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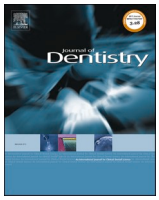

Utilisation of a think-aloud protocol to validate a self-reported periodontitis questionnaire

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ABSTRACT

Objectives: The gold standard approach to diagnose periodontitis is based on clinical examination and radiographic investigations. This, however, is expensive, tedious, and not feasible in population-level assessments. The self-reported periodontitis questionnaire offers great benefit to facilitate larger epidemiological surveys. There is limited evidence on cognitive validation of self-reported periodontitis questionnaire. This study employed a think aloud approach to investigate if participants interpreted, comprehended, and understood the items in a self-reported periodontitis questionnaire, in the same way as researchers' intended.

Methods: 20 adults, resident of the UK and fluent in English participated in online recorded think aloud interviews. The self-reported periodontitis questionnaire consists of 15 questions and 2 open ended questions. The interviews were then transcribed and coded by two independent researchers according to predefined categories representing comprehension and conventional content analysis was used to analyse open-ended data.

Results: The think aloud approach revealed that most of the questions in the self-reported periodontitis questionnaire were well understood by the participants. Two items, however, were identified as problematic: one was misinterpreted, and another question was not understood by most of the participants. Qualitative conventional content analysis of open-ended questions reiterated and complemented the findings of the think aloud study. Further questions coded as problematic for 3 or more participants were then considered for rephrasing.

Conclusions: This study revealed the interpretation and understanding of self-reported periodontitis questions by English speaking UK residents and highlighted the probable reason for lower sensitivity values of the self-reported periodontitis questionnaire.

Clinical significance: This study employed think-aloud approach to capture the thought process of the participants as they answered questions on self-reported periodontitis questionnaire. Overall, the questionnaire was well received by the participants, however, some questions were misunderstood/misinterpreted. This study highlights the potential information bias if participants do not understand the questions in epidemiological surveys.

1. Introduction

According to the Adult Dental Health Survey 2009 in the United Kingdom, prevalence of periodontitis is >50 % in the adult population (White et al., 2012) [1]. From 1999 to 2009, there was slight increase in severe periodontitis (6 % to 9 %) among adults (White et al., 2012) [1]. A small percentage of British adults (17 %) had a very healthy periodontal status.

Periodontitis is clinically characterized by periodontal pocketing, tooth mobility, drifting and eventually tooth loss, leading to decreased masticatory ability. Periodontitis remains silent in terms of symptoms until in the later stages of the disease [2].

The gold standard and preferred approach to diagnose periodontitis is based on clinical examination and radiographic investigations. This, however, is expensive, time-consuming, and not feasible in population-level assessments. This has led to exploration of alternative approaches,

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that are valid, reliable and less resource-intensive for the sustained surveillance of periodontitis [3]. Self-report of symptoms is an accepted method of assessing diseases or conditions such as cancer, cardiovascular and psychological disorders [4,5]. For example, a self-report system initially established in 1984 by the Centres for Disease Control and Prevention (CDC) to track diseases such as cancer, heart disease, diabetes, and cerebrovascular accidents has been shown to be useful [6]. This approach was later adopted in dentistry as well [7]. In the UK a study tested a set of questions on periodontitis symptoms along with sources of information which participants might be exposed to, for example information from their dentist /dental hygienist or dental professional, to develop a self-reported periodontal status questionnaire for use in epidemiological surveys [8].

In 2003, Centres of Disease Control and prevention / American Academy of Periodontology (AAP), collaboration started an initiative for the potential use of self-reported measures for surveillance of periodontitis. Through these effort, 8 self-reported questions were identified to be promising for screening periodontitis among US adults [9]. This self-reported measure of periodontitis is widely accepted and is field tested for different languages, cohorts and in different settings [4,8,10-14]. Blicher et al., [10] conducted a systematic review of 16 studies that assessed the validity of self-reported measures specific to gingivitis and periodontitis, against clinical examination. They categorised self-reported measures of periodontitis into the following:

1. Disease awareness/perception as defined by the participant (periodontal disease or periodontal disease with bone loss)
2. Knowledge of professional diagnosis of periodontal disease
3. Severity of periodontal disease
4. Symptoms of periodontal disease (tooth mobility, recession)
5. Treatment (periodontal treatment, surgery)

The validity of self-reported periodontitis questionnaires have been tested using psychometric approaches such as sensitivity, specificity, receiver operator's characteristics, positive predictive and negative predictive values [8]. Further, cognitive validity of the self-reported periodontitis questionnaire has been tested via semi-structured interviews and using Likert scales on agreeability of the scale by the participants [12,15].

Although, universally accepted measures of validity of self-reported questionnaire are sensitivity, specificity, and predictive values, [8,16] there have been few attempts to test cognitive validity of the self-reported periodontitis questionnaire, through varied approached including cognitive interviewing. The widely used CDC/AAP 8 items questionnaire was subjected to evaluation using the cognitive interview approach and those questions which presented with problems in English and Spanish languages were revised [15].

Another study reported the validity of a 9 item self-reported periodontitis questionnaire in a Japanese sample. The questionnaire adopted the 8 questions of CDC/AAP questionnaire and added another question on bleeding gums. The authors followed a 6-stage process, which included forward and backward translation and cognitive testing of the questionnaire for clarity on instructions and response to each item in 100 non-professionals. The authors used a 5-point Likert scale to explore the agreeability of each item in the questionnaire. Based on this, they identified a question ("Have you ever had treatment for gum disease, such as scaling and root planing, sometimes called "deep cleaning"?) with poor clarity which was then revised. Authors concluded that the locally adapted questionnaire (Japanese version) had acceptable diagnostic accuracy [12]. Finally, another study piloted to test the prefinal version of a CDC/AAP 8-item self-reported periodontitis questionnaire for overall comprehension among 20 individuals. Based on responses and evaluation, the questions were further refined to build the final version to clinically validate the questionnaire for periodontal disease and investigated its accuracy for differentiating periodontal health and different stages of periodontitis according to 2018 classification of periodontitis [17].

Cognitive interviewing and think aloud strategies are used extensively in psychological and educational research contexts to capture participants thought processes while engaging with completing a questionnaire [18]. The think aloud approach or 'the process tracing' has been used since as early as the 1970s [19,20]. Completing a questionnaire involves complex reasoning which involves comprehension, retrieval, judgement, and response [21]. Cognitive interviewing involves the interruptions and prompting during completion of the questionnaire, however, this could disrupt the thought process and thereby affecting the cognitive problem-solving process [22]. The think aloud protocol involves the process of encouraging the participant to verbalise their thought process without any interruptions or prompts [21,22]. Thus, think aloud can offer a better insight in cognitively validating a questionnaire.

To date, no study has attempted to understand how patients interpret questions in the self-reported periodontitis questionnaire using think aloud approach. Further, cognitive validation of self-reported periodontitis questionnaire has not been performed in the UK population. Hence the research question for the current study was 'how do participants from the UK population interpret questions of the self-reported periodontitis questionnaire?

1.1. Aim of the study

The purpose of the current study was to utilise a think aloud approach to explore participants thought processes and comprehension as they completed the self-reported periodontitis questionnaire (SRPQ).

1.2. Objectives of the study

1. To assess the participants comprehension and understanding of questions in the self-reported periodontitis questionnaire
2. Identify the question items of the self-reported periodontitis questionnaire, that were interpreted differently from that intended.
3. Identify potential misunderstandings encountered while interpreting and answering the questionnaire.

2. Materials and methods

2.1. Participants and design

The participants were 20 adult volunteers aged over 21 years, who were UK residents, and were fluent in English. Participants were non-dental-related profession individuals and were recruited through social media, friends of friends, and from non-clinical, non-academic staff within the School of Dentistry. Participants were recruited if they had access to the internet for an online interview via MS teams. Participants were aged between 23 and 74 years (mean age 43 years) and 12 were male and 8 were female. The sample size was decided to be 20 adults, which was similar to previous think aloud studies [23,24]. Nielsen [25] suggested after 5 interviews 77 to 85 % of solutions are yielded, however the higher sample size in this study was to obtain extensive and saturated data. Data saturation is defined as the point when the last two interviews no longer contribute any new elements and when a certain category has been exhaustively described in all its dimensions and variations [25]. This study was approved by the Dental Research Ethics Committee (DREC) (DREC ref: 011122/VKN/358; dated 28th Feb 2023).

2.2. Measures

A set of questions concerning self-reported periodontitis was adapted from previous published literature [8]. The questionnaire with 15 questions covers essentially four domains of periodontitis: participants' disease awareness and perceptions, knowledge of the professional

diagnosis of periodontitis, severity and symptoms of periodontitis and history of periodontal treatment. The questions are listed in the appendix. These questions were statistically validated in different studies in different settings across the world [4,9,11,12,26-28].

Different population attributes can affect understanding of the questions and question–response processing of these questions [16]. Hence each question was evaluated cognitively among UK residents and assessed on how they comprehended these questions and their question–response process. The questions were designed with responses required in terms of 'yes' 'no' and 'don't know'. Following completion of 13 interviews an additional question on 'bleeding gums' was added to assess the primary symptom of periodontal disease for a further 7 interviews.

2.3. Procedure

Data collection techniques were piloted and agreed by the research team. Further, calibration of the interviewer/researcher (VKN) was done by running a test (mock) session with another researcher experienced in using the think aloud approach (AP) and the method/ style of interviewing was modified as necessary. Informed written consent was obtained from all participants before the start of the study. Participants were invited to be interviewed on MS teams and to be audio recorded. Before beginning the interviews, the participants were shown the instructions adapted from French et al. [22].

Any questions from participants were clarified by the researcher at this stage and then the researcher's camera was turned off to minimize any influence. Once participants started the questionnaire, they were not disturbed, unless they fell silent for about 10 s and were encouraged to keep talking.

At the end of the think aloud process, respondents were asked about their experience with overall questionnaire instructions, wording of questions and response issues such as wanting to tick 2 boxes. Additionally, a general discussion took place covering what the respondent thought about the questions including whether they found them confusing or whether they had understood the instructions and how easy they had found the question to answer.

All participants were assigned a unique code with no personally identifiable information. Following recording the interviews were stored with these unique codes for 2 weeks. Within this time participants could withdraw from the study if they wished to. The think aloud recordings were then transcribed, and stored with the unique code, before the recordings were deleted.

2.4. Analysis

We analysed the transcript following the approach outlined by French et al. [24] and Zhang et al. [29]. Each interview segment was coded into one of five coding categories. Categories were 1. No problem 2. No sufficient thinking aloud 3. Reread/ stumbled 4. problems understanding and 5. misinterpretation of question (Table 1). Data analysis was performed using a triangulation method, a recognized approach in qualitative research, i.e., following full initial coding (VKN), 60 % of item responses were randomly subjected for blind second coding (AP), to confirm the findings of the analysis [30]. Further, the intra-examiner reliability was calculated using kappa statistics with the value of 0.83 indicating substantial agreement. Disagreements were resolved through discussion and coding was amended accordingly. Thus, full coding consensus was achieved.

Furthermore, a qualitative conventional content analysis (inductive approach) was undertaken [31]. This involved the identification and coding of key categories within the response to the open-ended questions on participants' overall experience of the questionnaire. Each interview of open-ended questions was read by 2 independent researchers (VKN & NH) and notes made on commonly identified ideas and thoughts to place them into categories and subcategories. Following independent analysis by these 2 researchers, the categories and subcategories were discussed, and a consensus was established. To enhance the trustworthiness, findings were reviewed and confirmed by another researcher (DBO). Since this was manageable data, the conventional content analysis was done manually, however the NVivo software was also used to aid in the data management.

Once coding was complete, problematic items on the self-reported periodontitis questionnaire were identified and suggested rephrasing was developed. Finally the amended questionnaire was presented to the members of the general public for further feedback in relation to the understanding and interpretation of the items.

Table 1
Coding categories for think-aloud interview analysis.

	Category	Description
1	No Problem	No significant problems identified
2	No sufficient thinking aloud	Participants did not report sufficient information for coding purposes on any of the four cognitive processes (Tourangeau, 1985)
3	Reread/stumbled	Participants re-read a question or stumbled while reading it. Although re-reading a question did not necessarily mean that participants had problems in understanding the question, more than one participant re-reading a question could indicate this question requires effort to understand
4	Problems understanding	Participants demonstrated problems in understanding or answering the question, including querying the meaning of the question, claiming they needed more information before they could answer it or stated they were uncertain about whether they had understood or answered the question properly.
5	Misinterpretation	Participants appeared to answer a different question from the one that was asked or gave reasoning that appeared inconsistent with or irrelevant to, the answer given.

3. Results

3.1. Segmenting and coding of think-aloud transcripts

A total of 20 volunteers completed this study (Table 2) and the additional question on bleeding gums did not pose any problems in understanding. The length of these interviews was between 8 and 14 min. 13 participants answered 14 items of self-reported periodontitis questionnaire, which generated 182 text segments, and the remaining 7 participants answered 15 items, which generated 105 text segments. Thus, a total of 287 text segments were generated for coding. Of the 287 segments, 24 (8.3 %) were assigned to category 2 (failed to provide

Table 2
Participant characteristics ($n = 20$).

Age in years (mean±SD)	43±16
Gender	
Male	12
Female	8
Race and ethnicity	
Caucasian	18
Mediterranean origin	1
Mixed race origin	1
Education	
GCSE	2
A levels	2
A level with certification	2
Diploma	2
Bachelor's degree	9
Master's degree	3
Occupation	
Employed	16
Unemployed	2
Retired	2

sufficient information) and were discounted from analysis. The coding of the remaining 263 (91.6 %) segments identified a total of 32 (12 %) problems related to 15 items of the questionnaire. The frequency and type of problems identified by participants for each item of the questionnaire (Table 3).

Generally, we adopted a 10 % cut-off, with items generating 3 or more problems (i.e., at least 2 participants having trouble with that item across any of the five think-aloud categories) were selected for rephrasing. We identified 2 items, which generated a total number of 3 problems or higher (ranging from 2 to 18) and were rephrased. Suggested rephrasing is shown in Table 4, the changes were modifications to the wording of the item to provide greater clarity.

Table 3
Frequency and type of problems with the self-reported periodontitis questionnaire ($n = 20$).

Construct items	N of overall problems	*Re*-read/ Stumbled	Problems understanding	misinterpretation
Q1 – gum disease	0	–	–	–
Q2 – Bleeding gums	0	–	–	–
Q3 – health of your gums	1	–	1	–
Q4 – health of your teeth	0	–	–	–
Q 5 – bone loss around your teeth	2	–	1	1
Q 6 – deep pockets	18	–	16	2
Q 7 – permanent teeth loose without injury	0	–	–	–
Q8 – lost teeth due to gum disease	1	–	–	1
Q9 – teeth loose or wobbly	0	–	–	–
Q10 – difficulty chewing due to tooth movement	0	–	–	–
Q11 – space between teeth	2	–	1	1
Q12 –presently bad breath?	1	–	1	–
Q13 - teeth looking longer than they used to	2	–	1	1
Q14 – LA to get deep cleaning	1	–	–	1
Q15 – Gum surgeries	4	–	1	3
Total 15	**32**	**0**	**22**	**10**

Table 4
Rephrasing of the item.

Self-reported periodontitis item	Suggested rephrasing
Q6. Has any dentist/dental hygienist/ dental professional ever told you that you have deep pockets? – Yes/ No / Don't know	Has any dentist/dental hygienist/dental professional ever told you that you have 'gum pockets' around the teeth? **Final modification:** Q6. Has any dentist/dental hygienist/ dental professional ever told you that you have deep 'gum pockets' around the teeth? (Gum pocket is the space between the teeth and gum, which may deepen if you have gum disease) - Yes/no/don't know
Q15. Have you ever had any gum surgeries?	Have you ever had surgery for gum disease?

3.2. Conventional content analysis of open-ended questions

From the open-ended answer data, content analysis identified 6 categories: 1) Perceived lack of knowledge, 2) Complex wording, 3) Clarity of questions, 4) Recalling of information, 5) Ease of understanding, 6) Need of additional comment box. Supporting narrative quotes from the participants are presented in Table 5.

3.3. Testing of rephrased questions

The rephrased questionnaire was presented to 9 members of the general public (5 Caucasians and 4 non-Caucasians) face to face following the think aloud protocol. The initial 4 individuals still did not understand the terminology 'gum pocket' in question 6, however, they all understood when the layperson definition of pocket was read out. Therefore, Q6 was further modified to include this definition as below:

Q6. Has any dentist/dental hygienist/dental professional ever told you that you have deep 'gum pockets' around the teeth? (Gum pocket is the space between teeth and gum, which may deepen if you have gum disease) - Yes/no/don't know.The questionnaire was then presented to further 5 individuals with the above rephrased Q6 and all of them suggested that the questionnaire was very clear, and they suggested that the definition in the bracket gave them the context and the understanding, which helped them to understand it clearly. Thus, we obtained 100 % approval from the last 5 members of the public indicating data saturation.

4. Discussion

This is the first study to evaluate the cognitive validity of the self-reported periodontitis questionnaire using a think aloud approach. This study informed the interpretation and comprehension of participants while answering a self-reported periodontitis questionnaire. This questionnaire covered domains of periodontal disease awareness, perception of the participants, knowledge of the professional diagnosis, severity and symptoms and history of any periodontal treatment [10]. The questionnaire was overall well received by the participants. Several items were either misinterpreted or respondents did not understand the meaning of the question. Further the content analysis revealed themes such as respondents' perceived lack of knowledge, difficulty in understanding terminology, clarity of questions, recalling information, ease of understanding and a need for additional comment box on items in the questionnaire.

The results of this think aloud study analysis indicated overall 32 problems related to 15 items of the questionnaire. Problems in understanding ($N = 22$) and misinterpretation ($N = 10$) were identified as the

Table 5
Conventional content analysis process: Category and supporting example quotes.

No.	Category	Frequency	Example quote
1	Perceived lack of knowledge	4	'I don't know whether I've got gum disease.'
			'I'm not exactly sure how I would know I suppose'
	awareness		'few things on there where you would think you don't have the knowledge of'
2	Complex wording	7	'I don't know what the deep pocket is'
			'one term I'd never heard before, which was deep pockets'
			'something about deep pockets cause I wasn't sure what that was'
			'I've never heard of the pocket'
			'only one was that deep pockets, one where the wording was such that I didn't really Understand'
			'deep pockets, I probably would have rather have put a comment saying I don't know what a deep pocket is rather than putting don't know'
			'none were confusing the only one and I think I mentioned it was the pockets'
3	Clarity of questions	4	'I was uncertain at times, receding gum type thing and What do you think Questions'.
			'For example the bad breath like to me it was, do you mean sometimes or do you mean in general like? Or day-to-day to day stuff'
			'I would say just for the last one of gum surgeries, I would have said if I had the option to have a commentary or like something explain to me because I don't know what gum surgery might include'?
4	Recollection of information	2	'Hard to recall your own dental history.'
			'Because I cannot really remember'
5	Well worded	18	'Questions were pretty easy to answer'
			'all the questions were pretty straight forward'
			'extremely well worded'
			'it was always very easy to answer one of the three options.
			'There weren't anything that I struggled with'
			'Were quite clear and easy to follow'
			'would have done it in about 30 seconds'
			'all easy to answer, all easy to understand and yes straight forward'
			'pretty straight forward'
			'A good, compassionate straight Forward questionnaire'
			'most of the time you would fall into yes, no or, I don't know'
			'it was quite clear and the instructions were clear as well.'
6	Provide additional information	3	You know, be useful if you wanted to put a comment on an explanation next to it, to explain why you've said no (001)
			I would have said if I had the option to have a commentary or like something explain to me cause I don't know what gum surgery might include (015)
			I probably would have rather have put a comment saying I don't know what a deep pocket is rather than putting don't know (019)

most commonly occurring issues among respondents. Out of 15 questions we identified 2 questions were problematic: Q 6 - Has any dentist/ dental hygienist/ dental professional ever told you that you have deep pockets? and Q 15 - Have you ever had any gum surgeries? The key explanation for the difficulty in understanding of Q6 could be because participants' dentists had not advised them of their disease or simply because there was no requirement to explain as they did not have that clinical feature of periodontal disease. The misinterpretation of Q 15 could be explained by the fact that they could not recall that information or got confused with other treatments.

The Q6 - Has any dentist/dental hygienist/ dental professional ever told you that you have deep pockets? was not understood by 16 participants and 2 participants misinterpreted. Further, the conventional content analysis suggested that majority of participants highlighted the terminology was complex. A cross-sectional study in the United States reported a convergent validity between radiographic bone loss and

questions on 'deep pockets/bone loss' [32]. Furthermore, a German study suggested that the question on 'gum pockets' had better prognostic value for periodontal disease [11]. This, however, was not reflected in our think aloud study as most of the participants did not understand the terminology 'pockets'. This difference could be because the studies were conducted in different cultural settings. This was however, remedied by reviewing, revising and rephrasing the question and presenting it to the members of the public, which was finally met with 100 % approval.

The Q15 - "have you ever had gum surgeries?" was misinterpreted and had problems in understanding by respondents. The respondents in our study misinterpreted this to be gum surgery for the removal of wisdom teeth which requires surgery on gums. This finding is similar to previous research results on cognitive evaluation of a self-reported question on "have you ever had scaling, root planing, surgery or other treatment for gum disease?" [16]. The respondents in their study, included their root canal treatments in addition to third molar removal, as surgery. A previous study by Miller et al., [16] adopted cognitive interviewing technique in which the interview began with a question and then, further, probing questions were asked to explain their (participants') answer. In the think aloud approach the participants verbalised their thought process without any interruptions or prompt. Interruption during problem solving, causes break in their chain of thought process, and prompting, may initiate secondary cues in working memory, leading to recall of invalid information from long term memory and that may force out current information from the working memory, muddling the thought process [23].

Another observational study reported lower sensitivity (0.00 to 0.24) on the question 'have you ever had surgery to clean underneath your gums?' [33]. This could be because the study was conducted among rural population with high prevalence of periodontitis with limited access to dental services. Thus, participants may not have said yes to the question, which does not mean that disease was absent. Hence, we argue that sensitivity of a question depends on the understanding and comprehension of the questions.

In addition, cognitive evaluation of self-reported periodontitis questions was carried out in 2 other observational studies in French and Japanese languages [12,34]. French study included a question on periodontal treatment 'Have you ever had any treatment for gum disease such as scaling and root planing, sometimes called "deep cleaning' but not on 'gum surgery'. They reported difficulty in understanding of the question on 'deep cleaning' by the respondents [34]. In our study, participants did not reveal difficulty with the question on 'deep cleaning'.

Similarly, Iwasaki et al., [12] tested the validity of self-report questionnaire for periodontitis in Japanese population. They reported that the question 'have you ever had treatment for gum disease, such as scaling and root planing, sometimes called 'deep cleaning' was found to have poor clarity, however, this was not observed in our study as the wording was different in our questionnaire. ('Have you ever been numbed up / had local anaesthetic to get a deep clean of your teeth?')

Another study reported that question 'have you had gum treatment'? with answers yes/no, demonstrated a significant association with moderate to severe bone loss, with subjects self-reporting of 'gum treatment' were three times more likely to have severe bone loss [35].

Furthermore, another study reported that question 'have you ever had scaling, root planing, surgery or other treatment for gum disease' had high specificity, however the sensitivity was low [36].

Our study appears to be the first study to assess the cognitive validity of the self-reported periodontitis questionnaire in the UK population using think aloud approach. This study used previously validated (sensitivity, specificity and predictive values) self-reported measures of periodontitis belonging to different domains as stated by Blicher et al. 2005 [10]. Hence this paper focuses on the gap highlighted in the literature, i.e., cognitive validity instead of clinical and statistical validity. Further we also assessed 2 open ended questions on overall experience of the questionnaire and whether it was confusing or easy to understand. This yielded some answer scripts, which were subjected for conventional content analysis. This analysis allowed us to assess the overall agreeability of the questionnaire along with participants suggestions. This also supported the findings of the think aloud analysis. Further, 2 researchers independently assessed these scripts of open-ended questions to improve the trustworthiness of findings and to reduce any chance of bias.

The participants also revealed another aspect such as difficulty in recalling the answers for some questions and some participants revealed to be an irregular attender to the dentist, which may have impacted their responses. The findings of this report must be interpreted in view of some limitations. Our sample was not representative of the entire UK, as participants were all based in England and were possibly from higher socioeconomic backgrounds. The wording of the questions was understood alike by all participants irrespective of their education status. Further all of our interviews were conducted online, so we only recruited subjects with access to internet resources.

5. Conclusion

Overall, the questionnaire was well received by the participants. The think aloud approach provides an invaluable insight into validating a self-reported questionnaire and this patient-centred approach must be considered in developing questionnaires before conducting large scale surveys.

Future research ought to explore the psychometric properties of the Self-reported Periodontitis Questionnaire in large scale diverse, representative English speaking and non-English speaking population in different settings.

Plain language summary of key finding

This study highlighted 2 problematic questions in the questionnaire due to complex wording and lack of knowledge of the participants and thus helped to improve the understanding of the questions by the participants.

CRediT authorship contribution statement

Vanaja Krishna-Naik: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Amy Palmer:** Writing – review & editing, Methodology, Formal analysis, Data curation. **Nicholas A. Hodson:** Writing – review & editing, Validation, Supervision, Software, Methodology, Formal analysis, Conceptualization. **Aradhna Tugnait:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization. **Daryl B. O'Connor:** Writing – review & editing, Visualization, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

We the authors declare that we have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. We have nothing to declare.

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Supplementary materials

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