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Translation and Validation of the Dental Impact Daily Living Oral Health-related Quality of Life Questionnaire in Indonesia

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Translation and Validation of the Dental Impact Daily Living Oral Health-related Quality of Life Questionnaire in Indonesia

Ira Tanti, Melisa, Henni Koesmaningati

Department of Prosthodontics, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

ABSTRACT

Objective: The need to assess oral health-related quality of life (OHRQoL) has grown increasingly in the healthcare sector over the past few decades. The Dental Impact on Daily Living (DIDL) assessment is a tool created to measure OHRQoL. The aim of this study was to complete a cross-cultural adaptation of the DIDL to yield a valid and reliable Indonesian version for use as an official instrument to assist in further OHRQoL research in Indonesia. **Materials and Methods:** The original English version of the DIDL was translated and validated. Content validity and face validity were considered. Psychometric testing for test–retest reliability was analyzed among 32 subjects, while internal consistency using Cronbach's alpha and clinical oral health status using the DMF-T index to obtain convergent validity of the questionnaire were checked among 278 subjects. **Results:** The study subjects showed a good understanding of how to complete the Indonesian language version of the DIDL questionnaire, and conceptual and semantic equivalence (content and face validity) were noted. Further, test–retest reliability was noted (intraclass correlation coefficient range: 0.975–1 and Cronbach's alpha: 0.942), whereas convergent validity suggested a correlation between DMF-T and DIDL questionnaire of −0.502 with significance at alpha of 5% ($P = 0.00$), which means that decreasing the DMF-T outcome will increase the satisfaction using the DIDL among research subjects. **Conclusion:** Cross-cultural adaptation of the DIDL yielded a valid and reliable Indonesian version. The DIDL questionnaire is a promising questionnaire that can be applied to measure OHRQoL in Indonesians.

Keywords: *Daily living, DIDL, oral health*

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Introduction

The most important goal of dental care is to help patients achieve an acceptable level of satisfaction with the oral cavity and dentition. Poor oral health status can lead to illness, an inability to eat, disruption to speech, lack of sleep, and a lower quality of life.[1,2] Therefore, the need to assess the oral health-related quality of life (OHRQoL) has become increasingly recognized over the past few decades.[1-3]

OHRQoL is a personal report specifically relating to the health of the oral cavity that considers the functional, social, and psychological aspects of oral disease. In fact, OHRQoL is an integral part of general health and well-being and is recognized by the World Health Organization as an important segment of the global oral health program.[3] Some studies have previously reported a relationship between teeth and OHRQoL. Multi-item questionnaires are the most widely used method to assess OHRQoL. Researchers have developed an array of OHRQoL questionnaires to

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Address for correspondence: Dr. Ira Tanti, Department of Prosthodontics, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia.
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date, and the number only continues to grow rapidly to comply with the demand for more specific measures.[4] Known examples include the Dental Impact on Daily Living (DIDL), Oral Health Impact Profile (OHIP), World Health Organization Quality of Life, OHIP-14, United Kingdom Oral Health-related Quality of Life, Oral Impacts on Daily Performance, and EuroQoL.[5]

The DIDL is one of the tools created by Leao and Sheiham made to measure oral perceptions of health and the correlation with quality of life.[1] It consists of 36 items designed to assess various impacts in five dimensions using a Likert scale, a method that quantifies the value assigned to each dimension by participants. Psychosocial problems are reflected in the quality of life score accordingly with the report of individual mouth conditions, using five dimensions of quality of life—namely, comfort (related to gingival health and the absence of food impaction), appearance (individual self-image), pain, performance (ability to do normal activities every day and interact socially), and eating restrictions (in biting and chewing).[1,5,6]

The DIDL is an easy tool for use by patients and clinicians alike. The items of this tool are simple and can be easily understood and scored. In addition, this test can be completed in a relatively short time period.[7] The literature indicates that this test is considered reliable, accurate, and reproducible.[8] The DIDL has also been successfully assessed in several countries with different cultures and languages, validated with a reliability of 0.87 and an internal consistency of 0.85.[6,9] However, to our knowledge, no Indonesian version of the DIDL exists. To ensure accurate answers are collected, investigators may need to translate existing questionnaires into the respondent's native language.[10] The aim of this study was therefore to complete a cross-cultural adaptation of the DIDL to yield a valid and reliable Indonesian version for use as an official instrument to assist in further OHRQoL research in Indonesia.

Materials and Methods

Study design and ethical considerations

The study emphasizes the cross-cultural adaptation of the DIDL. This cross-cultural adaptation followed a standard procedure that is internationally recognized and which has been well documented in numerous applications as referred to by Beaton *et al.*[11] The sample size was calculated to test the reliability of the questionnaire. Based on a significance level of 5% and targeted statistical power of 80%, 265 participants were required. Allowing for an attrition rate of 5%, 278 participants had to be recruited.

This study was a cross-sectional design and the subjects were identified by random consecutive sampling from inclusion criteria: among all dental students, all postgraduate dental students, and patients in a dental hospital, Faculty of Dentistry, Universitas Indonesia, able to communicate and willing to fill out the DIDL questionnaire sheet. Subjects who were unwilling to join the study or unable to communicate were excluded. Informed consent was sought and obtained from all subjects. The research protocol was approved by the Ethics Committee of Universitas Indonesia (no. 29/ethical approval/FKGUI/III/2019). The first step involved forming two translation teams, each consisting of two translators. The first team translated the DIDL questionnaire from English into Indonesian. The second team then retranslated the questionnaire back into English. Both teams did not meet with each other to discuss the questionnaire. It was decided to use members of the Indonesian University Language Institute as the first team and members of credible private language institutions as the second team.

After the questionnaire was translated into Indonesian, discussions were conducted on the results of the translation. The expert panel consisted of linguists; two prosthodontics staff from the Faculty of Dentistry, Universitas Indonesia; and one postgraduate student of prosthodontics from the Faculty of Dentistry, Universitas Indonesia, who gathered to conduct a transcultural content validation of the questionnaire to discern whether the translated and original versions showed semantic, idiomatic, experiential, and conceptual equivalence through making the necessary modifications to suit Indonesian culture.

After completing the translated questionnaire, 10 subjects were asked (verbally by an interviewer or via an open-ended question) to elaborate what they thought each questionnaire item and their corresponding response meant to ensure that the translated items retained the same meaning as the original items and to confirm that there was no confusion regarding the translated questionnaire.

Psychometric testing for test–retest reliability was conducted in 32 subjects. The questionnaire was applied two times, with an interval of 7–10 days in between, by the same researcher (intra-observer reliability). The second application procedure was identical to the first administration. Subsequently, in a cross-sectional study, the final DIDL questionnaire was deployed among 278 subjects to analyze its internal consistency using Cronbach's alpha and the convergent validity using an oral examination based on the DMF-T index.

This examination was completed by one researcher with a maximum of 20 subjects checked each day.

Description of the DIDL

The DIDL consists of 36 items with five dimensions as follows:

1. Appearance (n = 4 questions; question nos. 1, 3, 4, and 5);
2. Pain (n = 4 questions; question nos. 17, 18, 19, and 20);
3. Comfort (n = 7 questions; question nos. 2, 8, 9, 16, 34, 35, and 36);
4. Performance (n = 15 questions; question nos. 6, 7, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, and 33);
5. Eating restrictions or disability (n = 6; question nos. 10, 11, 12, 13, 14, and 15).

Using the DIDL scale, subjects were asked to rate each dimension by awarding a score from 0 to 10 points to measure the relative importance of each dimension to the subjects. Then, subjects were asked to begin scoring the items of the questionnaire by selecting one answer for each item to measure their response to that item. Subjects' ratings were assessed by three scales: positive, neutral, or negative. Scores for answers were given according to whether the impact was positive (+1), neutral (0), or negative (−1). Individual items within a dimension were then summed and divided by the number of dimension items. The formula to calculate a final score for the DIDL is presented below:

[(sum of scores of questions about appearance/no. of questions of appearance) × weight attributed to appearance] + [(sum of scores of questions about pain/no. of questions of pain) × weight attributed to pain] + [(sum of scores of questions about comfort/no. of questions of comfort) × weight attributed to comfort] + [(sum of scores of questions about performance/no. of questions of performance) × weight attributed to performance] = total score.

A score for each category was thus obtained.[12] Those who were satisfied with their mouths had scores ranging from 1 to 0.7 point(s), those who were relatively satisfied had scores ranging from 0.69 to 0 points, and those who were unsatisfied had scores of less than 0 points.[12]

Results

A prefinal version of the translated questionnaire was created. The team gathered at the Department of Prosthodontics, Faculty of Dentistry, Universitas Indonesia on June 21, 2019, where the DIDL questionnaire was translated and content validity was confirmed by correcting the words of the expert panel. After the questionnaire was corrected, the translated DIDL was filled out by other 10 respondents for face validity. Another suggestion from the respondents was adding the answer box for the checked answer. In the original version, there was not a place to answer the questionnaire, so the subjects were left a bit confused as to where to fill in their answers. The questionnaire included a global rating question to measure oral perceptions of health and the correlation with quality of life as measured by a 5-point Likert scale.

To measure the test–retest reliability, interclass coefficient correlation (ICC) was used. The step taken was adding the scores of each question item to each dimension in the first measurement and the second measurement. The second step taken was to calculate the ICC correlation for each dimension [Table 1]. The final version was unanimously found to be perfectly understood by another 32 subjects.

The calculation results showed that the ICC between the first and second measurements for each dimension was very high. Patients tended to provide relatively the same perception or assessment between the first and second measurements.

Further testing of the Indonesian version of the DIDL was conducted in another 278 subjects. The characteristics of the subjects consist of 111 male and 167 female. Subjects were divided into two groups: the productive age (15–64 years) and non-productive age groups (over 65 years) [Table 2]. An oral examination using the index DMF-T was also carried out, with 278 subjects having a minimum DMF-T score of zero points and a maximum score of 32 points [Table 3]. According to the World Health Organization classification, DMF-T scores ranging from 0 to 36 points vary as low to very high DMF-T.

The internal consistency for all dimensions was confirmed using Cronbach's alpha which was 0.942, suggesting excellent reliability. Cronbach's alpha values for the subscales (dimension) to measure appearance, comfort, performance, food restriction, and pain were 0.846, 0.702, 0.848, 0.946, and 0.726, respectively [Table 4].

Correlation analysis with clinical oral status using the DMF-T index and DIDL questionnaire was

Table 1: The ICC of the DIDL (n = 32)

Dimension	ICC
Appearance	1.000
Comfort	0.996
Perform	0.975
Food restriction	1.000
Pain	0.987

Table 2: Characteristics of the subject

Subjects demographic		Frequency (n= 278)	Percentage (%)
Gender	Male	111	39.9
	Female	167	60.1
Age	Productive (15–64 years)	261	93.9
	Non-productive (over 65 years)	17	6.1

Table 3: Distribution of index DMF-T

	n	Minimum	Maximum	Mean	Std. deviation
DMF-T average	278	0.00	32.00	8.2878	7.39474

performed with the Spearman rho correlation because both data distributions were not normal. Correlation between DMF-T and satisfaction score is −0.502, with significance at an alpha of 5% (P = 0.00), which means that decreasing the DMF-T will increase the satisfaction of research subjects. In other words, the lower the DMF-T score, the more satisfaction will increase; otherwise, the greater the DMF-T score, the lower the satisfaction of the research subjects will be. The correlation between DMF-T and other satisfaction parameters was also significant at an alpha of 5% and had a negative direction, meaning that with lower DMF-T scores, the appearance, comfort, performance, eating restrictions, and pain will increase. Specifically, DMF had a significant and negative correlation with appearance (r = −0.483), comfort (r = −0.317), performance (r = −0.395), eating restrictions (r = −0.551), and pain (r = −0.197). Among the five dimensions, the correlation of DMF-T and eating restrictions was the strongest and the correlation of DMF-T and pain was the weakest, meaning that the relationship between DMF-T and satisfaction is more dominated by the dimension of eating restrictions.

Discussion

This was the first study to examine OHRQoL in Indonesia using the DIDL questionnaire. Although DIDL has been proven valid and reliable in many studies in different languages, there is no DIDL questionnaire in Indonesian and cross-cultural adaptation is needed when it is used in different countries from the initial DIDL in English. The cross-cultural adaptation process consists of translation into a second language, retranslation into English, discussions to eliminate dualism in the translated version, testing the version of the translation that has been approved on a representative group of people, as well as assessing the psychometric characteristics of the questionnaire on the research respondents. This is important because there may be differences in the pronunciation of a specific term and difficulties in finding comparable ideas or phenomena in different languages. Cultural differences in the same country still require cross-cultural adaptation as well as validity and reliability testing; this needs to be done to ensure the correct use of language, including the possibility of changing the use of terms that are more appropriate to the local culture and ensuring that there is no change in validity and reliability. Cultural differences with the same oral condition can be viewed in different ways and provide a different quality of life for the population. Patients with different cultural backgrounds may place different emphases on the various aspects asked in the questionnaire.[11]

The results of the present study indicate that the Indonesian version of the DIDL is a reliable and valid means to measure OHRQoL. In the process of translating the questionnaire, some discrepancies between the original text and backward translation were found. The comparison between the original and backward translation of the DIDL needs to be done to ensure the proper use of language, including the possibility of changing the use of terms that are more in line with the local culture and ensuring that there are no changes in validity and reliability. Translation into the Indonesian language was done without any major problems. Validity means that the research has succeeded in finding what the researcher has stated through the instrument or that the observations reported can be trusted and the extent to which the results obtained can be applied to other populations is high. Reliable research means that research has stable results and can be repeated by other researchers.[10,13]

In terms of reliability, the ICC was calculated from the agreement observed in two interviews over a 7–10-day period with the same researcher. Test–retest reliability can be considered to indicate the stability of respondents' attributes; if the duration between the first time and second time is too short, individuals may remember their responses from the first time.[10] The second test was done at least 1 week after the first time the respondent filled

Table 4: The reliability test and corrected item-total correlation

Dimension	Cronbach's alpha	Question		Corrected item-total correlation	Cronbach's alpha if item deleted
Appearance	0.846	Q1	*How satisfied have you been, on the whole, with your teeth in the last 3 months?*	0.806	0.747
		Q3	*How satisfied have you been with the appearance of your teeth in the last 3 months?*	0.828	0.736
		Q4	*How satisfied have you been with the colour of your teeth in the last 3 months?*	0.537	0.861
		Q5	*How satisfied have you been with the position of your teeth (if they are crooked or not) in the last 3 months?*	0.582	0.845
Comfort	0.702	Q2	*Have your teeth worried you with any problem in the last 3 months?*	0.472	0.652
		Q8	*Sometimes, when people eat, they get food stuck between their teeth. Have you had any problems with food getting stuck between your teeth in the last 3 months?*	0.512	0.641
		Q9	*Sometimes people have bad breath. Have you had any bad breath caused by any problems in your mouth, during the last 3 months?*	0.427	0.665
		Q16	*Have you had any loose teeth in the last 3 months?*	0.448	0.659
		Q34	*How satisfied have you been, on the whole, with your gums in the last 3 months?*	0.378	0.678
		Q35	*Have your gums bled in the last 3 months?*	0.4	0.672
		Q36	*Have you felt any sensitivity when you ate or drank anything cold or acidic because your gums retracted in the last 3 months?*	0.254	0.709
Performance	0.848	Q6	*Some people when not satisfied with their teeth avoid showing them when they smile. Have you tried to avoid showing your teeth when smiling or laughing in the last 3 months?*	0.659	0.827
		Q7	*How satisfied have you been in showing your teeth when you smiled in the last 3 months?*	0.668	0.827
		Q21	*How much did the appearance of your teeth affect your working capacity during the last 3 months?*	0.702	0.825
		Q22	*If you had toothache or any jaw joint pain, how much did this pain affect your working capacity during the last 3 months?*	0.348	0.846
		Q23	*How much did the function of your teeth (like, eating, talking) affect your working capacity during the last 3 months?*	0.766	0.82
		Q24	*How much did the appearance of your teeth affect your contact with people (for example, going out with friends) during the last 3 months?*	0.729	0.822
		Q25	*If you had toothache or any jaw joint pain, how much did this pain affect your contact with people (for example, going out with friends) during the last 3 months?*	0.413	0.842
		Q26	*How much did the function of your teeth (like eating, talking) affect your contact with people (for example, going out with friends) during the last 3 months?*	0.664	0.828
		Q27	*How much did the appearance of your teeth affect your romantic life during the last 3 months?*	0.404	0.843
		Q28	*If you had toothache or any jaw joint pain, how much did this pain affect your romantic life during the last 3 months?*	0.039*	0.858
		Q29	*How much did the function of your teeth (like eating, talking) affect your romantic life during the last 3 months?*	0.134*	0.854

Table 4: Continued

Dimension	Cronbach's alpha	Question		Corrected item-total correlation	Cronbach's alpha if item deleted
		Q30	*If you had any toothache or any jaw joint pain in the last 3 months, how much has this pain affected your sleep?*	0.123*	0.854
		Q31	*If you had any toothache or any jaw joint pain in the last 3 months, how much stress has this pain caused you?*	0.101*	0.857
		Q32	*Have your teeth helped you to feel confident during the last 3 months?*	0.443	0.842
		Q33	*Have your teeth caused any embarrassment in the last 3 months?*	0.679	0.826
Food restriction	0.946	Q10	*Have you had to change the food you eat for a long period of time (more than 3 months) because of anything the matter with your teeth?*	0.809	0.939
		Q11	*Have you had to change the way you prepare your food for a long period of time (more than 3 months) because of anything the matter with your teeth?*	0.847	0.935
		Q12	*How well have you been able to chew your food, without having any difficulties caused by your teeth in the last 3 months?*	0.849	0.935
		Q13	*How satisfied are you with your chewing?*	0.847	0.935
		Q14	*How well have you been able to bite your food, without having any difficulties caused by your teeth, in the last 3 months?*	0.88	0.931
		Q15	*How satisfied are you with your biting?*	0.789	0.942
Pain	0.726	Q17	*Have you had any spontaneous toothache (toothache without any specific cause) in the last 3 months?*	0.712	0.529
		Q18	*Have you had any toothache when you ate or drank anything cold/hot or sweet in the last 3 months?*	0.513	0.674
		Q19	*Have you had to change your food since this pain began?*	0.681	0.569
		Q20	*Have you had any pain in your jaw joint in the last 3 months?*	0.200*	0.801

An analysis was then performed between the DMF-T score and the satisfaction level of the subjects using the Indonesian version of the DIDL questionnaire to elucidate the convergent validity [Table 5].

out the questionnaire. The problem of testing reliability with the test–retest method is the potential for learning, continuing, or remembering the content of the first test, it could be the first test affecting the second test. The test–retest method itself does not have a clear limit on the minimum time interval for taking the first and second data. The length of time between the two test administrations also affects the reliability of the retest test. Very short time intervals allow respondents to still remember questions, whereas longer intervals increase the possibility of changes in the respondent's clinical status.[14] In this study, the time interval chosen was between 7 and 10 days since the first data collection, it is expected that the research respondents did not remember the contents of the questionnaire.

The ICC provides a measure of the agreement between observations made on two occasions, less the agreement that would be obtained by chance. When the agreement is perfect, the value of the ICC equals 1, whereas when the agreement is no better than that which would be obtained by chance, the value of the ICC is 0. The value of the ICC of all question items for the five dimensions in the DIDL ranged from 0.996 to 1, which is considered to suggest good agreement between the responses to a degree even higher than that in the original study by Leao and Sheiham, in which the test–retest result was 0.87.[9]

For final test internal consistency, Cronbach's alpha was 0.942, which was also higher than that in the previous study in which the value was 0.85.[9] In this study, findings of both higher ICC and Cronbach's alpha may be because of the smaller samples of 32 and 278 subjects relative to Leao and Sheiham's 84 and 662 subjects. It is important to note that Cronbach's alpha is a property of the

Table 5: Correlation between the DIDL and clinical oral status

		DMF-T average
Appearance	*r*	−0.483*
	p	0.00
Comfort	*R*	−0.317*
	P	0.00
Performance	*R*	−0.395*
	P	0.00
Eating restriction	*R*	−0.551*
	P	0.00
Pain	*R*	−0.197*
	P	0.00
Total score	*R*	−0.502*
	P	0.00

r = correlation; *p* = significance

*Analysis spearman rho

**r*-value. DIDL: Dental Impact on Daily Living; DMF-T: decayed, missing, filled teeth

responses from a specific sample of respondents. The use of Cronbach's alpha is not acceptable in all circumstances. Rather, the alpha value only indicates the extent to which the questionnaire is reliable for a particular population of examinees.[10] It has been shown that the DIDL questionnaire discriminates between different subjective impacts for different groups and also confirms that there are different subjective impacts for different social classes and sexes.[6] In the previous research, the study population was patients attending medical service, whereas in our investigation, the study population included dental students, postgraduate dental students, and patients. It is possible in the later study that, because of their background in dentistry, some subjects were biased in answering the DIDL questionnaire such that the results show higher ICC and Cronbach's alpha values.

From the results of the study, there are items that have a weak correlation, item numbers 20, 28, 29, 30, and 31. Looking at Cronbach's alpha, if Cronbach's alpha item deleted is greater than Cronbach's alpha dimension, the item is considered less valid. which are question numbers 4, 20, 28, 29, 30, 31, and 36. In this study, the researcher chose to keep the question items because the reliability value in the form of Cronbach's alpha was already high even though the items were omitted and all questions were still considered important to be assessed and the question items were related to assessing the respondent's OHRQoL.

In addition to filling out the questionnaire, an oral cavity examination was carried out based on the DMF-T index, seen from the presence or absence of cavities, missing teeth, or fillings for later analysis of convergent validation with the level of satisfaction of research respondents seen from the condition of their oral cavity.

The correlation of DMF-T with a moderate satisfaction score (−0.502) is significant with $P = 0.00$, which means that a decrease in DMF-T will increase the satisfaction of research respondents. The lower the DMF-T score, the higher the satisfaction, and the higher the DMF-T score, the lower the satisfaction of research respondents. The correlation between DMF-T and satisfaction dimensions is also significant at 5% alpha and has a negative direction. This means that the lower the DMF-T score, the respondent's appearance, comfort, performance, eating, and pain will increase. DMF-T affects OHRQoL, and the DIDL questionnaire can assess the OHRQoL level of research respondents well.

This study revealed results similar to those of Ganesh, Leao, and Sheiham, in which decreasing DMF-T scores can be most effective in changing OHRQoL. Decreasing the value of DMF-T leads to a higher level of patient satisfaction.[1,12] Regarding the clinical status, DMF-T scores are directly linked to OHRQoL: subjects with higher DMF-T scores think that they really have poor OHRQoL.[15] Research conducted by Kumar *et al.*[6] suggested a weak correlation existed between the DIDL questionnaire and oral health status among subjects from low social classes, whose priorities in life are different from those of subjects in higher social classes.

DIDL was also previously tested among Jordanian and non-Jordanian populations, and the reliability, validity, accuracy, and reproducibility of the Jordanian and non-Jordanian DIDL were authenticated.[7] Furthermore, the DIDL was found to be an efficient tool for use by patients and clinicians that can be completed within a relatively short time period. Its items are simple and can be easily understood and scored.[7,16] The DIDL also assesses the dental impact on daily living, including the relative importance that respondents attribute to each dimension and oral status. Also, the DIDL allows a respondent to indicate whether a problem is entirely internal or whether it has interpersonal or social impacts. Additionally, as impacts seldom occur separately, a single impact score is given to assess the total oral impact. As there are important links between quality of life and clinical oral status, data on significant impacts should be used to assess needs. This study has several limitations such as part of its sample population having a dentistry background, which may cause bias in filling out the questionnaire. Further, the study was only conducted by one examiner but, to overcome this, the examiner limited oral examinations only to a maximum of 20 subjects each day. There was no further analysis of sociodemographic factors done that could affect OHRQoL. Therefore, it is necessary to test the DIDL in larger populations and to provide additional

sociodemographic and psychosocial data of subjects because cultural differences even among subjects with the same mouth can yield a different OHRQoL.

Conclusion

Our cross-cultural adaptation of the DIDL yielded a valid and reliable Indonesian version of the DIDL. The DIDL questionnaire is a promising OHRQoL questionnaire that can be applied to the Indonesian population.

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Conflicts of interest

There are no conflicts of interest.

Authors contributions

IT designed the study, performed data interpretation, wrote and reviewed the manuscript to be published. M designed the study, performed the data collection, data analysis and interpretation, and wrote the manuscript. HK designed the study, performed data interpretation and reviewed the manuscript to be published.

Ethical policy and institutional review board statement

The research protocol was approved by the Ethics Committee of Research Faculty of Dentistry, Universitas Indonesia (no. 29/ethical approval/FKGUI/III/2019).

Patient declaration of consent

All research subjects have signed informed consent.

Data availability statement

Data can be obtained via email of corresponding author.

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