A Swedish version of the Dental Visit Satisfaction Scale

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The aims of this study were to translate and analyze the Dental Visit Satisfaction Scale (DVSS), which has been developed to measure different aspects of the dentist–patient relationship in the view of the patient. Subjects were ordinary dental patients attending dental care in various public dental service clinics (PDS) and patients attending an emergency PDS clinic and an oral medicine clinic ($n = 204$). Consecutively, patients were asked to answer a questionnaire that consisted of the DVSS and information about dental anxiety, age, and gender. The results revealed similar DVSS item/sum of scores levels as those in previous studies. There was no significant difference with respect to gender. High dental anxiety was associated with low DVSS score. Three dimensions were found in the exploratory factor analysis: Information/communication, Understanding/acceptance, and Technical competence. Item 8 was found to have skewed properties according to correlation, reliability, and factor analysis. A confirmatory factor analysis with the 9-item DVSS (item 8 removed) revealed a model with 4 dimensions. A general dental satisfaction factor was found, loading on all 9 items, together with the above-mentioned, more narrow factors. □ *Dental care; factor analysis; patient satisfaction; psychometrics*

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Patient satisfaction with health care has been indicated as an important factor associated with health beliefs, compliance, and treatment outcomes, among others (1, 2). In dentistry, several factors are encountered related to patient satisfaction with dental care and dentists. The dentist–patient relationship, technical competence of the dentist, accessibility, cost and location, pain experience, and dental anxiety have previously been found to be concomitant parameters to patient satisfaction with dental care (3–9).

In the literature there are several reports describing ways of evaluating patient satisfaction by means of different questionnaires or psychometric tests (1, 2, 4, 5, 7, 8). One such test is the Dental Visit Satisfaction Scale (DVSS) that was developed by Corah et al. (7) in 1984. They investigated the Medical Interview Satisfaction Scale (MISS), which was developed to assess patients' perceptions of the physician directly following a medical interview and examination (2). This scale included 26 items measuring various aspects of the medical encounter, allowing the patient to agree or disagree with different statements. Three dimensions were assumed to reflect cognitive, affective, and behavioral satisfaction, and provided an overall satisfaction score. Corah et al. (7) used the MISS, but transferred the items to dentistry, referring to the dentist and dental problems. After data reduction and factor analysis, their analyses showed 10 remaining items that tapped dimensions similar to those in the MISS. These factors included Information/communication (IC), Understanding/acceptance (UA), and Technical competence (TC), which were represented by 3, 3, and 4 items, respectively. Moreover, their study showed that the DVSS discriminated between groups of patients experiencing different types of dentist behavior during dental care situations.

In an epidemiological study by Locker & Lidell (10) in Canada, concerning dental anxiety and concomitant factors among older adults, the DVSS was used to evaluate the behavioral consequences of dental anxiety. The analysis revealed significant differences in DVSS mean overall and sub-scale scores between individuals classified and not classified as dentally anxious. However, in a linear regression model, dental anxiety and age only explained a small portion of variance in DVSS scores, indicating that patient satisfaction with dental care involves a wide spectrum of parameters. Stouthard et al. (11) translated and tested the DVSS on a Dutch sample of psychology students. The mean overall and subscale scores showed concordance with the studies by Corah et al. (7, 9) and Locker & Lidell (10). In addition, an exploratory factor analysis (EFA) revealed approximately the same structure as the Corah et al. (7) study, but a suggestion for modification was made based on the EFA and intercorrelations. Item 8 had low correlations to the subscales and lowest item remainder correlation; thus, the authors proposed removal of that item from the DVSS. Furthermore, the Locker & Lidell (10) and Stouthard et al. (11) studies also included a minor alteration of the DVSS in that they changed the items from past to present tense.

In Sweden, no established psychometric test has been used to measure patient satisfaction with dental care. However, there is a need for such an instrument in quality

Table 1. The Swedish version of the Dental Visit Satisfaction Scale

Information/communication
After talking with the dentist, I know what the condition of my mouth is.
After talking with my dentist, I have a good idea of what changes to expect in my dental health in the next few months.
The dentist tells me all I want to know about my dental problem(s).
Understanding/acceptance
I really feel that the dentist understands me.
I feel that the dentist really knows how upset I am about the possibility of pain.
I feel that the dentist accepts me as a person.
Technical competence
The dentist is thorough in doing the procedure.
The dentist is too rough when he works on me.
I am satisfied with what the dentist does.
The dentist seems to know what he is doing during my visit.

evaluations of dental care, and specifically in Swedish dental research. The aims of this study were to translate the DVSS into Swedish, to test and analyze the DVSS on different dental patient groups and to analyze the factor structure of the DVSS.

Materials and methods

Subjects were ordinary dental patients receiving dental care in 4 different public dental service clinics (PDS) ($n = 112$) and patients attending an emergency PDS clinic ($n = 71$). One clinic was a specialist clinic in oral medicine (OM) ($n = 21$). Consecutively, patients were asked before dental treatment to answer a questionnaire, which consisted of the DVSS and information about dental anxiety, age, and gender.

The 10 items of the DVSS are displayed in Table 1. The items are scored from 1 (strongly disagree) to 5 (strongly agree), with total scores ranging from 10–50. Scores from each subdimension were obtained: Information/communication (range 3–15), Understanding/acceptance (range 3–15), and Technical competence (range 4–20). Item 8 is scored in the opposite direction, and data for that item was reversed before the analyses. Two bilingual individuals translated the English version of the DVSS into Swedish and then back into English in order to check for semantic differences. In addition, in accordance with previous studies (10, 11), we used the DVSS in the present tense, which permitted its use regardless of whether dental care preceded it or not.

Table 2. Mean and standard deviation of DVSS items of Swedish, Dutch (11), and US (7) versions

	Version					
	Swedish		Dutch		US	
	Mean	SD	Mean	SD	Mean	SD
1.	4.31	0.70	4.14	1.04	3.80	1.12
2.	3.74	1.07	3.58	1.14	3.60	1.05
3.	4.19	0.92	3.79	1.23	3.68	1.13
4.	4.12	0.89	3.28	1.22	3.75	0.98
5.	4.19	0.97	3.33	1.20	3.83	0.95
6.	4.45	0.72	3.62	1.14	4.04	0.78
7.	4.48	0.71	4.23	0.96	4.30	0.73
8.	4.25	1.17	4.20	1.07	4.30	0.70
9.	4.39	0.89	4.09	1.11	4.36	0.63
10.	4.57	0.72	4.34	0.91	4.44	0.68

Table 3. Means and standard deviations of total and subscale scores of Swedish, Dutch (11), and US (7) versions of the DVSS

	Swedish		Dutch		US	
	Mean	SD	Mean	SD	Mean	SD
DVSS total	42.8	5.9	38.5	7.9	42.3	—
Subscale						
I-C	12.2	2.2	11.5	2.8	12.9	—
U-A	12.7	2.2	10.2	3.0	12.3	—
TC	17.7	2.6	16.9	3.4	17.2	—

I-C = Information/communication; U-A = Understanding/acceptance; TC = Technical competence.

Dental anxiety was measured by the Corah Dental Anxiety Scale (DAS), a 4-item scale with responses scored from 1 (no anxiety) to 5 (extreme anxiety) per item (12–17). The sum of scores (range 4–20) is used to measure the level of dental anxiety, where a score ≥ 13 is considered a high dental anxiety level (17). The DAS has been used in several epidemiological and controlled clinical studies (10, 12–17).

The computer programs SPSS 9.0 and EQS 5.2 were used in the statistical analyses. The methods applied were the t test, one-way analysis of variance, including the Bonferroni multiple comparison test, Pearson's correlation analysis, and alpha reliability analysis. The exploratory factor analysis included a principal component analysis with inspection of initial factor loadings, eigenvalues, and scree plots. The Varimax method was used for extracting rotated factor loadings. Confirmatory factor analysis was applied to analyze further possible dimensions of the DVSS and to specify error variances of the items. The evaluation of a CFA includes several goodness-of-fit indices, which, for the EQS program, are a χ^2 test, normed, non-normed, and comparative fit indices, among others (18).

Results

Among the 219 patients who were asked to fill out the questionnaire, 15 refused to participate. Reasons for refusal were 'don't have the time', 'just don't want to', 'don't have my eyeglasses and can't read', and 'can't read Swedish well enough'. Since the questionnaire was answered anonymously, further analysis of the dropouts cannot be performed. Among those who answered, 32 and

Table 4. Swedish and Canadian (10) mean DVSS scores (standard deviation) among individuals with reported low and high dental anxiety as measured by the DAS < 13 and DAS ≥ 13, respectively

	Swedish		Canadian	
	Low	High	Low	High
% of sample	86.8	13.2	91.6	8.4
DVSS total	43.2 (5.4)*	39.5 (7.7)	41.1 (5.4)*	37.7 (5.6)
Subscales				
I-C	12.3 (2.2)	11.8 (2.6)	12.3 (1.7)**	11.4 (1.8)
U-C	12.9 (1.9)*	11.7 (3.1)	12.2 (1.9)*	11.3 (1.9)
TC	17.9 (2.4)**	16.0 (3.3)	16.6 (2.9)**	15.0 (2.9)

* $P < 0.01$, ** $P < 0.001$.
I-C = Information/communication; U-A = Understanding/acceptance; TC = Technical competence.

Table 6. Exploratory factor analysis of the DVSS with factor loadings and commonalties

	Factor loadings			
Item	1	2	3	h^2
1.	0.72	0.34	0.18	0.66
2.	0.87	0.01	0.00	0.75
3.	0.76	0.27	0.18	0.68
4.	0.59	0.32	0.51	0.71
5.	0.25	0.17	0.71	0.59
6.	0.33	0.43	0.61	0.67
7.	0.35	0.72	0.33	0.74
8.	0.06	0.08	0.79	0.62
9.	−0.26	0.85	0.15	0.81
10.	0.07	0.90	0.14	0.83

34 patients did not respond to the gender and age questions, respectively. However, there were no statistically significant differences between respondents and non-respondents in terms of gender and age with respect to DVSS items or sum of scores, and DAS sum of scores. The mean age was 47.3 years (SD = 18.3, $n = 170$) and 41% were women.

In Tables 2 and 3, means and standard deviations of the DVSS items, sum of scores, and subscales are shown together with Dutch and US published DVSS scores. The results revealed, on average, higher item scores for the Swedish sample as compared to the Dutch and US levels (7, 11). However, the variability had similar values across studies, with the Swedish and US samples in general showing lower estimates than the Dutch sample. There were no statistically significant differences with respect to gender and DVSS items, sum of scores, and subscales. The intercorrelations between the subscales were IC:UA = 0.56, IC:TC = 0.45, and UA:TC = 0.64. The item correlation matrix revealed coefficients ranging from 0.04–0.71. Item 8 showed the consistently lowest correlations to other items (range 0.04–0.34). Internal consistency was determined by Cronbach's alpha, and was, for the total DVSS scale, 0.86, and for the subscales IC, UA, and TC, 0.76, 0.77, and 0.72, respectively.

High dental anxiety was reported by 13.2%, with women being more dentally anxious than men (mean 9.1 and 7.0, respectively; $t = 4.0$, $P < 0.001$). As shown in Table 4, patients with high dental anxiety were found to have statistically significantly lower scores on the DVSS total, UC, and TC scales. According to type of clinic attended, patients seeking dental care at the emergency clinic (EC) reported higher DAS scores (Table 5).

Table 6 shows the loadings of the Varimax-rotated factor matrix for the total sample. The principal component analysis revealed 3 factors with eigenvalues of 4.81, 1.24, and 0.99 and a total explained variance of 70.5%. The first factor explained 48.1% of the variance. Overall, the EFA showed factor loadings >0.51 and the same dimensions as in the US and Dutch analyses, with 1 exception, i.e. item 8, which loaded highest on the second factor together with items 4–6. The CFA, with 10 items and 3 hypothesized factors according to the EFA results, revealed a χ^2 of 298.8 based on 35 degrees of freedom with NFI = 0.68, NNFI = 0.62, CFI = 0.71, and

Table 5. Means and standard deviations of the DVSS and DAS according to type of clinic

	EC ($n = 71$)		GP ($n = 112$)		OM ($n = 21$)		ANOVA
	Mean	SD	Mean	SD	Mean	SD	F-value
DAS	9.3	3.9	7.3	3.2	7.0	2.6	8.0*
DVSS total	41.3	7.0	43.2	5.0	44.3	5.5	3.1
Subscales							
I-C	11.9	2.6	12.3	2.1	12.9	1.8	1.7
U-A	12.3	2.5	13.0	2.0	13.0	1.9	2.6
TC	17.1	3.0	17.9	2.3	18.4	2.5	2.8

* EC > GP, EC > OM at $P < 0.05$ (Bonferroni test).
EC = emergency clinic; GP = general practice clinic; OM = oral medicine clinic; I-C = Information/communication; U-A = Understanding/acceptance; TC = Technical competence.

Table 7. The standardized solution of the CFA with factor loadings on a general dental satisfaction dimension (GDS) and Information/communication, Understanding/acceptance, and Technical competence dimensions ($n = 204$)

Item	GDS	I-C	U-A	TC	Residual
1.	0.66	0.37	—	—	0.65
2.	0.45	0.56	—	—	0.70
3.	0.64	0.43	—	—	0.63
4.	0.81	—	0.09	—	0.58
5.	0.55	—	0.52	—	0.65
6.	0.76	—	0.21	—	0.62
7.	0.75	—	—	0.33	0.57
8.	0.37	—	—	0.02	0.93
9.	0.64	—	—	0.58	0.51
10.	0.54	—	—	0.64	0.55

I-C = Information/communication; U-A = Understanding/acceptance; TC = Technical competence.

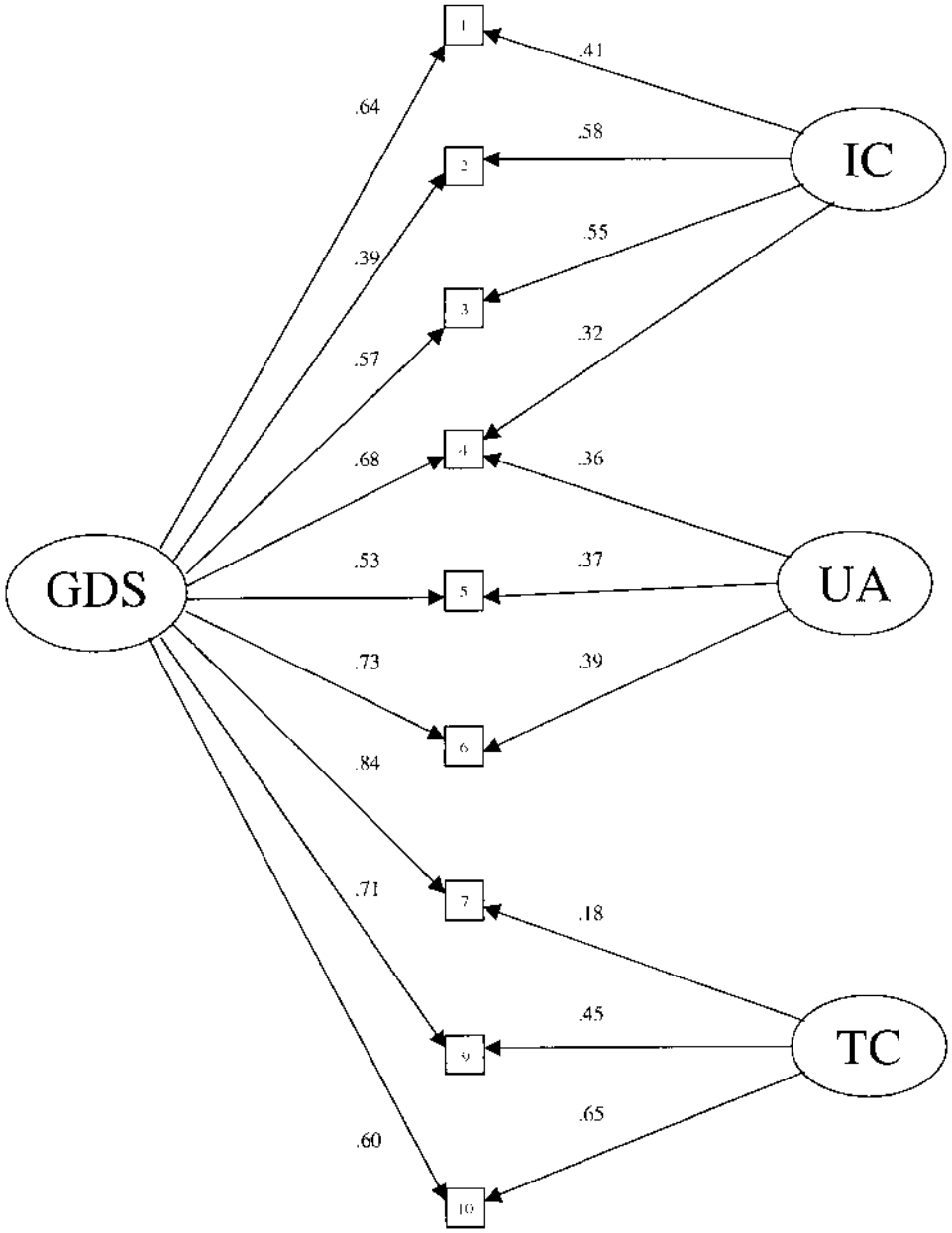

Fig. 1. Dimensions, factor loadings, and residuals (E) of the reduced, 9-item, DVSS according to confirmatory factor analysis (E1 = 0.65, E2 = 0.72, E3 = 0.61, E4 = 0.54, E5 = 0.76, E6 = 0.57, E7 = 0.52, E9 = 0.55, E10 = 0.47.)

RMSEA = 0.19, indicating a bad fit of the model. Modification indices improved if covariances between the latent variables were included in the model. That model revealed a $\chi^2 = 86.5$ with 32 df, $P < 0.001$, NFI = 0.91, NNFI = 0.92, CFI = 0.94, and RMSEA = 0.09, i.e. a clear improvement, although the χ^2 statistic was significant.

The next step was to test a model with a general factor measuring a hypothesized, general dental satisfaction dimension (GDS), which would load on all factors together with the previously tested 3 factors. The strong first factor of the PCA pointed towards such a model. This model showed the best model fit with $\chi^2 = 46.1$, df 25, $P = 0.006$, NFI = 0.95, NNFI = 0.96, CFI = 0.98, and RMSEA = 0.065 (Table 7). However, item 8 had low loadings on both the GDS and TC. A last modification of the CFA model was made based on the low correlation coefficients between item 8 and the other items, the EFA and CFA, and the suggestion made by Stouthard et al. (11) to remove item 8 from the DVSS. The 9-item EFA explained 75.2%

of the variance, and rotated factor loadings ranged from 0.59–0.90. The alpha coefficients also improved with 0.87, 0.76, 0.77, and 0.85 for the DVSS total, IC, UA, and TC, respectively. The last CFA 9-item model revealed $\chi^2 = 17.4$, df 17, $P = 0.43$ with NFI = 0.98, NNFI = 0.99, CFI = 1.0, and RMSEA = 0.012. This model had a good fit, as indicated by the indices, and the factor structure was the same as for the 10-item model with 2 differences. Item 8 was removed and item 4 loaded on both factors IC and UA (Fig. 1).

Discussion

The purposes of this study were to translate an existing psychometric test, measuring dental patients' satisfaction with dental care, from English into Swedish and to evaluate the scale's properties from different aspects. We have shown that the Dental Visit Satisfaction Scale has several positive features, such as good statistical and discriminating functions, and may thus be a promising questionnaire for use in Swedish odontological, epidemiological, and clinical studies. The Swedish version of the DVSS revealed comparative, parallel results with respect to previous research findings from different countries and cultures (7, 8, 10, 11). However, there are shortcomings in the present study, one being that the sample was not representative of the general adult population. Secondly, patients attending private practices were not included specifically, although some individuals in the EC and OM groups were presumed to be attenders in private clinics. Thus, the results should be interpreted with caution, and further investigations will be performed in which the DVSS will be evaluated among middle-aged and elderly women representative of the general population, and among dental phobic patients attending a specialized dental fear clinic.

In the literature there have been several reports on the development of dental satisfaction questionnaires, but the DVSS is the test that has been used most frequently (7, 8, 10, 11). Advantages of the DVSS are that it is short, easy to use, and thus practical to include in research surveys. Moreover, its validity and reliability have been investigated and proven to be satisfactory (7, 8, 11).

Satisfaction with dental care has been reported to be associated with dental visiting habits, dental anxiety, and the dentist–patient relationship (3, 5–10). One study indicated that dental patients' satisfaction with their care was related to their utilization of dental services (19). Arnbjerg et al. (20) confirmed this result, and reported that satisfaction with previous dental care depended upon 3 factors: choice of dentist, chewing ability, and contentment with self-reported oral health. It has been shown that EC patients more often have irregular dental habits, which may influence DVSS levels (21). However, there were no statistically significant differences between clinics in DVSS scores in the present study. High dental anxiety was found to be associated with lower DVSS levels, which is in accordance with the results from the Locker & Lidell study (10). The correlation between DAS and DVSS was −0.25 and −0.26 in the former and latter studies, respectively. There is no evidence, though, that satisfaction with dental care decreases dental anxiety, as Corah et al. (8) have pointed out.

The factor structure of the Swedish 10-item DVSS version proved to be similar to results from the studies of Stouthard et al. (11) and Corah et al. (7). In the study of Stouthard et al. (11), it was concluded that the DVSS had 2 peculiarities. First, the TC subscale has 4 items, unlike the IC and UA, which have 3 items each. Secondly, item 8 is scored in the opposite direction, which the subjects may overlook, thus affecting the scoring. In the present study, item 8 had specifically low item intercorrelations and loaded on another factor than the presumed TC scale. The poor loadings of item 8 were also reflected in the CFA for 10 items, which revealed a high error variance as compared to the other item residuals (Table 7). When item 8 was removed, both the EFA and CFA modeling results improved significantly. The total explained variance and reliability coefficients (alpha) increased, which is similar to the results of the Stouthard et al. study (11). The CFA also revealed a general dental satisfaction dimension loading on all items, which we believe may enhance the interpretation of the DVSS. Thus, the 9-item DVSS may be a more valid and reliable psychometric test from a statistical point of view than the 10-item version. However, we need more confirming surveys in clinical and epidemiological research to validate the present results.

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