

Analysis of Indonesian Version of Index of Dental Anxiety and Fear (IDAF-4C)

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Abstract

This study aimed to validate the Indonesian version of the Index Dental Anxiety and Fear-4 Components (IDAF-4C) questionnaire. The IDAF-4C questionnaire was developed to measure dental anxiety and fear. The validity and reliability of the translated instrument need to be established before it can be used for further research stages. A cross-sectional study was conducted with 121 patients (age: 17–46 years) with indication of extraction at the Dental Hospital, Faculty of Dentistry, Universitas Indonesia. The questionnaire was translated into Indonesian by a certified translator and then finalized by a panel of experts including medical, dental, and language experts. The questionnaire consists of eight items with responses in the form of a Likert scale from 1 to 5. The validity and reliability were assessed using Cronbach's alpha. The results showed that IDAF-4C had a single-factor structure and that it showed good internal consistency with Cronbach's alpha and test-retest reliability (0.916). In this study, convergent validity was analyzed by comparing the Indonesian version of IDAF-4C with heart rate variability (HRV). The p value of the Mann Whitney test was found to show no statistical significance, indicating that the Indonesian IDAF-4C has equality.

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Introduction

Dental anxiety is one of the conditions suffered by patients that complicates dentists' work in practice. Dental anxiety is more specific than general anxiety. Dental anxiety refers to the tendency to feel anxious during dental care.¹ General anxiety is a response to an unpleasant experience and is typically followed by worry and fear. Anxiety is a subjective aspect of one's emotions, because it involves uncomfortable feelings, tension, and threat of failure, insecurity, and conflict. Furthermore, the individual is not completely aware of what caused him/her to experience anxiety. According to some literature, anxiety and fear are complementary because in

actual dental practice situations, patients experience real fear and anxiety that is subjective.²

In 1969, Dr. Normal L. Corah of the Department of Behavioral Science, School of Dentistry, State of the University of New York, developed the first dental anxiety scale (DAS). DAS was developed to measure dental anxiety and fears in adult patients; however, its questionnaire was too difficult for children to understand. Other reported dental anxiety tools include Kleinknecht's Dental Fear Survey (DFS) proposed in 1973, Stouthard's Dental Anxiety Inventory Short-Form (DAI-S) proposed in 1993, the Modified Dental Anxiety Scale (MDAS) proposed in 1995, the Hierarchical Anxiety Questionnaire (HAQ) proposed in 1999, and the Index of Dental Anxiety and Fear (IDAF-4C+) proposed in 2010.³

Armfield (2010) proposed the anxiety measure IDAF-4C+. It has three modules, including IDAF-4C dental phobia (IDAF-P) and

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potential anxiety-inducing stimuli (IDAF-S). IDAF-4C assesses four components: emotional, behavioral, psychological, and cognitive.⁴

Around 25 years of clinical research have shown that heart rate variability (HRV) is one of the most reliable indicators of anxiety. HRV refers to the variation in the time interval between one heartbeat and the next.⁵

On average, the heart rate typically ranges from 60 to 90 beats per minute. In fact, changes in heart rate can occur at every beat. Ismail et al. (2014) found that HRV looked stable and reliable to assess anxious conditions.⁶ HRV examination can be used to assess anxiety objectively.⁵

HRV can be used to measure naturally occurring irregularities in the heart rate. HRV is affected by the activity of the autonomic nervous system owing to stimulations; external stimulations can affect the sinoatrial node in the heart and cause HRV within minutes. HRV can be used to objectively assess the autonomic nervous system, cardiovascular system, and homeostasis system.⁷

As mentioned above, HRV can be used to objectively measure anxiety. However, this approach has some limitations. For example, interpreting the HRV value requires psychiatric expertise and special skills. Additionally, HRV measurement instruments are expensive. Therefore, a comparative analysis can be performed using the subjective IDAF-4C questionnaire, which is the latest dental anxiety measure. The IDAF-4C questionnaire has been translated into Indonesian so that it can be used flexibly by Indonesians.

Methods

Samples and Procedure

This study involved 121 patients (age: 18–46 years) at the Dental Hospital, Faculty of Dentistry, Universitas Indonesia. The inclusion criteria are deuterio-Malay race, no missing teeth, and secondary school graduate. The questionnaire was given and self-administered. Before dental extraction is performed, the patient filled out the IDAF-4C questionnaire and underwent HRV examination.

Translation Process

The Indonesian version of IDAF-4C was translated from the English version given by the

World Health Organization (WHO) in 2004.

First, the English IDAF-4C questionnaire was translated into Indonesian by two certified translators. Second, an Indonesian version of IDAF-4C was analyzed by a panel of experts in the field of medical and dental health. The language translations contain conceptual, semantic, and pragmatic equivalents for the Indonesian version and ensure that culturally translated content is appropriate, relevant, and meaningful.

The expert panel also included the two translators. By consensus, no differences were found in translation results at this stage. Third, the Indonesian version of IDAF-4C was translated back into English by two new certified, independent translators.

Fourth, the expert panel examined the sentence patterns and content validity and compared the original English questionnaire to the English translation of the Indonesian version of IDAF-4C. Fifth, in a preliminary test, the questionnaire was administered to 10 children who had graduated from junior high school and whose age fulfilled the inclusion criteria for both men and women.

They were asked about what they thought of the questions and whether they could understand the questions, and sixth, the Indonesian version of the IDAF-4C questionnaire was declared ready for use, as it was found that its language was easy to understand. Finally, this questionnaire was distributed as a test of its validity and reliability (Figure 1: Indonesian Version of Index of Dental Anxiety and Fear (IDAF-4C))

In this study, 121 subjects completed the Indonesian IDAF-4C questionnaire. The questionnaire took 2–4 min to fill. Then, the HRV was measured using an HRV analyzer tool (SA 3000p, Medicore, 1996 Task Force). Before HRV examination, the subjects were prohibited from drinking coffee (containing caffeine) and/or smoking for 2 h, allowed to eat only more than 2 h before the test, made to sleep in moderation, and prevented from using paint or other accessories.

The subject was asked to be in as comfortable a position as possible, not move, not speak, not close his/her eyes, not fall asleep, not regulate breathing and breathe normally, and remain relaxed.

Figure 1. Indonesian Version of Index of Dental.

'Setujukah Anda dengan pernyataan berikut?' :

- Saya merasa cemas sesaat sebelum pergi ke dokter gigi.
- Saya biasanya menghindari pergi ke dokter gigi karena saya menemukan pengalaman yang tidak menyenangkan atau menyedihkan.
- Saya gugup atau gelisah pada kunjungan ke drg berikutnya.
- Saya berpikir bahwa sesuatu yang sangat buruk akan terjadi pada saya jika saya harus mengunjungi dokter gigi.
- Saya merasa takut atau sangat ketakutan ketika mengunjungi dokter gigi.
- Jantung berdetak lebih cepat ketika saya pergi ke dokter gigi.
- Saya menunda membuat janji untuk pergi ke dokter gigi.
- Saya sering berpikir tentang semua hal yang mungkin salah sebelum pergi ke dokter gigi.

Jawaban :
 1 = Tidak setuju
 2 = Sedikit setuju

Anxiety and Fear (IDAF-4C)

For data collection, the room should not be noisy and be comfortable, and its temperature should be stable; furthermore, the procedure should be performed at the same time. In this study, HRV was measured through heart rate analysis on the left-hand thumb (Figure 2 Heart Rate Variability Analyzer (SA 3000p, Medicore, 1996 Task Force)



Figure 2. Heart Rate Variability Analyzer.

Results

All subjects in this study had provided informed consent, and this study was approved by the ethical commission of the Faculty of Dentistry, Universitas Indonesia. This study involved 121 subjects (age: 18–46 years, mean age: 30 years), including 62 females and 59 males.

The results showed that the Indonesian version of the IDAF-4C questionnaire can be used to assess dental anxiety because it has high validity and reliability, with Cronbach's α of 0.916 (range: 0.627 to 0.856) with all correct statements (Table 1).

Table 1 Validity Analysis of Indonesian IDAF-4C Questionnaire's Statement Items.

Item of IDAF-4C	r	p
I feel anxious shortly before going to the dentist.	0.728	0.000
I generally avoid going to the dentist because I find the experience unpleasant or distressing.	0.627	0.000
I get nervous or edgy about upcoming dental visits.	0.735	0.000
I think that something really bad would happen to me if I were to visit a dentist.	0.787	0.000
I feel afraid or fearful when visiting the dentist.	0.856	0.000
My heart beats faster when I go to the dentist.	0.852	0.000
I delay making appointments to go to the dentist	0.804	0.000
I often think about all the things that might go wrong prior to going to the dentist	0.741	0.000

*Chi-Square; $p \leq 0.05$ is statistically significant

The cognitive value distribution showed that for subjects with anxiety score of 1 on IDAF-4C, there is a difference between subjects who do and do not show anxiety; however, this is not statistically significant. This difference shows that both dental anxiety measurement tools have similarities as measuring instruments (Table 2).

The distribution of emotional values shows when subjects feel an emotion, there is a difference between subjects who do and do not show anxiety, although this difference is not statistically significant. This finding also shows that both dental anxiety measurement tools have similarities as measuring instruments (Table 3).

Table 2. Distribution of Cognitive Value Based on Anxiety Value According to HRV.

Cognitive	Anxiety (HRV)		p
	Anxiety	No	
I think that something really bad would happen to me if I were to visit a dentist	16	53	0.080
Score 1	3	18	
Score 2	6	6	
Score 3	5	5	
Score 4	2	7	
Score 5			
I often think about all the things that might go wrong prior to going to the dentist	15	39	0.010
Score 1	2	24	
Score 2	5	13	
Score 3	8	5	
Score 4	2	8	
Score 5			

* Mann Whitney Test; $p \leq 0.05$ is statistically significant

Table 3. Distribution of Emotional Value Based on Anxiety Value According to HRV.

Emotional	Anxiety (HRV)		P
	Anxiety	No	
I feel anxious shortly before going to the dentist			0.771
Score 1	10	35	
Score 2	8	14	
Score 3	6	14	
Score 4	5	16	
Score 5	3	10	
I feel afraid or fearful when visiting the dentist			0.089
Score 1	15	37	
Score 2	5	27	
Score 3	4	5	
Score 4	7	9	
Score 5	1	11	

* Mann Whitney Test; $p \leq 0.05$ is statistically significant

The psychological condition of dental anxiety in the Indonesian IDAF-4C questionnaire shows a statistically significant difference (Table 4). The behavioral assessment does not show a statistically significant difference, and therefore, it has equivalence with HRV (Table 5).

The cognitive, emotional, psychological, and behavioral components of the IDAF-4C questionnaire have objective dependencies when compared to the HRV. The results indicate that the dental anxiety measurement tools based on HRV and the Indonesian IDAF-4C questionnaire have the same ability to assess dental anxiety.

Table 4. Distribution of Emotional Value Based on Anxiety Value According to HRV.

Psychologic	Anxiety (HRV)		P
	Anxiety	No	
I get nervous or edgy about upcoming dental visits			0.916
Score 1	17	45	
Score 2	5	15	
Score 3	4	10	
Score 4	5	12	
Score 5	1	7	
My heart beats faster when I go to the dentist			0.214
Score 1	10	36	
Score 2	4	20	
Score 3	8	13	
Score 4	7	9	
Score 5	3	11	

* Mann Whitney Test; $p \leq 0.05$ is statistically significant

Table 5. Distribution of Behavior Value Based on Anxiety Value According to HRV.

Behavior	Anxiety (HRV)		P
	Anxiety	No	
I generally avoid going to the dentist because I find the experience unpleasant or distressing			0.343
Score 1	22	55	
Score 2	4	18	
Score 3	4	3	
Score 4	1	7	
Score 5	1	6	
I delay making appointments to go to the dentist			0.853
Score 1	14	49	
Score 2	4	10	
Score 3	6	15	
Score 4	6	8	
Score 5	2	7	

* Mann Whitney Test; $p \leq 0.05$ is statistically significant

Discussion

The Indonesian version of the IDAF-4C questionnaire is tested for validity to determine the feasibility of each item statement in defining a variable. These statements support a particular group of variables. The validity of the questionnaire is considered based on the content and discriminant validity. Content validity means that each item represents what you want to measure, and discriminant validity means that every element in the component is different and has no relationship to other elements.

Originally, IDAF-4C+ is based on psychological theory on emotions, and it includes three modules to make it a flexible instrument for various uses in epidemiological research, clinical research, and clinical practice. Promising findings have been reported on the reliability and validity of IDAF-4C+ in a representative sample of adults in an epidemiological Australian study⁴ as well as for normative data.⁸

We tested the validity and reliability of IDAF-4C+ by examining the relationships among variables. As mentioned above, we considered both the content and the discriminant validity. The reliability test of the questionnaire for internal consistency used Cronbach's $\alpha > 0.8$ indicating excellent internal consistency, 0.6–0.8 indicating moderate internal consistency, and <0.4 indicating poor internal consistency.⁹

The Malay IDAF-4C validated by Baharudin (2015) shows internal consistency of Cronbach's α with the correct scale reliability for the potential factors measured. Cronbach's α for the Malay IDAF-4C was 0.929, indicating excellent reliability (Cronbach and Meehl, 1955).¹⁰ Spanish IDAF-4C reported high validation values with Cronbach's α of 0.94 (Carrillo-Diaz, Crego, Armfield, & Romero, 2012); Cronbach's α for the original version is 0.91 (Armfield, 2010).¹¹

In this study, IDAF-4C showed agreement with the four assessment factors and with HRV. Thus, both IDAF-4C and HRV can be used as anxiety measures. The value of the interrelationships among the variables in the Indonesian IDAF-4C ranged from 0.627 to 0.856. The results of this study are similar to those reported by Carrillo-Diaz, Crego, Armfield, and Romero (2012), who reported that the value of the interrelationships among the variables in the Spanish IDAF-4C range from 0.77 to 0.92,

indicating strong linkages of each item with the possible construction.¹¹ Pearson's correlation coefficient r is 0.65, 0.81, 0.71, and 0.73 for item pairs of cognitive, physiological, behavioral, and emotional components. The cognitive components show weaker relationships with each of the other three components. However, all components are interrelated, and Pearson's correlation coefficient r and the absolute agreement are statistically significant at $p < 0.001$.

Cronbach's α was 0.94 in this study, confirming the internal consistency of the Indonesian IDAF-4C scale. The corrected item-total correlation ranges from 0.70 to 0.89, indicating that the Indonesian IDAF-4C items are homogeneous and each measured equals other items on a scale. The consistency for a single measurement is 0.66 (95% CI = 0.61–0.71). The internal scale consistency reliability will not be corrected if one item is removed with a reliability test of 0.83. This result is in contrast to that of a study of the Indonesian IDAF-4C dental anxiety questionnaire, in which Cronbach's α ranges from 0.896 to 0.915 with a reliability test of 0.916 when the item is removed.

The Swedish IDAF anxiety module showed a clear, one-dimensional structure with good internal consistency (Cronbach's $\alpha = 0.95$) and adequate validity, as evidenced by the strong correlations with other DA measures, Single-Question Assessment of Dental Anxiety (SQDA), and Dental Fear Survey (DFS) and weak correlations with the Internal Health Locus of Control (IHLOC).¹²

The IDAF-4C questionnaire has four components: cognitive, emotional, psychological, and behavioral. In the Indonesian version of the IDAF-4C questionnaire, these components have objective dependence when compared to HRV. The results indicate that HRV and the Indonesian version of the IDAF-4C questionnaire show the same ability for assessing dental anxiety. The correlations between IDAF-4C and HRV for dental anxiety were moderate to strong, compared to the correlation with another psychological construct.

Conclusion

The Indonesian version of the IDAF-4C questionnaire can be used to assess dental anxiety. Statistical results for both the Indonesian

IDAF-4C and HRV questionnaires show that both can serve as a measure of dental anxiety. Objectively, the HIV analyzer has equivalence with the Indonesian IDAF-4C with adequate roughness.

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