A short English version of the Fear of Dental Pain questionnaire


Fear of dental pain is a highly relevant covariate in dental pain research. The present study was designed to develop a short version of the Fear of Dental Pain questionnaire (FDPQ) in order to facilitate research in this area. The original 18-item FDPQ was translated from Dutch to English, and data from previously published and unpublished studies (all Dutch-speaking subjects) were used to examine psychometric properties (n = 960). A short version was constructed based on psychometric properties and face validity of the items. Five items were selected for a short FDPQ. A strong correlation was found between the original and the short version (r = 0.96). Factor analysis revealed a one-dimensional solution, explaining ≥76% of the variance, with high internal consistency (alpha = 0.87). The short FDPQ allows rapid identification, by dentists, of patients who may require special attention, longer appointments, and specific dental pain management. In addition, it would assist in the development and evaluation of tailored interventions aimed at this group.

The Fear of Dental Pain questionnaire (FDPQ) (1) is an 18-item self-report instrument assessing fear of pain associated with a variety of dental procedures. A recent study showed that fear of dental pain (FDP) was associated with pain felt during periodontal probing in a sample of periodontal patients (2). In addition, within a sample of highly anxious dental patients, a reduction in dental anxiety was associated with lower FDP scores. The latter result suggests that FDP is partly dependent on the level of dental anxiety. Indeed, development of the FDPQ was based on the assumptions that anxious people overestimate pain (3), that (anticipated) pain can induce anxiety, and that anxious people may experience pain more intensely owing to an attentional bias towards the painful stimulus (4). As such, people with a tendency to respond fearfully to pain are at an increased risk of ending up in a vicious circle of overestimated pain and escalating anxiety.

The above makes it clear that FDP is a highly relevant concept within dentistry. Therefore, it is useful to have an instrument that can quickly screen patients with respect to FDP. At present, however, the FDPQ consists of 18 items, which is somewhat long for clinical purposes. So, for clinical (and research) purposes, it is desirable to have a more efficient instrument. Indeed, constructing shorter versions of existing psychological instruments is quite common (5–8).

Application of the instrument in other languages. In fact, all data used in this study were obtained from Dutch-speaking subjects/patients. Although the authors did provide a preliminary translation into English (1), there are no data to support the validity of this translation. To conclude, the present study was set out to develop a short English version of the FDPQ.

Material and methods

In the present study, data from previously published studies (of Dutch-speaking subjects) (1,2,9) and unpublished studies were used (n = 1021). Included were two samples of psychology freshmen (n = 310 and n = 460), a sample of patients waiting for endodontic therapy (n = 63), a sample of periodontal patients waiting for periodontal treatment (n = 126), and a sample of highly anxious dental patients treated in a dental fear clinic (n = 62). Only data from subjects with no missing values were included (n = 960). All studies were performed according to the ethical principles described in the Declaration of Helsinki (10).

Fear of dental pain

Fear of dental pain was measured using the FDPQ (1). The original questionnaire consists of 18 items and assesses fear of pain associated with a variety of dental procedures. Each item is answered on a rating of 1 (no fear) to 5 (extreme...
fear), resulting in a possible total score of 18–90. The FDPQ was developed as a dental equivalent of the Fear of Pain Questionnaire-III (11).

Procedure

Psychometric criteria were combined with face validity to derive a selection of items for the short version of the FDPQ. All items were ranked on the criteria; all ranks were summed to decide which items would contribute most to the scale’s reliability. The initial item selection was based on the relatively large student sample. Next, psychometric properties of the selected items were examined in the samples from patients.

Statistical analysis

Exploratory factor analysis was performed to test the latent factor structure of the short FDPQ. Pearson’s correlation coefficient was used as a measure of linear association. Cronbach’s alpha was used as a measure of internal consistency.

Four psychometric criteria were used: item-total correlation (total score minus the score on the respective item), factor loadings on a general factor, van Nearssen’s f (12), and the item-reliability index (13). Item-total correlations represent the extent to which items measure the same construct as the other items (corrected total scale). High factor loadings indicate a strong association between an item and the underlying latent factor. Van Neersen’s f is based on the signal/noise ratio of a test and indicates whether an item contributes to the scale’s reliability (positive F-value) or reduces it (negative F-value). The item-reliability index is defined as the product of the standard deviation of an item score and its item-total correlation. As such, it combines item dispersion and item homogeneity, both of which preferably are high. A higher score on any of the criteria indicates a stronger contribution to the reliability of the scale.

Results

Translation

To judge the face validity of the translated FDPQ items, 66 native English-speaking undergraduates were given the preliminary translated FDPQ (1) to complete, followed by 4 questions asking them to comment on the face validity, grammatical correctness, clarity, and pleasantness of the FDPQ. Responses were subjected to content analysis and generally supported the face validity and clarity of the translated FDPQ. Minor amendments were suggested for optimum translation, resulting in the translated items presented in Table 1.

Item selection

First, all samples were compared with respect to the mean FDP score. Analysis of variance (ANOVA) showed that the samples differed on mean FDP score [F (4, 955) = 41.7, P < 0.001]. Post hoc analysis showed that all samples differed from each other (P < 0.001), except the two student samples. The result of this analysis is presented in Table 2. Additionally, using age as a covariate, an analysis of covariance (ANCOVA) was performed to test whether age differences can account for the sample differences found. The result from this analysis showed that age is a significant covariate but that sample differences still exist [F (4, 950) = 40.99, P < 0.001]. In fact, age only accounted for the difference between the student samples and the periodontal patients. However, as sample differences prohibit merging the data, it was decided to base item selection on the largest sample (the two student samples).

To obtain a selection of items, the psychometric criteria were calculated. Next, items were ranked on the criteria and given a rank value. For each item, all rank

### Table 1

<table>
<thead>
<tr>
<th>Item no.</th>
<th>English translation</th>
<th>Selected items</th>
<th>Mean</th>
<th>SD</th>
<th>IT_R</th>
<th>VNF</th>
<th>FL</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receiving an anesthetic in the mouth</td>
<td>–</td>
<td>2.48</td>
<td>1.06</td>
<td>0.57</td>
<td>0.47</td>
<td>0.62</td>
<td>0.66</td>
</tr>
<tr>
<td>2</td>
<td>Treatment in which part of the gum is burned away</td>
<td>–</td>
<td>3.51</td>
<td>1.02</td>
<td>0.68</td>
<td>0.96</td>
<td>0.72</td>
<td>0.73</td>
</tr>
<tr>
<td>3</td>
<td>The dentist’s hook tugging at a filling</td>
<td>–</td>
<td>3.57</td>
<td>1.09</td>
<td>0.55</td>
<td>0.32</td>
<td>0.59</td>
<td>0.66</td>
</tr>
<tr>
<td>4</td>
<td>Having a lump in the mouth removed</td>
<td>–</td>
<td>3.71</td>
<td>1.07</td>
<td>0.66</td>
<td>0.91</td>
<td>0.71</td>
<td>0.76</td>
</tr>
<tr>
<td>5</td>
<td>The filling of a molar</td>
<td>–</td>
<td>2.19</td>
<td>1.01</td>
<td>0.68</td>
<td>0.96</td>
<td>0.72</td>
<td>0.73</td>
</tr>
<tr>
<td>6</td>
<td>Receiving root canal treatment</td>
<td>+</td>
<td>3.50</td>
<td>1.08</td>
<td>0.69</td>
<td>1.02</td>
<td>0.74</td>
<td>0.79</td>
</tr>
<tr>
<td>7</td>
<td>Having a tooth pulled</td>
<td>+</td>
<td>3.03</td>
<td>1.12</td>
<td>0.68</td>
<td>0.96</td>
<td>0.72</td>
<td>0.81</td>
</tr>
<tr>
<td>8</td>
<td>A cold sensation in the mouth close to a cavity</td>
<td>–</td>
<td>2.12</td>
<td>0.99</td>
<td>0.57</td>
<td>0.47</td>
<td>0.62</td>
<td>0.61</td>
</tr>
<tr>
<td>9</td>
<td>An incision in the gums</td>
<td>–</td>
<td>3.26</td>
<td>1.05</td>
<td>0.71</td>
<td>1.11</td>
<td>0.75</td>
<td>0.79</td>
</tr>
<tr>
<td>10</td>
<td>Having an old filling removed</td>
<td>–</td>
<td>2.24</td>
<td>0.96</td>
<td>0.70</td>
<td>1.02</td>
<td>0.74</td>
<td>0.71</td>
</tr>
<tr>
<td>11</td>
<td>Being drilled in the jawbone</td>
<td>–</td>
<td>3.52</td>
<td>1.05</td>
<td>0.72</td>
<td>1.16</td>
<td>0.77</td>
<td>0.80</td>
</tr>
<tr>
<td>12</td>
<td>Having a tooth drilled</td>
<td>+</td>
<td>2.67</td>
<td>1.05</td>
<td>0.72</td>
<td>1.18</td>
<td>0.77</td>
<td>0.80</td>
</tr>
<tr>
<td>13</td>
<td>A cavity that’s being explored with the dentist’s hook</td>
<td>–</td>
<td>2.54</td>
<td>1.12</td>
<td>0.65</td>
<td>0.82</td>
<td>0.69</td>
<td>0.78</td>
</tr>
<tr>
<td>14</td>
<td>Receiving an injection in the roof of the mouth</td>
<td>+</td>
<td>3.01</td>
<td>1.16</td>
<td>0.64</td>
<td>0.77</td>
<td>0.69</td>
<td>0.80</td>
</tr>
<tr>
<td>15</td>
<td>Braces that are being tightened</td>
<td>–</td>
<td>1.82</td>
<td>0.93</td>
<td>0.51</td>
<td>0.23</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>16</td>
<td>Having a wisdom tooth extracted</td>
<td>+</td>
<td>3.22</td>
<td>1.12</td>
<td>0.69</td>
<td>1.02</td>
<td>0.73</td>
<td>0.82</td>
</tr>
<tr>
<td>17</td>
<td>A severe toothache</td>
<td>–</td>
<td>2.84</td>
<td>1.04</td>
<td>0.56</td>
<td>0.42</td>
<td>0.61</td>
<td>0.64</td>
</tr>
<tr>
<td>18</td>
<td>A cavity that’s being excavated with a rough drill</td>
<td>–</td>
<td>3.18</td>
<td>1.14</td>
<td>0.74</td>
<td>1.26</td>
<td>0.78</td>
<td>0.89</td>
</tr>
</tbody>
</table>

+ selected item based on excellent psychometric properties combined with face validity; –, not selected; FL, factor loadings on general factor; IT_R, item-total correlation; RI, reliability index; SD, standard deviation; VNF, Van Naersen’s f.
values were summed (presented in Table 1). Normally, a selection is made of items with the lowest summed rank value (depending on how one ranks the criteria: ascending or descending). This would lead to selection of items in the following order of preference: 11, 12, 9, 6, 16, 10, 7, 2, 5, 4, 13, 14, 1, 8, 17, 3, and 15. Consequently, the items were judged with respect to their face validity. Item numbers 18, 11, 9, 10, 2, 5, and 13 were excluded from the selection. Items 18, 10, and 5 describe just a part of the situation in which a (new or old) cavity needs preparation and filling. Items 11, 9, 2, 4, and 13 were excluded because they are not actual dental procedures. The five remaining items with the highest ranks were selected. Based on the selection presented in Table 2, a short FDPQ version was constructed and will be referred to as s-FDPQ. Pearson’s correlation was calculated between the FDPQ and the s-FDPQ. A strong correlation was found \( r = 0.97 \) \((n = 232, P < 0.001)\), suggesting a high correspondence between the two questionnaires.

The s-FDPQ was examined with respect to psychometric qualities within the total patient sample and for each patient sample separately. Pearson’s correlation was calculated between the FDPQ and the s-FDPQ. Again, a strong correlation was found \( r = 0.97 \) \((n = 232, P < 0.001)\). An exploratory factor analysis (PCA) was performed to inspect the latent factor structure underlying the 5 items, and the results are presented in Table 3. The analysis yielded a one-factor solution accounting for almost 76% of the variance. Highly similar results were seen across patient samples. Only the sample of periodontal patients showed a somewhat lower explained variance. Communalities were within an excellent range, and only item number 14 showed a somewhat lower communality across all samples. All items showed a high factor loading on the extracted component. The alpha value was sufficiently high (0.87), especially when considering the limited number of items. All inter-item correlations showed an acceptable range (0.52–0.71). Deleting any one item would not lead to an increment in the alpha value.

The s-FDPQ

Item selection based on the student sample, and subsequent testing on the patient samples, yielded satisfying results. However, item 14 showed a moderate communality (variance on the item explained for by the latent factor) and, even though the authors would have preferred item 1 in the selection, this item performed less well on the psychometric criteria. Although both items concern receiving an injection, item 1 does not mention an injection or needle (and is evaluated as less painful or less fearful) and is therefore somewhat vague. Item 14, on the other hand, concerns a specific location of the injection (i.e. a palatal injection, which is very painful, but this fact is unknown to many patients), which seems somewhat too specific. Therefore, it is proposed to change item 14 into: ‘Receiving an anesthetic injection in the mouth’. Another issue concerns the instruction. The original instruction stated that the questionnaire describes painful dental experiences’ (1). This was changed into ‘possibly painful dental procedures’ to prevent the inducement of any unwanted anxiety besides that already present in the patient. In addition, ‘experiences’ was changed into ‘procedures’ because, in its present form, this reflects the content of the items more accurately. Based on the presented results, the proposal shown in Fig. 1 is made for the s-FDPQ.
Fear of dental pain

The items listed below describe potentially painful dental procedures. Please look at each item carefully and think about how FEARFUL you are of experiencing the PAIN associated with each item. If you have never experienced the PAIN of a particular item, please answer on the basis of how FEARFUL you expect you would be if you had such an experience. Circle one number per item to rate your FEAR OF PAIN in relation to each event.

Answer scale:

1 = Not at all  2 = A little  3 = A fair amount  4 = Very much  5 = Extreme

Please circle one number per item to rate your FEAR OF PAIN in relation to each event.

<table>
<thead>
<tr>
<th>Items</th>
<th>Amount of fear of pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Receiving an anesthetic injection in the mouth</td>
<td>1—2—3—4—5</td>
</tr>
<tr>
<td>2. Having a tooth drilled</td>
<td>1—2—3—4—5</td>
</tr>
<tr>
<td>3. Receiving root canal treatment</td>
<td>1—2—3—4—5</td>
</tr>
<tr>
<td>4. Having a tooth pulled</td>
<td>1—2—3—4—5</td>
</tr>
<tr>
<td>5. Having a wisdom tooth extracted</td>
<td>1—2—3—4—5</td>
</tr>
</tbody>
</table>

Fig. 1. Item selection for the short Fear of Dental Pain questionnaire (s-FDPQ).

Discussion

In the present study, a short English version of the FDPQ (1) was constructed. Analyses of previously published and unpublished data show that the Dutch version of the s-FDPQ shows excellent psychometric properties and high correspondence with the original questionnaire among Dutch-speaking participants.

A point of discussion relates to the face validity of the items. In this study, face validity was based on whether the item describes a very common, potentially painful, dental procedure. The logic behind this is that a common dental procedure is either experienced by a majority of people, or so familiar that most people have expectations about it (or can easily imagine what it is). As such, fear of pain for these procedures can be estimated from the same frame of reference. Some items were excluded for not being really painful (‘The dentist’s hook that gets stuck behind a filling’), or because they are actually part of some other dental procedure (‘A cavity that’s being explored with the dentist’s hook’ is only one part of the procedure in which the dentist identifies a cavity and decides to prepare and fill it). In this case it was felt that people might have difficulty isolating this item as a single event in order to estimate its painfulness. Other items such as ‘A severe toothache’ were excluded because they are not dental procedures in themselves. Although the pain from a severe toothache is actually something to be fearful about, it has little meaning to be fearful of a severe toothache because it does not occur on a regular basis and cannot be anticipated. A visit to the dentist, on the other hand, should be a regular activity in which potentially painful procedures, such as the dentist having to drill, extract a tooth or perform an endodontic therapy, can be anticipated and feared. To conclude, we tried to select items (within the pool of psychometrically preferred items) that together would constitute a collection of the most common and familiar potentially painful dental procedures. Asking a subject to rate his/her fear of pain associated with these procedures gives us an indication of whether s/he possesses an extremely negative view regarding pain related to dental procedures in general. As such, the FDPQ allows dentists to identify patients whose dental anxiety centers around a specific fear of the pain associated with dental procedures, and may therefore require special attention, longer appointments, and specific dental pain management. In addition, it would assist in the development and evaluation of tailored interventions aimed at this group (for instance cognitive behavioral therapy).

Another point worth discussing is the fact that the student samples scored significantly higher than the periodontal and endodontic patient samples, while the latter are about to undergo a (potentially painful) dental procedure. Possible explanations exist. Age, for instance, is known to correlate negatively to dental anxiety (14–16). As the students in the sample were relatively young, they are expected to show relatively higher levels of dental anxiety. Indeed, our analysis shows that age can account for the differences between the periodontal patients and the student samples. Another study (17) reported that patients having experience with oral surgery or root canal therapy reported lower anxiety levels towards those treatments than those who had no such experience. As the students in the sample were young, they were also relatively inexperienced with dental procedures and were expected to rate higher levels of anxiety towards dental procedures. Vice versa, the endodontic patients probably experienced several dental procedure before receiving root canal therapy, and were expected to rate lower levels of anxiety. Moreover, subjects without actual experience of particular dental procedures have to estimate their fear, which is more likely to be biased by anxiety (2), and is therefore overestimated.

For future research, a number of options are discussed. First, studies employing English-speaking subjects are needed to evaluate the cross-cultural stability of the s-FDPQ. This may involve patients as well as non-patients. Second, the s-FDPQ could be employed quickly and easily, alongside other measures, in clinical investigations. For instance, patients receiving potentially painful procedures, such as periodontal probing, endodontic therapy, third molar extraction, and palatal injection, could be asked to complete a pain measure (i.e. an 11-point NRS) in addition to filling out the s-FDPQ. Thus, the proposed mechanism, by which overestimated pain and escalating anxiety may lead to increased pain perception, especially among patients reporting high levels of FDP, can be further investigated. In addition, it may prove useful to establish normative data and cut-off scores above which patients are at risk of experiencing disproportionate anxiety related to overestimated pain and possible increased pain perception. Understanding gained from such investigations could then be used to develop interventions...
aimed at reducing fear and pain perception among this
group. The mean scores reported in this study can give
researchers some direction in what to expect with dif-
ferent samples. Note, however, that all data are based on
Dutch-speaking subjects. It may well be possible that
comparative samples of English- and Dutch-speaking
subjects will yield different mean scores.

To conclude, a short English version of the FDPQ was
constructed and translated. Analysis of previously pub-
lished and unpublished data shows high correspondence
with the original questionnaire and excellent psycho-
metric properties. We believe that the English translation
will stimulate an increase in dental pain research to
evaluate the cross-cultural stability of the s-FDPQ, to
investigate the relationship between FDP and pain felt
during dental procedures, and to determine whether we
can positively influence the pain experienced during
dental procedures.

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