Development of a psychometric scale to assess satisfaction with dental care among Sri Lankans

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Objective: To develop and validate a psychometric scale to assess dental satisfaction among Sri Lankans. ***Design:*** A population based cross sectional study, where the data were collected by a postal questionnaire. A 22-item scale was developed to measure dental satisfaction. ***Participants:*** 1,000 Sri Lankans aged 18-75 years, selected by cluster sampling with probability proportionate to size technique, using National Voters' register**.** ***Outcome measures:*** Reliability of the scale was assessed by internal consistency using Cronbach's alpha and corrected item-total correlations. Construct validity was determined by factor analysis and acceptability was assessed by percentage of item-specific non-response. ***Results:*** The overall response rate was 30.9%. Among respondents, analysis was limited to dental care users within two years (n=117). Item-specific non-response was low, ranging from 3.4% to 9.4%. Four (negatively worded) items were removed from the scale due to poor internal consistency (corrected item-total correlations <0.2). After removal, corrected item-total correlations of remaining 18 items were improved, ranging from 0.23 to 0.76. Factor analysis revealed a four factor solution, interpreted as: *"outcome of care/clinic context" (8-items), "factors related to treatment process" (7-items), "convenience" (2-items)* and *"cost of care" (single item).* Identified factors explained 64.56% of the variance of the scale. The Cronbach's alpha values for the first three dimensions were 0.90, 0.87 and 0.60 respectively and for the overall construct it was 0.91. ***Conclusions:*** The present scale appeared to be a valid and reliable instrument for measuring dental satisfaction among Sri Lankans, but merits further refinements to explore detailed aspects of it.

Keywords: Dental satisfaction, factor analysis, reliability, validity.

Introduction

Dental satisfaction is a multidimensional concept consisting of domains such as dentist-patient relationship, accessibility to dental care, clinic environment and cost of care (Chapko *et al*., 1985; Corah *et al*., 1985). It is influenced by cross-cultural differences in attitudes, beliefs, perceptions and expectations of population, as well as country-specific organization of dental care services (Skaret *et al*., 2004). Therefore, it becomes a health outcome measure indicating individual health status, quality of dental care received, compliance and utilization of dental services (Davies and Ware, 1981; Alveslalo and Uusi-Heikkik, 1984; Donabedian, 1987; Reifel, *et al*, 1997; Takemura *et al*., 2006). Hence, an array of scales has been developed to assess dental satisfaction; for example, 19-item Dental Satisfaction Questionnaire -DSQ (Davies and Ware, 1981), the 10-item Dental Visit Satisfaction Scale -DVSS (Corah *et al*., 1984) and 31-item Australian Dental Satisfaction Scale-1999 -DSS (Stewart and Spencer, 2002).

However, in contrast to developed countries, most dental satisfaction scales, which have originated in developing countries, have not been psychometrically tested (Ntabaye *et al* 1998; Sur *et al*., 2004). Therefore, irrespective of several socio-economic and cultural similarities, translated versions of such scales might not adequately capture the 'true picture' of dental satisfaction among Sri Lankans. Hence, the aim of this study was to develop and validate a scale to assess dental satisfaction among Sri Lankans aimed at improving quality of care.

Methodology

The data for the present paper were collected in 2003, as part of an island-wide study to assess the utilization of dental services and dental satisfaction among Sri Lankans. Only the results pertaining to dental satisfaction in this population will be presented.

The updated Voters' Register of Sri Lanka-2002 was the sampling frame. A multi-stage cluster sampling combined with probability proportionate to size technique was used to select the sample. Each cluster consisted of 10 individuals (aged 18 to 75 years) selected randomly from different households using a table of random numbers from a given electorate. As there were no previous studies, the sample size was calculated assuming 50% prevalence of satisfaction at 95% level of confidence and accepting a sampling error of 5%. Accordingly, the minimum sample size required was 384 (Lwanga and Lemeshow, 1991). Subsequently, adjusting for cluster factor of 1.2 and response rate of 45%, the minimum sample size was estimated as 1,022, but for practical purposes, the final sample size was limited to 1,000.

Data were collected using a self-administered (postal) questionnaire, which consisted of three parts. The first part intended to collect socio-demographic data of the people while the second part was focused on identifying factors affecting utilization of dental services. The third part consisted of the dental satisfaction scale, which was developed in stages. Firstly, based on an extensive literature review, a tentative 30-item scale was developed

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under three conceptual dimensions: "*context of the clinic environment*", "*factors related to treatment process*" and "*outcome of care*". Secondly, a series of three focus group discussions (FGDs) were conducted in native languages (Sinhala and Tamil) among 30 dental care recipients (equal numbers of males and females aged 25 to 50 years) at three public hospitals to explore their views on factors that have influenced dental satisfaction. FGDs were based on three dimensional conceptual model and each lasted for one hour. Whole discussions were audio-taped and analyzed by "framework approach" (Morgan, 1993). Based on the findings, the tentative scale was modified to make it relevant to Sri Lankan socio-cultural context.

Finally, while maintaining the diversity of items of the conceptual model, total number of items was limited to 22 for minimizing the "respondents' burden." Subsequently, they were ordered randomly and some were worded negatively in order to minimize the bias attributed to 'response fix' (Table1). The respondents were instructed to mark their agreement on a 5-point Likert scale: 1=strongly disagree, 2=partially disagree, 3=no comment/neutral, 4=partially agree, 5=strongly agree, based on their experience related to last dental visit.

Due to the availability of almost all relevant literature, the questionnaire was originally developed in English. It was then translated into native languages and back-translated into English to ensure comparability. All modifications of the questionnaires were done thereafter in native languages. After finalizing the questionnaire by FGDs, it was sent to four local experts in community dentistry for their consensus and also pre-tested among 30 individuals, who attended the Dental Institute-Colombo (where the investigators were based), for content, clarity and flow of questions. After making necessary modifications, the questionnaires were mailed to selected 1000 participants with a stamped-addressed envelope and a covering letter explaining the aim of the study and the importance of their participation. To increase the response rate, two reminders were sent after two weeks (to all participants) and after four weeks (to non-respondents with a replacement questionnaire). Data were analyzed using SPSS® 13 statistical software package. All negatively worded items were re-coded prior to data entry.

Reliability of the scale was assessed in terms of internal consistency using Cronbach's alpha coefficient, inter-item and corrected item-total correlation coefficients. Validity of the scale was assessed by consensual and construct validity. A modified Delphi process was used to gain consensual validity from experts. Factor analysis by principal component analysis and varimax rotation with Kaiser normalization was performed to determine the construct validity of the scale. Factors were conserved if eigenvalues were ≥1.0. Bartlett's tests of sphericity, Kaiser-Meyer-Olkin (KMO) test of sampling adequacy were performed to confirm the appropriateness of correlation matrix for conducting factor analysis (Tabachnick and Fidell, 2001). The acceptability of the scale was assessed by calculating the percentages of item-specific non-response. Ethical clearance for the study was obtained from the Office of the Deputy Director General of Dental Services, Ministry of Health, Sri Lanka.

Results

The overall response rate was 30.9% (n=309). Of them, 226 had utilized dental care services; 71 (23%) within one year, 46 (14.9%) within 1-2 years and 109 (35.3%) more than two years. Therefore, the findings of the present study were based on 117 (71+46) respondents, who had utilized dental services within two years. The majority of respondents were aged 30-44 years (38.3%), females (54.4%) and rural residents (85.4%). The percentages of item-specific non-response for 22 items were low, varying from 3.4% to 9.4% (Table 1).

Of 22, four items had corrected item-total correlation less than 0.2; namely, negatively worded S6, S7, S9 and S21. Therefore, in order to maintain the internal consistency of the scale, these items were excluded and not considered for subsequent analysis. Once they were removed, the corrected total–item correlations of the remaining 18 items were improved, ranging from 0.23 (S22) to 0.76 (S5). The overall Cronbach's alpha coefficient for the scale was 0.91. When alpha was computed after eliminating one item at a time, it was same or lower than the original value (Table 2).

Table 3 shows the correlation matrix for 18-item scale. The maximum correlation (0.83) was found between S5 (*I believed that I got the correct treatment for my dental problem*) and S19 (*My dental problem was cured by the treatment I received*). The lowest correlations (0.01) were found between S10 (*The Dental Surgeon gave me post-op instructions*) and S22 (*I had to spend much more than I expected for my dental treatment*), as well as between S15 (*The dental clinic is located at a convenient place*) and S22. Two of the inter-item correlations were negative: S22 and S15 (-0.01) as well as S16 (*It is possible to get convenient appointments for my dental treatments*) and S22 (-0.08). No correlations were high enough for any item to be redundant. The Bartlett's test of sphericity was significant (p<0.001) and the KMO statistic was 0.883

Table 4 and Figure 1 depict the four factor solution after conducting factor analysis. An item was considered for a given factor if its loading was ≥0.30. The communality estimates ranged from 0.498 to 0.788 (Table 4). Altogether, four factors explained 64.56% of variance of the scale. The first factor consisted of items S1, S5, S8, S14, S18, S19 and S20, while the second factor encompassed of items *S*2, S3, S4, S10, S11, S12, and S17 respectively. Items S15 and S16 constituted the third factor and the fourth factor had items S22 and S13. However, for a meaningful interpretation, it was decided to transfer item S13 (*The Dental Surgeon would have been more kind to me*) to factor 2 (factor loading 0.41). Similarly, item S17 (*I shall be going to the same dental clinic if I need dental treatment again*) was assigned to factor 1 (factor loading 0.39) (Table 4).

The first factor, which consisted of a mix of items of the conceptual model: *structure of the clinic environment and outcome of care*, was labeled as "*outcome of care/clinic context*". The second factor simulated the "*factors related to treatment process*" of the conceptual model. The third factor, which consisted of convenient access to dental clinic and appointment times (S15 and S16), was named as "*convenience*" and the fourth factor, which carried the only item related to cost (S22), was labeled as "*cost of*

Table 1. The conceptual model for dental satisfaction scale for Sri Lankans with % item-specific non-response

Dimension	Item no	Statement	Item-specific non-response (%)
	S1	The dental clinic is kept clean and tidy	6.0
	S7*	I had to wait much more than I expected until my turn to get dental treatment*.	7.7
	S8	I believed that the dental clinic had all the facilities for my treatment	7.7
Context of the	S14	I believed that sterilized instruments been used for my dental treatment	3.4
clinic environment	S15	The dental clinic is located at a convenient place	3.4
	S16	It is possible to get convenient appointments for my dental treatments	4.3
	S18	The staff of the dental clinic was courteous	3.4
	S20	The dental clinic had modern dental equipment	4.3
	S2	The Dental Surgeon explained the possible treatment for my dental problem	7.7
	S3	The Dental Surgeon was concerned about my discomforts during treatment	7.7
	S4	The Dental Surgeon allowed me to explain my dental problems	7.7
	S6*	The supportive staff of the dental clinic would have been more kind to me*	8.5
Factors related to	S9*	My treatment was more painful than I expected*	8.5
treatment process	S10	The Dental Surgeon gave me post-op instructions	7.7
	S11	The Dental Surgeon spent reasonable time for my treatments	6.8
	S12	I received instructions for other dental problems I had	7.7
	S13*	The Dental Surgeon would have been more kind to me*	9.4
	S5	I believed that I got the correct treatment for my dental problem	7.7
	S17	I shall be going to the same dental clinic if I need dental treatment again	4.3
Outcome of care	S19	My dental problem was cured by the treatment I received	4.3
	S21*	I got side effects due to the dental treatment I received*	4.3
	S22*	I had to spend much more than I expected for my dental treatment*	3.4

* Negatively worded
Total number of items 22
Note: *Items were direct translations from the questionnaire which was finalized in native languages.*

care" (Table 5). When the factor analysis was repeated after elimination of S22, the distribution of items for the first three factors was the same. Cronbach's alpha values for three dimensions were; 0.90 for "*outcome of care/clinic context*", 0.87 for *"factors related to treatment process"* and 0.60 for *"convenience"*.

Discussion

Measuring dental satisfaction among populations requires a culturally-sensitive scale, which captures their socio-cultural context and country-specific characteristics of dental care delivery systems. Therefore, after generating the item pool from validated scales, it was modified based on the findings of FGDs. This could be attributed to low item-specific non-response rate thus reflecting acceptability of the scale (Table1).

During analysis 4-negatively worded items with corrected item-total correlation >0.2 were excluded from the scale to achieve a satisfactory internal consistency as recommended by Streiner and Norman (1995). Even though it did not pose problems in the pre-test where the majority of the sample consisted of better versed and educated urban population, the low internal consistency of

excluded items could be due to misinterpretation of negative wordings by respondents. Some of these items, for example 'the role of supportive staff (S6)' were specifically included in the scale based on the findings of FGDs as in Sri Lankan context, they could play an influential role in patient satisfaction because they work as receptionists cum chair-side assistants without any formal training. Excluded items therefore, merit further investigations.

However, obtaining high Cronbach's alpha value (0.91) for the eventual 18-item scale, (Table 2), indicated its reliability (Streiner and Norman, 1995 and obtaining the same or lower than the original Cronbach's alpha value after eliminating one item at a time (Table 2), provided evidence for satisfactory internal consistency of the scale.

In the absence of a definitive "gold standard" for measuring dental satisfaction (Skaret et al., 2004), construct validity becomes the crux of the scale validation, achieved by obtaining a meaningful factor structure by conducting factor analysis (Mackeigan and Larson, 1989; Alonso et al 1990). Therefore the emergence of a meaningful, interpretable factor structure with explaining 64.56% of scale variance provided evidence for construct validity of the scale Obtaining high Cronbach's alpha values, especially for the first two dimensions, in which the

Table 2. Reliability analysis: Corrected item-total correlation, Cronbach's alpha if item deleted of the 18-item scale (after deleting four items)

Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S1	0.64	0. 90
S2	0.66	0.90
S3	0.69	0.90
S4	0.61	0.90
S5	0.76	0.90
S8	0.62	0.90
S10	0.69	0.90
S11	0.68	0.90
S12	0.61	0.90
S13*	0.34	0.91
S14	0.61	0.90
S15	0.24	0.91
S16	0.43	0.91
S17	0.68	0.90
S18	0.68	0.90
S19	0.70	0.90
S20	0.58	0.90
S22*	0.23	0.91

* Negatively worded
Overall Cronbach's Alpha 0.91, No of Items 18

Table 3. Reliability analysis: inter-item correlation matrix of the 18-item scale

	S1	S2	S3	S4	S5	S8	S10	S11	S12	S13*	S14	S15	S16	S17	S18	S19	S20	S22*
S1	1.00																	
S2	0.49	1.00																
S3	0..50	0.70	1.00															
S4	0.33	0.44	0.44	1.00														
S5	0.66	0.53	0.54	0.49	1.00													
S8	0.57	0.44	0.44	0.38	0.63	1.00												
S10	0.43	0.60	0.66	0.54	0.54	0.41	1.00											
S11	0.44	0.52	0.45	0.49	0.55	0.52	0.54	1.00										
S12	0.34	0.51	0.49	0.43	0.40	0.36	0.53	0.54	1.00									
S13*	0.09	0.21	0.24	0.20	0.27	0.24	0.30	0.34	0.31	1.00								
S14	0.62	0.42	0.48	0.29	0.51	0.49	0.41	0.36	0.32	0.08	1.00							
S15	0.02	0.16	0.13	0.24	0.10	0.04	0.22	0.05	0.21	0.04	0.14	1.00						
S16	0.16	0.24	0.32	0.24	0.27	0.16	0.34	0.26	0.41	0.17	0.30	0.48	1.00					
S17	0.52	0.45	0.49	0.60	0.61	0.35	0.51	0.60	0.46	0.23	0.43	0.21	0.31	1.00				
S18	0.43	0.38	0.48	0.41	0.59	0.42	0.49	0.57	0.39	0.29	0.51	0.27	0.45	0.58	1.00			
S19	0.60	0.45	0.53	0.45	0.83	0.54	0.52	0.41	0.39	0.22	0.48	0.24	0.33	0.49	0.51	1.00		
S20	0.50	0.37	0.40	0.36	0.50	0.63	0.42	0.42	0.39	0.14	0.52	0.07	0.26	0.35	0.43	0.46	1.00	
S22*	0.27	0.21	0.19	0.19	0.21	0.23	0.01	0.22	0.07	0.31	0.26	-0.01	0-.08	0.19	0.10	0.17	0.09	1.00

* negatively worded
Kaiser-Meyer-Olkin Measure of Sampling Adequacy. .883
Bartlett's Test of Sphericity - Approx. Chi-Square = 906.528, df = 153, Sig=0 .000

Table 4. Communalities, Eigenvalues and factor loading matrix of the 18-item scale

	Item	Communalities Extraction	Component 1	2	3	4
S1	The Dental clinic is kept clean and tidy	.724	0.81			
S2	The Dental Surgeon explained me the possible treatment for my dental problem	.591	0.37	0.67		
S3	The Dental Surgeon was concerned about my discomforts during treatment	.605	0.42	0.65		
S4	The Dental Surgeon allowed me to explain my dental problems	.498		0.62		
S5	I believed that I got the correct treatment for my dental problem	.736	0.71	0.43		
S8	I believed the dental clinic had all the facilities for my treatment	.627	0.71	0.31		
S10	The Dental Surgeon gave me post-op instructions	.719		0.77		
S11	The Dental Surgeon spent reasonable time for my treatments	.644	0.32	0.69		
S12	I received instructions for other dental problems I had	.603		0.73		
S13*	The Dental Surgeon would have been more kind to me	.651		0.41		0.68
S14	I believed that sterilized instruments been used for my dental treatment	.650	0.77			
S15	The dental clinic is located at a convenient place	.734			0.86	
S16	It is possible to get convenient appointments for my dental treatments	.703			0.78	
S17	I shall be going to the same dental clinic if I need dental treatment again	.565	0.39	0.57		
S18	The staff of the dental clinic was courteous	.591	0.46	0.42	0.43	
S19	My dental problem was cured by the treatment I received	.647	0.67	0.34		
S20	The dental clinic had modern dental equipment	.548	0.67			
S22*	I had to spend much more than I expected for my dental treatment*	.788				0.84
	Eigenvalues		4.22	4.17	1.83	1.40
	% of Variance explained		23.46	23.17	10.15	7.78

*Negatively worded

Total variance explained = 64.56%   Extraction Method: Principal Component Analysis

values exceeded the stringent criterion of 0.7 (Nunnally and Breinstein, 1994), indicated its reliability for group comparisons (Table 5). Moreover, >50% of the variance of all items were being taken up by the emerged factor structure (given by communality estimates), also reflected reliability of the scale (Kim and Muller, 1978).

In consistent with other studies (Stewart and Spencer, 2002; Skaret et al., 2004), in this study *"cost/affordability"* and *"convenience/availability"* emerged as separate dimensions of dental satisfaction. However items of *"factors related to treatment process"* emulated the conceptual model, while some items of *"context of the clinic environment"* and *"outcome of care"* were grouped together. These findings appeared to be slightly different from the findings of other studies. For example, in 31-item Australian DSS, *"content"* items, which closely resembled the *"factors related to treatment process"* of the present study, were distributed in a different manner: part of the *"content"* items were grouped into a single factor titled *"communication"* and the rest were coupled with *"outcome"* items. Moreover, they observed a 'nine factor structure' instead of original four dimensional conceptual model (Stewart and Spencer, 2002). Similarly, Skaret et al. (2004), validated DSQ among 23-year-old

Norwegians and reported a five factor structure, (*pain management, quality, cost, availability/convenience* and *access*) compared to three dimensional original model *(pain management, quality and access)* developed by Davies and Ware (1981). Therefore it is suggested that the differences observed in factor loadings and explained variances by factor structures in various studies could be attributed to population specific, clinically meaningful dissimilarities in cognitive, behavioural and emotional aspects of dental care (Hakeberg et al., 2000; Skaret et al., 2004). Accordingly, emergence of a different factor structure in the present study compared to the conceptual model and other studies could be attributed to such differences among Sri Lankans.

In accordance with other studies, *"cost of care"* (S22) emerged separately as a single dimension in the eventual model. The emergence of the same factor structure even after its elimination, made *"cost of care"* a 'significant factor' in dental satisfaction among Sri Lankans. However, the detailed aspects of *"cost of care"* have not emerged at FGDs, as the participants for FGDs were public dental service users, who received care free of charge thus making the cost factor insignificant to them. Nevertheless, its eventual appearance as a single item requires further investigations.
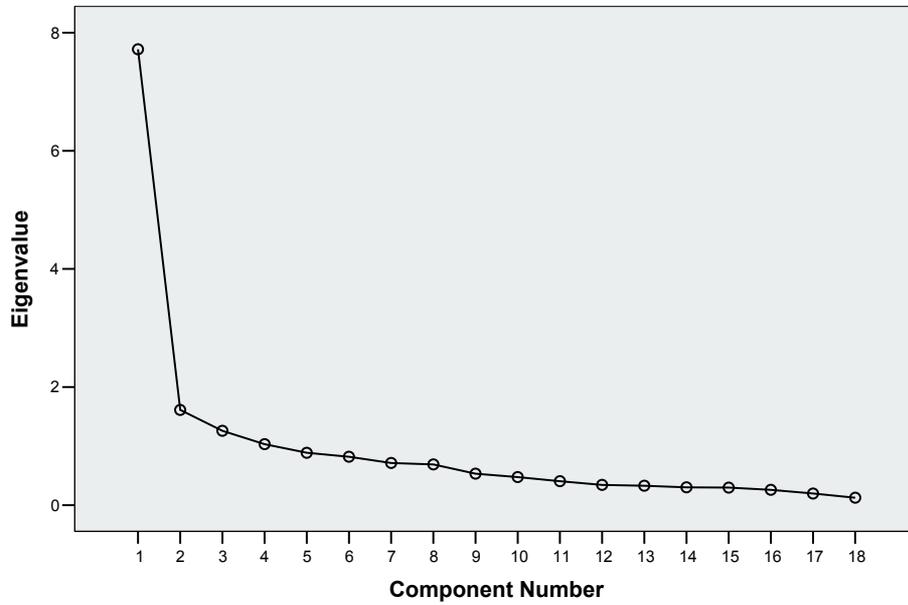
Scree Plot

Figure 1. *A scree plot for the 18 item scale*

Table 5. Internal consistencies (Cronbach's alpha) of dimensions of the 18 item scale

Dimensions	Item no	Statement
"Outcome of care/ clinic context"	S1	The dental clinic is kept clean and tidy
	S5	I believed that I got the correct treatment for my dental problem
	S8	I believed that the dental clinic had all the facilities for my treatment
	S14	I believed that sterilized instruments been used for my dental treatment
Cronbach's alpha 0.90	S17	I shall be going to the same dental clinic if I need dental treatment again
	S18	The staff of the dental clinic was courteous
	S19	My dental problem was cured by the treatment I received
	S20	The dental clinic had modern dental equipment
"Factors related to treatment process"	S2	The Dental Surgeon explained me the possible treatment for my dental problem
	S3	The Dental Surgeon was concerned about my discomfort during treatment
	S4	The Dental Surgeon allowed me to explain my dental problems
Cronbach's alpha 0.87	S10	The Dental Surgeon gave me post-op instructions
	S11	The Dental Surgeon spent reasonable time for my treatments
	S12	I received instructions for other dental problems I had
	S13*	The Dental Surgeon would have been more kind to me
"Convenience"	S15	The dental clinic is located at a convenient place
Cronbach's alpha 0.60	S16	It is possible to get convenient appointments for my dental treatments
"Cost of care" **	S22*	I had to spend much more than I expected for my dental treatment

Scale overall Cronbach's alpha 0.91

* negatively worded
** single item hence Cronbach's alpha cannot be computed

Although the overall response rate was lower (30.9%) than anticipated rate (45%), it is deemed acceptable for population based postal surveys (Moser and Karlton, 2001). One main reason for the low response rate was the inability in tracing people in given addresses (11.1%) especially in the conflict stricken North and East province of the country, probably due to external and internal migration. Moreover, similarities of the socio-demographic distribution of the eventual sample (n=117) with the National population (Department of Census and Statistics, 2001), and obtaining the Bartlett's test of sphericity (p<0.001) and the high (0.883) KMO statistic (exceeding the cut-off point of 0.5) (Table 3), provided evidence for sampling adequacy for the factor analysis (Tabachnick and Fidell, 2001), and the generalizebility of results

However, non-response bias still could be considered as a limitation as they could have been systematically different from the respondents regarding dental satisfaction.. Likewise, elimination of four items from the scale could be another limitation, because, it could have reduced the variability of aspects of dental satisfaction, hence it could have interfered with the emergence of factor solution. Another possible weakness could be the 'recall bias' of respondents who have visited dental care facilities more than one year ago. However, as Sri Lankans predominantly make dental visits when their oral problems become advanced, the potential for recall bias could be relatively low.

Overall, the present scale appeared to be a sensible instrument for measuring dental satisfaction among Sri Lankans due to many reasons. Firstly, the factor solution obtained closely resembled other validated scales. Secondly, it has high internal consistency (0.91 Cronbach's alpha) similar to other validated scales namely; 0.90 of Australian DSS (Stewart and Spencer, 2002), 0.81 of Norwegian DSQ (Skaret et al., 2004) and 0.86 of Swedish DVSS (Hakeberg et al., 2000). Moreover, high proportion of the variance explained by the factor structure (64.56%) was comparable with that of the Norwegian DSQ (51.6%) (Skaret et al., 2004), and the Swedish-DVSS (75.2%) (Hakeberg et al., 2000).

In conclusion, the present scale appeared to be a valid, reliable and acceptable instrument for measuring dental satisfaction among Sri Lankans but merits further refinements.

Acknowledgements

References

Alonso, J., Maria, A.J. and Moreno, C. (1990): Spanish version of Nottingham Health Profile: Translation and preliminary validity. *American Journal of Public Health* **80**, 704-708.

Alvesalo, I., and Uusi-Heikkila, Y. (1984): Use of services, care seeking behaviour and satisfaction among University dental clinic patients in Finland. *Community Dent Oral Epidemiol* **12**, 297-302.

Chapko, M.K. Bergner, M. Green, K., Beach, B. Milgrom P., and Skalabrin N. (1985): Development and validation of a measure of dental patient satisfaction and anxiety. *J Am Dent Assoc* **111**, 443-446.

Corah, N.L. O'Shea, R.M. Pace, L.F. and Seyrek, S.K. (1984): Development of a patient measure of satisfaction with the dentist; the Dental Visit Satisfaction Scale. *J Behav Med* **7**, 367-373.

Corah, N.L. O'Shea, R.M. and Bissell, D.G. (1985): The dentist-patient relationship: perceptions by patients of dentist behaviour in relation to satisfaction and anxiety. *J Am Dent Assoc* **111**,443-446.

Davies, A.R. and Ware J.E,Jr (1981):Measuring patients satisfaction with dental care. *Soc Sci Med* **15**, 751-60.

Department of Census and statistics (2001), *Census of population and housing-Sri Lanka 2001-Population by sex, age, religion, ethnicity according to districts and D.S.division-preliminary release*. Department of Census and statistics –Sri Lanka.

Donabedian, A. (1987): Guideposts to a conference on quality assessment and assurance. In: Shanahan M, editor. *Proceedings of an international symposium on quality assurance in health care.* Chicago (IL): Joint Commission on Accreditation of Hospitals.

Hakeberg, M. Heidari., Norinder M. and Beggeren U. (2000): A Swedish version of the Dental Visit Satisfaction Scale. *Acta Odontol Scan* **58**;19-24.

Kim, J.O. and Muller, C.W. (1978): *Factor analysis: Statistical methods and practical issues*. Sage University Paper Series on Quantitative Applications in the social Sciences, series no.07-014.Newbury Park.CA:Sage.

Lwanga SK and Lemeshow S (1991): *Sample size determination in health studies: a practical manual*. World Health Organization, Geneva.

Mackeigan L.D. and Larson L.N. (1989): Development and validation of an instrument to measure patient satisfaction with pharmacy services. *Medical Care* **27**:522-536.

Morgan DL (1993): *Successful Focus Groups: advancing the state of the art*. California: Sage Publications,3-19.

Moser, L.A. and Karlton, G. (2001): *Survey Methods in Social Investigations*. London, UK: Heinmann Educational Books Ltd 351-376.

Nunnally, J.C. and Bernstein I (1994): *Psychometric theory*, 2nd ed. New York, USA:Mc Graw-Hill,1994.

Ntabaye, M.K. Scheutz, F. and Poulsen, S. (1998): Patient satisfaction with emergency oral health care in rural Tanzania. *Community Dent Oral Epidemiol* **26**(5): 289-95.

Reifel, N.M., Rana, H. and Marcus, M. (1997), Consumer satisfaction. *Adv Dent Res* **11**(2); 281-290.

Skaret, E. Berg, E. Raadal, M. and Kvale,G. (2004), Reliability and validity of the Dental Satisfaction Questionnaire in a population of 23-year-olds in Norway, *Community Dent Oral Epidemiol* **32**;25-30.

Stewart, J.F. and Spencer, A.J. (2002): *Dental Satisfaction Survey 1999*, AIHW cat no.DEN98. Adelaide: AIHW Dental Statistics Research Unit.

Streiner, D.L and Norman, G.L. (1995): *Health Measurement Scales: A Practical Guide to their development and use*.2nd edition . Oxford, Oxford University Press.

Sur, H. Hayran, O. Yildirim, C. and Mumcu, G. (2004): Patient satisfaction in dental outpatient clinics in Turkey. *Croatian Medical Journal* **45**(5):651-654.

Tabachnick, B. and Fidell, L. (2001): *Using Multivariate Statistics*. 4th Edition, Harper Collins College of Publishers. New York.

Takemura, Y., Liu J., Atsumi, R. and Tsuda, T. (2006), Development of a questionnaire to evaluate patient satisfaction with medical encounters. *Tohoku J.Exp.Med* **210**;373-381.