Beliefs about professional ethics, dentist–patient communication, control and trust among fearful dental patients: the factor structure of the revised dental beliefs survey

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The revised version of the Dental Beliefs Survey (DBS-R), intended to measure three dimensions of the patient–dentist relationship as perceived by the patient, namely *Ethics*, *Communication* and *Control*, was tested in a confirmatory factor analysis. Five different models for the internal structure of the questionnaire were tested. The final model, a 5-factor solution, basically including the 3 assumed dimensions as well as the re-introduced dimension *Trust* covered in the first version of the DBS plus a global factor including all items, yielded an acceptable fit. This model also omits 4 items from DBS-R, i.e. items 3, 11, 18, and 28. The reduced DBS-R is recommended for clinical use when assessing the patient's perception of the relationship to the dentist, including both trust and ethical behavior. □ *Confirmatory factor analysis; dental belief survey; dental fear; ethics*

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The Dental Beliefs Survey (DBS (1)) was created to examine the interpersonal process or relations between the patient and the provider. While other psychometric instruments for dental fear focus mainly on aspects of anxiety reactions to specific dental procedures (2, 3), the DBS is directed towards the patient's subjective perceptions regarding the dentist's behavior and the process of how the care is delivered. The purpose of the DBS is therefore to identify the extent to which the patient sees the relationship with dental personnel and their behavior as part of dental fear. In this sense, the DBS is a clinical instrument. The information obtained is both diagnostic and prescriptive. Since the instrument is intended as a supplement to other dental fear surveys, the correlation measures of anxiety, e.g. Dental Fear Survey and the Dental Anxiety Scale, are usually significant but moderate (4, 5).

The first version of the DBS contained 15 items intended to cover 4 major areas intuitively named Communication, Belittlement, Lack of Control, and Trust (6–8).

In 1995, a new version of the DBS was introduced (DBS-R (9), primarily the result of extensive clinical experience with patients expressing concerns about the dentist and the professional relationship. The DBS-R was intended to refine and add items that were of importance to the patient. Thirteen new items were added and the original 15 items were retained or slightly modified. The DBS-R therefore contains 28 items (see Table 1) intended to cover 3 dimensions of the interpersonal relationship as conceived by the patient.

The first dimension, named Ethics, relates to concerns about the ethical standards of the dentist. Previous instruments assessing dental fears have neglected this topic. The Ethics dimension focuses on the patient's perception of the dentist's competence and integrity, as well as on standards related to what treatment is recommended and whether that treatment is based on informed consent.

The next dimension in the DBS-R, called Communication, addresses the way the dentist and dental personnel listen, provide explanations, and show empathy. Extensive research in medicine has shown that a patient's perceived ease of communication with providers is a critical variable in determining compliance with health-care recommendations and satisfaction with services (10, 11). Also, the communication might be a crucial variable in determining the degree to which a patient's fears are decreased or exacerbated. Scott et al. (12) noted, for example, that highly anxious patients were reluctant to talk to the dentist. The Communication dimension explores how well the patient believes the dentist communicates and how comfortable the patient feels in attempting to talk to the dentist.

The last dimension (Control) covers questions related to the patient's sense of control when treated by the dentist, which is a major theme of dental fear (13, 14). Within this dimension, question 28 focuses on the patient's fear of 'hearing the bad news', which has been found to be a prevalent concern of fearful patients (15).

In other words, the 'Belittlement' and 'Trust' dimensions in the DBS-R were replaced by an Ethics dimension.

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The psychometric properties of DBS-R have not been explored. The aim of the current study was to test the intended factor structure of DBS-R. Specifically, we explored the fit of the clinically based model containing the dimensions Ethics, Communication and Control.

Method

Participants

Subjects were 224 consecutive patients admitted to the Dental Fears Research Clinic, University of Washington, Seattle from January 1996 to June 2001. Twenty-two (10%) of these patients were excluded because more than 20% of items contained missing data on one of the psychometric instruments. The results are therefore based on a reduced data set including 202 patients (53 M (27%) and 146 F (72%). Remaining missing values were replaced by the corresponding variable means. Information about gender was missing for 3 persons (1.3%). Subjects had a mean DFS score of 75.4 (range 22–98, $s = 16.2$). See Table 2 for patient characteristics in the sample.

Instruments

The subjects completed 2 survey instruments: (a) the Dental Fears Survey (DFS) (16), which is a 20-item instrument measuring 3 dimensions of fear of the dentist: avoidance behavior, physiological upset, and the specific aspects of dental fear that are most fearful. The items are rated on 5-point Likert-like scales from 1 to 5, with 5 indicating maximal fear, (b) the revised Dental Beliefs Survey (DBS-R) includes 28 items intended to index 3

Table 1. Exploratory factor analysis of the DBS-II with the highest factor loadings in the respective factor and communalities (h2)

Item number and main content		Factor loading				
		1	2	3	4	h^2
22	Dentists don't seem to notice that patients sometimes need a rest	0.773				0.762
21	When I am in the chair I don't feel like I can stop the appointment for a rest if I feel the need	0.698				0.522
06	Dentists don't seem to care that patients sometimes need a rest	0.693				0.651
18	I am concerned that dentists do not like it when a patient makes a request	0.648				0.676
23	Once I am in the chair I feel helpless (that things are out of my control)	0.640				0.559
13	I am concerned that dentists do not like to take the time to really talk to patients	0.612				0.719
26	Dentists often seem in a hurry, so I feel rushed	0.594				0.702
10	Dentists focus too much on getting the job done and not enough on the patient's comfort	0.591				0.734
16	I am concerned that dentists will not take my worries (fears) about dentistry seriously	0.581				0.735
20	I believe that dentists don't have enough empathy for what it really is like to be a patient	0.569				0.710
11	I'm concerned that dentists might not be skilled enough to deal with my fears or dental problems	0.557				0.547
27	I am concerned that the dentist will do what he wants and not really listen to me while I'm in the chair	0.520				0.710
14	I feel uncomfortable asking questions	0.402				0.383
01	I am concerned that dentists recommend work that is not really needed		0.754			0.593
02	I believe dentists say/do things to withhold information from me		0.697			0.634
03	I worry if the dentist is technically competent and is doing quality work		0.678			0.540
05	I am concerned that dentists provide all the information I need to make good decisions		0.667			0.549
12	I feel dentists do not provide clear explanations		0.608			0.671
09	I am concerned that the dentist is not really looking out for my best interests		0.587			0.647
08	When a dentist seems in a hurry I worry that I'm not getting good care		0.536			0.612
07	I've had dentists seem reluctant to correct work unsatisfactory to me		0.500			0.465
15	Dental professionals say things to make me feel guilty about the way I care for my teeth			0.808		0.770
19	I am concerned that dental personnel will embarrass me over the condition of my teeth			0.800		0.724
28	Being overwhelmed by the amount of work needed (all the bad news) could be enough to keep me from beginning treatment			0.666		0.505
17	I am concerned that dentists will put me down (make light of my fears)			0.618		0.765
25	I have dentists not believe me when I said I felt pain				0.751	0.741
24	If I were to indicate that it hurts, I think that the dentist would be reluctant to stop and try to correct the problem				0.647	0.696
04	I have heard dentists say one thing and do another				0.594	0.580

Table 2. Characteristics of the sample

	Age $\bar{x}$ s	Education $\bar{x}$ s	Full-time work %	Avoidance $\bar{x}$ s	Multiple DSM IV diagnoses %	Missing teeth $\bar{x}$ s	Filled teeth $\bar{x}$ s	Virgin teeth[a] $\bar{x}$ s	Sum DFS $\bar{x}$ s
Females (n = 146)	44.0 (11.8)	15.4 (2.6)	49.3	4.5 (6.0)	45.0	5.3 (4.2)	8.0 (5.4)	15.0 (6.7)	76.6 (16.3)
Males (n = 53)	42.0 (10.2)	14.6 (2.6)	56.6	5.6 (6.8)	35.0	5.4 (4.0)	6.3 (4.5)	14.3 (6.4)	71.6 (16.0)
Total (n = 202)	43.3 (11.4)	15.2 (2.6)	50.5	4.8 (6.3)	43.8	5.4 (4.3)	7.5 (5.2)	14.6 (6.6)	75.4 (16.2)

[a]Teeth without cavities.
s = standard deviation.

dimensions of the patient's perception of dental caregivers and the professional relationship, namely *Ethics* (items 1–11), *Communication* (items 12–20), and *Control* (items 21–28). Each item has 5 score levels from 1 to 5, with 5 indicating maximal concern. In item 28 (intended to be part of the Control index), the patient is asked to rate how fearful he or she is of 'hearing "bad news"'. See Table 1 for the content of the items.

Statistical procedures

With the exception of the confirmatory factor analyses (CFAs) all analyses were performed using Social Sciences SPSS Version 9.0 (17). The AMOS program (18) was used for confirmatory factor analysis (CFA) and for the bootstrapping procedure (19).

In order to evaluate the relationship between the indicator variables, exploratory factor analyses (EFA) were performed (principal component analyses with varimax as well as oblique rotations) as a basic guideline for the structural modeling.

In order to test the assumed latent model underlying DBS-R, a series of CFAs were performed. As opposed to EFA, where the basic assumption is that all observed variables (items) are related to all common factors, CFAs permit detailed specifications of relationships between observed (manifest) variables and theoretical or clinical relevant (latent) variables. Generally, this approach allows for comparative tests of alternative solutions based on theoretical considerations (20). It should also be noted that this strategy of model-building might lead to solutions that are 'better' in a mathematical sense, but less than optimal on theoretical grounds. Substance rather than mathematics must therefore govern the final choice of models.

A large number of indices are used to evaluate the extent to which a certain theoretical model fits the actual data. The chi-square should be non-significant if the theoretical model (latent) fits the actual data (the manifest variables) well. However, the χ^2 statistic is sensitive to sample sizes. In order to avoid having to rely on this sensitivity, a commonly used simple and rough indicator is to divide the chi-square by the degrees of freedom. There is no clear-cut guideline for evaluating the value of χ^2/d.f. that is minimally acceptable, but a frequent suggestion in the literature is that this ratio should be less than 3, assuming a medium (100–200 subjects) or large sample size (>200 subjects) (21).

Other frequently used indices are the Jöreskog-Sörbom goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI) (Jöreskog & Sörbom, 1996); it is recommended that both are larger than 0.90. The Bentler-Bonnet comparative fit index (CFI, see 22) gives an indication of how good the suggested model is compared to a null model. If the CFI equals 0.80, for example, the relative fit of the researcher's model is 80% better than that for the null model estimated with the same sample data. In the null model, the observed variables are assumed to be uncorrelated. The Bentler-Bonnet CFI is robust to sample sizes (21). Also, the root mean square error of approximation (RMSEA) standardized residuals should, as a rule of thumb, be less than 0.08 for an 'acceptable' model, and 0.5 for a fit to be 'good' in a practical sense (23).

Results

DBS-R

Means, standard deviations, and correlation coefficients of the DBS-R are given in Table 3. Cronbach's alpha for the complete set of items in the DBS-R was 0.95.

Exploratory factor analysis

Principal component analysis revealed a first eigenvalue of 13.0 explaining 46.7% of the variance. The analysis produced 4 factors with eigenvalues greater than 1.0, explaining a total of 63.9% of the variance. According to Kaiser's criterion (24), this indicates that there may be at least 4 common factors in the DBS-R. Thirteen of the items had high loadings on the first component, and 6 of these were of 0.60 or more (see Table 1).

Two of the items (7 and 14) had communalities less than 0.50. An item analysis on the complete set of items yields an item-total correlation of 0.50 or less for these items together with no. 1, which is confirmed by the weak communalities for these items. They seem to be relatively independent of the remainder.

The principal components were rotated both orthogon-

Table 3. Item means, standard deviations, and correlation coefficients for the DBS-R ($n = 202$)

Item	M	s	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
DBS01	2.24	1.15	1.0																											
DBS02	2.0	1.12	.57	1.0																										
DBS03	2.6	1.23	.46	.47	1.0																									
DBS04	2.0	1.23	.30	.55	.39	1.0																								
DBS05	2.8	1.34	.40	.42	.44	.30	1.0																							
DBS06	2.9	1.32	.23	.39	.32	.43	.34	1.0																						
DBS07	1.7	1.07	.32	.33	.35	.38	.28	.25	1.0																					
DBS08	2.7	1.34	.35	.40	.43	.35	.45	.40	.46	1.0																				
DBS09	2.5	1.28	.49	.55	.46	.48	.46	.53	.43	.60	1.0																			
DBS10	3.3	1.38	.33	.47	.43	.48	.37	.66	.33	.57	.59	1.0																		
DBS11	3.6	1.40	.27	.36	.51	.35	.37	.51	.19	.42	.43	.60	1.0																	
DBS12	2.7	1.26	.39	.59	.50	.44	.52	.46	.39	.54	.55	.63	.54	1.0																
DBS13	3.0	1.33	.36	.56	.46	.45	.45	.59	.32	.56	.58	.70	.60	.75	1.0															
DBS14	2.7	1.30	.28	.34	.23	.29	.25	.35	.14	.23	.29	.32	.36	.42	.44	1.0														
DBS15	3.2	1.45	.18	.34	.30	.35	.20	.37	.15	.23	.36	.50	.42	.41	.44	.37	1.0													
DBS16	3.7	1.37	.32	.46	.40	.44	.35	.59	.26	.41	.56	.64	.63	.53	.65	.45	.58	1.0												
DBS17	3.5	1.42	.25	.43	.34	.37	.27	.57	.18	.34	.48	.61	.60	.48	.58	.43	.66	.80	1.0											
DBS18	3.0	1.35	.29	.50	.37	.46	.26	.59	.26	.42	.57	.64	.54	.57	.66	.42	.46	.72	.72	1.0										
DBS19	3.0	1.55	.09	.32	.24	.29	.15	.33	.12	.19	.25	.43	.31	.36	.41	.31	.80	.53	.63	.47	1.0									
DBS20	3.2	1.40	.28	.42	.41	.43	.33	.60	.26	.43	.57	.72	.62	.54	.67	.39	.55	.74	.73	.66	.52	1.0								
DBS21	3.4	1.90	.13	.27	.22	.26	.31	.45	.17	.30	.35	.42	.32	.39	.47	.34	.29	.45	.42	.49	.32	.39	1.0							
DBS22	3.2	1.33	.17	.34	.29	.38	.27	.78	.29	.40	.51	.65	.52	.47	.57	.37	.41	.65	.61	.69	.39	.65	.56	1.0						
DBS23	3.9	1.28	.16	.29	.26	.28	.29	.48	.18	.34	.36	.53	.46	.46	.47	.43	.40	.54	.55	.54	.39	.56	.47	.59	1.0					
DBS24	3.2	1.36	.20	.31	.27	.42	.19	.53	.22	.40	.40	.63	.39	.43	.48	.32	.47	.54	.56	.51	.43	.59	.30	.56	.58	1.0				
DBS25	2.9	1.48	.22	.34	.31	.58	.19	.48	.30	.36	.46	.57	.39	.35	.42	.32	.46	.52	.50	.44	.42	.57	.27	.52	.44	.68	1.0			
DBS26	3.0	1.28	.23	.47	.35	.46	.33	.57	.32	.62	.56	.71	.49	.61	.64	.40	.45	.59	.59	.65	.41	.59	.46	.63	.53	.61	.58	1.0		
DBS27	3.1	1.35	.29	.48	.39	.50	.33	.57	.31	.47	.59	.70	.49	.58	.65	.37	.51	.66	.63	.66	.44	.68	.39	.61	.59	.66	.59	.72	1.0	
DBS28	3.3	1.46	.20	.27	.21	.25	.20	.25	.16	.13	.31	.33	.35	.31	.33	.32	.49	.47	.46	.34	.47	.45	.26	.35	.44	.34	.32	.32	.40	1.0

s = standard deviation.

Table 4. CFA results

Model	d.f.	χ^2	χ^2/d.f.	CFI	GFI	AGFI	RMSEA
Model 1	350	1308.68	3.74	0.76	0.63	0.57	0.117
Model 2	350	1633.08	4.66	0.68	0.64	0.59	0.135
Model 3	347	1171.17	3.38	0.79	0.67	0.62	0.109
Model 4	319	804.15	2.52	0.88	0.76	0.70	0.087
Model 5	221	422.08	1.91	0.94	0.85	0.79	0.067

Note. CFI = Bentler-Bonnet comparative fit index, GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; RMSEA = root mean square error of approximation. Maximum iterations = 100.

ally (varimax) and obliquely (oblimin), both with Kaiser normalizations. The results from the principal factor analysis with varimax rotation are presented in Table 1. In the varimax rotation, item 14 loaded on Factor 1, while it loaded on Factor 3 in the oblimin rotation. Apart from this, the factor solutions were identical.

Despite the 4 factors suggested by Kaiser's criterion, the scree plot indicated that 1 common factor might be responsible for most of the covariation (25).

Confirmatory factor analysis

A series of 5 models with increasing complexity is considered (the results from each model are summarized in Table 4). Table 5 contains the results from bootstrapping (19) the same models using procedures included in the AMOS program (18). These results, based on 500 samples, represent an estimate of the population value for the discrepancy (fit for the model) as well as the standard error for the discrepancy. The latter, along with a count of the number of failures (where the program was unable to obtain a solution), is an indicator of the stability of the results from each of the models. It should be added that the start value (seed) for the random number generator was the same for all models, which means that the composition of the first 500 generated samples (attempted solutions) is the same for all models. The results from the 5 models are presented below:

1. A model with all items loading on one common factor or latent variable.
2. All items with three uncorrelated factors or latent variables, one for each of the dimensions as originally proposed.
3. Three intercorrelated factors for each of the dimensions as originally proposed.
4. A model with one common latent variable for all items, plus 3 latent variables for each of the original dimensions. The latter 3 are allowed to intercorrelate as in Model 3, but are uncorrelated with the common latent variable.
5. A final model (see Fig. 1) based on a reduced set of items with 1 added latent variable, 1 common to all items, and 4 latent variables corresponding to dimensions in the set of variables. The latter 4 are permitted to correlate, but are uncorrelated with the common factor.

The starting point is *Model 1*, which postulates that all the items belong to one single factor. This model did not show an impressive fit (χ^2/d.f. = 3.74, RMSEA = 0.117) even though it is reasonable to assume that there is a strong component common to all the items in the questionnaire. Note, also, that this one-dimensional model identifies some items with low loadings (standardized regression weights) in respect of a common factor. These are: item 1 = 0.39, item 5 = 0.45, item 7 = 0.38, item 14 = 0.50, and item 28 = 0.48. These results confirm the item analysis, where the same items had relatively low item–total correlations. In other words, these items contribute less to a common factor than the other items, but they may nevertheless contribute to more specific factors.

Model 2 is closer to the intentions of the questionnaire. The DBS-R was intended to cover 3 dimensions or areas of the interpersonal relationship as perceived by the patient; namely *Ethics (items 1 to 11)*, *Communication (items 12 to 20)* and *Control (items 21 to 28)*. This model includes 3 latent variables corresponding to each of these dimensions. In addition, the 3 factors are regarded as uncorrelated, corresponding to the varimax solution in the EFA. As indicated in Table 4, this model is considerably weaker than the first (χ^2/d.f. = 4.66, RMSEA = 0.135).

Model 3 is a modification of *Model 2*, where the latent variables of dimensions have been allowed to be correlated fairly analogously to the oblique rotation in the EFA. In this case the fit is slightly better than in the first model (χ^2/d.f. = 3.38, RMSEA = 0.109). The correlations between the 3 factors are high, which explains why this model is not much better than the first where a single latent variable common to all items was considered. Omitting the 3 weakest items mentioned above from the model (1, 7, and 28) did improve the model, but not substantially.

On the other hand, if one defines a model (*Model 4*) as a combination of *Model 1* and *Model 3* with (a) one common factor for all items, and (b) the original 3 dimensions for the questionnaire (Ethics, Communication, and Control) as latent variables that are permitted to intercorrelate, and (c) where the common factor is uncorrelated in respect of

Table 5. Bootstrapping results

Model	Failures[a]	Mean χ^2	χ^2/d.f.	Standard error
Model 1	0	1398.65	4.00	1.09
Model 2	0	1724.39	4.93	1.11
Model 3	0	1269.54	3.66	1.18
Model 4	390	967.51	3.03	1.89
Model 5	20	569.54	2.58	1.65

Note. Based on 500 random samples from the data set using the same seed for all models. With the exception of Model 4, there are 480 samples common to all models. Maximum iterations = 100.
[a]Number of failed models, i.e. models that did not reach a solution within the first 100 iterations.

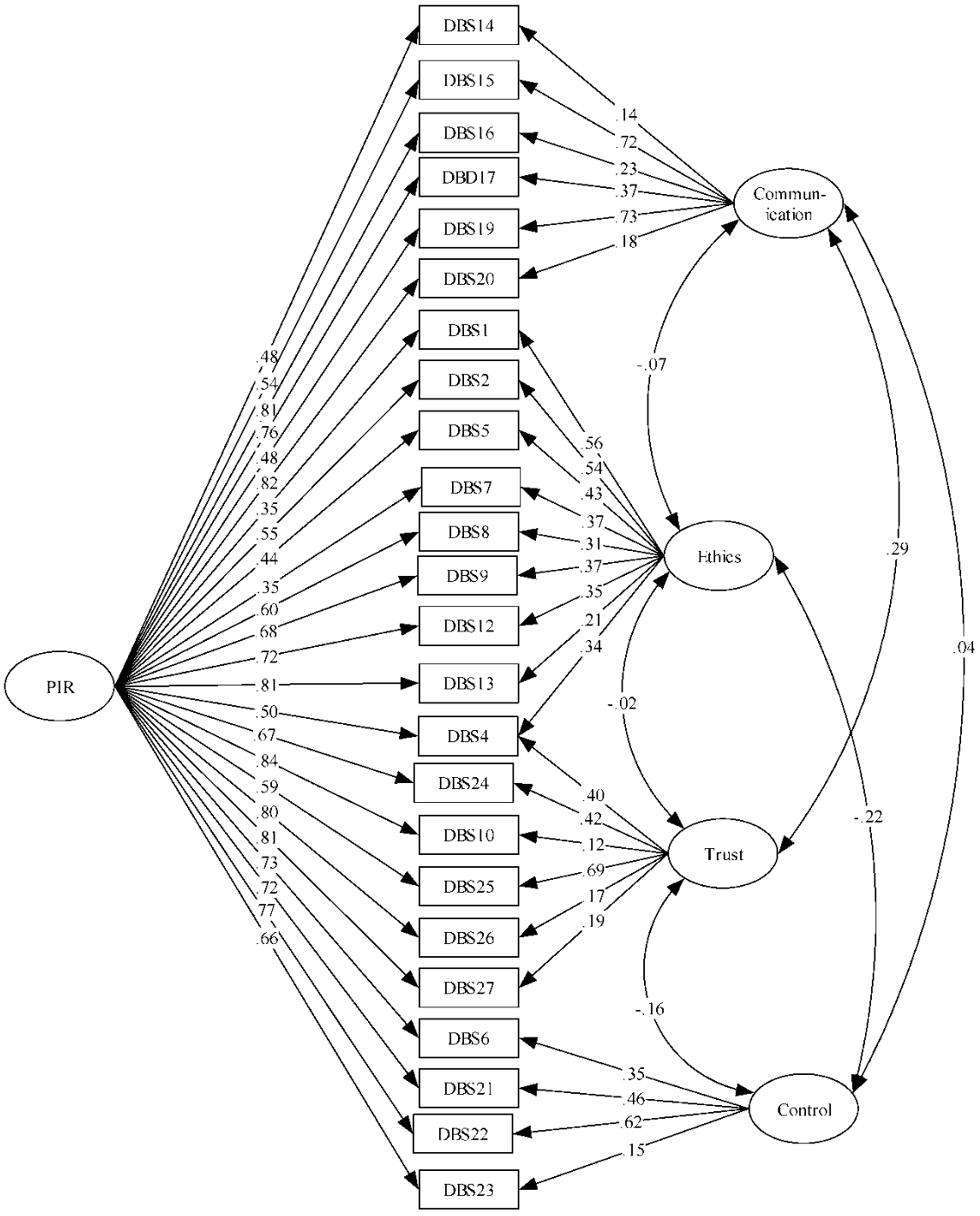

Fig. 1. Final model, four specific factors and one general factor. Chi-square = 422.08, d.f. = 221, RMSEA = 0.067.

Table 6. Squared multiple correlations and standardized regression weights, final model

	SMC	Common	Ethics	Communication	Control	Trust
DBS14	0.25	0.48		0.14		
DBS15	0.81	0.54		0.72		
DBS16	0.70	0.81		0.23		
DBS17	0.72	0.76		0.37		
DBS19	0.77	0.48		0.73		
DBS20	0.70	0.82		0.18		
DBS1	0.44	0.35	0.56			
DBS2	0.59	0.55	0.54			
DBS5	0.38	0.44	0.43			
DBS7	0.26	0.35	0.37			
DBS8	0.46	0.60	0.31			
DBS9	0.60	0.68	0.37			
DBS12	0.64	0.72	0.35			
DBS13	0.70	0.81	0.21			
DBS4	0.52	0.50	0.34			0.40
DBS24	0.63	0.67				0.42
DBS10	0.72	0.84				0.12
DBS25	0.82	0.59				0.69
DBS26	0.66	0.80				0.17
DBS27	0.70	0.81				0.19
DBS6	0.65	0.73			0.35	
DBS21	0.73	0.72			0.46	
DBS22	0.97	0.77			0.62	
DBS23	0.46	0.66			0.15	

the other 3, the fit is considerably improved. The χ^2/d.f. ratio is now 2.52, and RMSEA is reduced to 0.087, within the acceptable range. However, both the GFI and the AGFI increase compared to *Model 3* due to the corresponding change in the d.f.'s for the model. In other words, the better fit as measured by the χ^2 and the RMSEA does not compensate for the increased complexity of the model. The error parts of the model for some of the observed variables are still high, indicating that these items contribute much to the model. Furthermore, although the overall results from this model approach an acceptable level, the results from the bootstrap procedure indicate that this model is highly unstable in a mathematical sense and cannot be recommended. Too many (396) bootstrap samples (see Table 5) were rejected before the procedure managed to generate results for 500 samples.

All of the above models have remained relatively faithful to the original definitions of the items. However, the modification indices from *Model 4* suggest that the fit of the last model can be improved by the introduction of some additional relations to the model. A number of correlated errors for the observed variables could be introduced to the final model to get a better fit, but the introduction of relations of this type is not warranted by the intentions behind the questionnaire and could be regarded as a substitute for adding extra dimensions to the structure of the questionnaire. In other words, *Model 4* is not good, even after modification.

However, an alternative model, *Model 5* (χ^2/d.f. = 1.91, RMSEA = 0.067; see Fig. 1), is suggested by a detailed study of the results from Model 4 together with inspection of the text for each item. One could introduce an additional latent variable called *Trust* to the model, leave out 4 of the items (3, 11, 18, and 28) that do not contribute to the overall fit from the model, and rearrange assignment of the items to the latent variables as indicated in Fig. 1. Inspection of the wording of items 3 and 11 indicates that these differ from the others in that they are oriented towards the professional competence of the dentist rather than towards the relationship between the dentist and patient. Furthermore, item 28 is focused mainly on the consequences of dental avoidance and not on the dentist/patient relationship. The content of item 18 is covered by other more specific items, and clinically this item may be removed without loss in substance.

Table 7. Correlations between latent variables, final model

	Ethics	Communication	Control	Trust
Ethics	1.000			
Communication	−0.067	1.000		
Control	−0.224	0.041	1.000	
Trust	−0.016	0.292	0.161	1.000

The squared multiple correlations and the standardized regression weights for the remaining items in this model are presented in Table 6. The correlations between the 4 latent variables in this model are very much reduced compared to the results from *Model 3* (see Table 7), where the most interesting results are a correlation of 0.29 between Communication and Trust and a negative correlation of–0.22 between Ethics and Control. In addition, the bootstrapping procedure suggests that this model is considerably more stable than the previous one.

Reliability of the scales in the final solution

The reliability of the scales in the suggested final solution was: Ethics, $\alpha = 0.88$, Communication, $\alpha = 0.90$, Control, $\alpha = 0.89$, and Trust, $\alpha = 90$.

Discussion

This study examined the factor structure of the DBS-R in a population with high dental fear. The original version of the DBS did not capture patients' concerns sufficiently about their relationships with dentists and other dental personnel (9), especially issues related to the dentist's ethics. The revised version therefore excluded the previously intended dimensions *Belittlement* and *Control*, and replaced them with the dimension named *Ethics*.

The original model based on 3 orthogonal factors was substantially improved first by allowing the dimensions to correlate, and then by adding a global dimension covering all items (Model 4). Since the dimensions are intended to measure different aspects of the dentist–patient relationship as perceived by the patient, these improvements are clinically relevant. However, this model was unstable.

In the final solution (*Model 5*), we re-introduced the

dimension *Trust*, which was excluded in the DBS-R, and omitted 4 items. *Trust* was also identified in a recent confirmatory factor analysis (26) performed on the old version of the DBS. Since this dimension included only 2 items, Kulich et al. (26) expressed some concern about its stability. In the current analysis, this dimension includes 6 items, and the reliability of the dimension is highly satisfactory. One of the items (no. 4) is allowed to load on both *Trust* and *Ethics*, which might also indicate that these 2 dimensions are related.

Two of the omitted items (3 and 11) invite the patient to evaluate the dentist's formal skills and competence. In our opinion, these items do not primarily address the patients' perception of the relationship, which was also noted by Kulich et al. (26). We excluded item 28 from the final model. This item addresses the patients' feared consequences of dental avoidance. Previously, we have found this to be the only DBS item highly correlated with the Dental Fear Survey (4), which is an indication that it belongs to another aspect of dental fear. Also, item 18 is removed from the questionnaire. The content of this item is covered by several more specific items, and may be removed without loss of content. In conclusion, the final solution in the confirmatory factor analyses to a large extent confirmed the clinically based dimensions of the instrument.

These findings are important because they indicate that the intended improvement of the DBS-R by including the dimension named *Ethics* was relevant. This dimension has been a neglected issue in dental fear research. Recently, the importance of this aspect of the patient–caregiver relationship has been focused in the general dental patient population (27, 28). Advice was given to clinicians to be aware of the 'interactive dialogue' when proposing a treatment plan (28). To our knowledge, the relationship between dental patients' perceptions of caregivers' ethical standards on the one hand, and patients' anxieties and trust on the other, has not been subject to empirical research in dentistry. We do, however, know that the extent of patient participation in treatment planning, including explicit informed consent, is significantly related both to treatment satisfaction and to treatment outcome (29–32).

One reason for this lack of evidence-based information might be related to an under-use of psychometric instruments that include assessment of the patient's perception of the caregiver's ethical standards, as indicated by the lack of studies including DBS-R (26).

It is thus concluded that the suggested factor structure of DBS-R has statistical support, and that the scale in this sense, too, is an improvement on the original DBS. We thus suggest that the DBS-R should be the instrument of choice when assessing the patient's perception of the professional relationship with a revised allocation of items to subscales.

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