.478 |

The Indonesian version of ORTO-15 retained the original 3 components of the construct. The 3 components can explain up to 73.5% of the variance of the responses as shown by the cumulative extraction.

Multiple components and items to measure a construct aid in the determination of the reliability of measurement and, in general, improve the reliability or precision of the measurement (Kimberlin & Winterstein, 2008). It has been shown that this instrument has high reliability.

The reliability test showed that the Indonesian version of ORTO-15 has good reliability. Cronbach's alpha was 0.915 (table 6).

**Table 6.** *Reliability test result of ORTO-15*

| Cronbach's Alpha | n of items |
|---|---|
| 0.915 | 15 |

The Indonesian version of ORTO-15 is a reliable instrument. Reliability is a very important factor in assessment and is presented as an aspect contributing to validity. Reliability reflects consistency and replicability over time (Kimberlin &Winterstein, 2008). Results showed that the instrument will be consistent over time.

## Discussions

ORTO-15 has been widely used to assess and study ON. It is used to measure the tendency for ON (Dunn & Bratman, 2016). Key indicators of the quality of a measuring instrument are the validity and reliability of the measures (Kimberlin & Winterstein, 2008). In this study, the Indonesian version of ORTO-15 is a valid instrument. Validity refers to the appropriateness of the inferences made about the results of an assessment using the instrument. The analysis showed that the instrument can be used to measure orthorexic tendency.

Some researchers argue on the cultural component of healthy eating behaviors that are not accommodated in ORTO-15. Healthy eating behaviors of some cultures and sport practitioners do not necessarily influence individuals' lives negatively (Håman et al., 2015; Herranz Valera et al, 2014). Some of the questions are difficult to classify as dysfunctional signals because individuals who eat healthfully could also score high on some of the questions. The instrument also does not consider temporal evolution. For instance, an individual could score high on the ORTO-15 because of a period of dieting that is transient (Håman et al., 2015). Therefore, ORTO-15 should be used in combination with careful diagnostic interviews since ORTO-15 is unable to distinguish between healthy eating and pathologically-healthy eating (Brytek-Matera et al., 2018).

The ORTO-15 is a self-report instrument. The use of self-report instrument poses bias. Subjects may provide responses that are socially acceptable or that are in line with the impression they want to create (Kimberlin & Winterstein, 2008). Although the Indonesian version of ORTO-15 is a valid and reliable instrument, careful consideration for this possibility is warranted when interpreting the results of the measurements.

## Limitations

This study was conducted with normal and relatively young population. Careful analysis should be conducted in high-risk subjects or subjects who culturally might have symptoms of ON (such as people with strict dietary requirements due to illnesses).
Conclusion and Recommendation

The ORTO-15 Indonesian version is a valid and reliable instrument for the assessment of ON. It can be used for further studies of ON in Indonesia which might provide a better insight into the cultural aspect of ON.

Based on the results of this study, the use of this instrument to screen for ON is recommended. Using this instrument in high-risk populations, people with specific dietary requirements or those with culturally-specific eating behaviors should be carefully analyzed.

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### Conflict of interest

There is no conflict of interest in this study.

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### Ethical approval

The protocol of this study has been reviewed and approved by MHREC Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada.

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