Use of Patient Self-Report Oral Health Outcome Measures in Assessment of Dental Treatment Outcomes

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Abstract

Objective: To assess the sensitivity of a newly developed brief measure of oral health-related quality of life (OQOL). Methods: Self-assessed oral health and OQOL were measured in three groups of patients who had presented for either prophylaxis (n = 32), endodontic care (n = 15), or for a denture (n = 16) in a dental school setting before and after treatment. Main outcome measures included the single-item selfreport of oral health (OH-1) and the 6- and 12-item versions of a new OQOL instrument. General linear modeling was used to compute means of self-reported oral health by treatment group. Results: Of the 63 patients who completed the baseline questionnaire, 44 (70 percent) returned questionnaires after treatment. The sample averaged 43 \pm 15 years, 48 percent male and 55 percent with some college education. Ethnic representation included 35 percent White, 33 percent Black, and 32 percent other – mostly Latino. The mean self-reported number of teeth was 20.6. In terms of sensitivity, significant differences were observed between the treatment groups on the items assessing being upset (P < 0.05), feeling depressed (P < 0.05), and uncomfortable about the appearance of teeth or dentures (P < 0.05). However. magnitude of change, as measured by an effect size, was characterized as minimal to small in the recall and endodontic groups and borderline moderate in the denture group. Conclusion: The measure was sensitive to differences within groups, with a small to borderline magnitude of change.

Key Words: oral health, quality of life, sensitivity, dental treatment, outcome measures

Introduction

Oral health-related quality of life (OQOL) represents the selfperceived impact of oral conditions on daily functioning and well-being. These functions include physical, psychological, and social functioning; performance of self-care; perceived health and symptomology; and the presence of pain or distress (1). Combined with clinical and other indices, these measures of oral health status help provide a more comprehensive assessment of an individual's overall health.

Over the past several decades several OQOL instruments have been developed and have undergone considerable testing, establishing their validity and reliability (2). These instruments have been used to describe the impact of disease on patient's daily functioning (3); and as outcome measures to evaluate the effectiveness of interventions (4). Less attention has been paid to the use of these instruments to measure the magnitude and extent of longitudinal change. Only a few population-based studies have examinedchanges in OQOL as a result of dental intervention, and much of this research has focused on the replacement of teeth using conventional or implantable prosthesis (5-8), temporomandibular joint dysfunction (9), or to evaluate dental care programs (10). Failure to consider a broader range of interventions is an important gap in our knowledge base given the increased recognition of the importance of these instruments for quantifying the treatment benefit in clinical trials or investigating the impact of illness over time (11). If OQOL instruments are to be of value in assessing outcomes from clinical interventions, then their ability to describe the magnitude and extent of change must be determined (12). Furthermore, establishing the sensitivity of OQOL instruments would assist investigators in selecting the most appropriate measure and assist health professionals to interpret the meaning of changes in scores derived from the instrument.

The present study of dental school patients examines the impact of treatment of dental conditions on patients' quality of life. These data provide us the opportunity to assess the sensitivity to change of a newly developed brief measure of quality of life. This new measure, consisting of 6- and 12-item scales, is comprised of items from three existing OQOL measures: the Oral Health

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Quality of Life instrument (OHQOL) (13), the General Oral Health Assessment Index (GOHAI) (14), and the Oral Health Impact Profile (OHIP) (15). Both the 6- and 12-item scales of this new measure have demonstrated sound psychometric properties including excellent validity, reliability, internal consistency, and limited floor and ceiling effects (16). Both the 6- and 12-item scales can be used in the clinical setting as an outcome measure. However, the observed differences in internal consistency reliability suggest that the 6-item scale is appropriate for use in comparing groups of patients while the 12-item scale is appropriate for use in assessing outcomes among individual patients (16).

The present work using this new 6- and 12-item measure was developed based on a conceptual model of health and quality of life proposed by Patrick and Erickson (17) and applied to oral health by Gift and Atchison (18,19). This model contains five health-related quality of life concepts including a) opportunity; b) perceptions; c) three functional states: physical, social, and psychological functioning; d) impairments; and e) survival. Opportunity reflects the impact that oral health has on one's ability to function in social and work roles. Perceptions include selfrating of oral health as well as satisfaction with this self-rating and perceived need for treatment. Physical functioning of the teeth and oral cavity includes activity restrictions such as a patient's ability to eat, chew, speak, or sleep without discomfort. Social functioning includes the impact of oral health on social roles such as speaking, smiling, eating in public, and being able to meet one's obligations such as work and family responsibilities. Psychological functioning includes a patient's satisfaction with the esthetics of their dentition, comfort with interpersonal relations as well as worry, concern, embarrassment about, or lack of confidence because of problems with teeth or gums. Impairments include self-reported symptoms or other indication of discomfort or pain. Finally, survival can be measured by tooth loss or mortality, e.g., from oral cancer.

Our aim was to assess the sensitivity to change of this new measure as a consequence of dental interventions on three groups of dental patients: denture replacement, endodontic, and patients on recall with no apparent disease. These groups were selected based on the rationale that patients with more severe conditions (endodontic and denture replacement) would have a greater level of change in their oral health status, and that OQOL indicators should be more sensitive to the impact of these conditions. We expected little change in the self-reported oral health status of the recall group. Baseline and follow-up oral quality of life scores were evaluated using both the 6- and 12-item OOOL scales (summary scores and individual items in each), as well as a global assessment of OQOL.

Materials and Methods

Design. We used a repeated measure design to examine the effects of dental treatment on patient-assessed outcomes of dental care in three groups of patients (recall, endodontic, or denture) in a dental school setting. This design is characterized by having more than one measurement of at least one variable for each subject. We compared baseline (immediately before treatment) and follow-up (3 months after treatment) quality of life scores. protocol The study received approval from the Institutional Review Board at Boston University. Consent to participate was obtained according to Institutional Review Board requirements.

Setting and Participants. Participants were a convenience sample of adults aged ≥ 18 years seeking treatment in the dental clinics at Boston University Goldman School of Dental Medicine, Boston, Massachusetts, between June 2002 and May 2004. Three categories of patients were recruited: those coming to the general dentistry clinics for "recall" visits for checkups and prophylaxis (RECALL group), those presenting to the endodontic clinic in pain (ENDO group), and patients presenting to the prosthodontic clinic for removable dentures (DENTURE group). Patients were excluded if they were less than 18 years of age or if they had a diagnosis other than those specified earlier. Research staff recruited subjects in the waiting areas of the three clinics from Monday through Friday between 9 AM and 5 PM. All treatments were provided by undergraduate dental students under supervision by staff from the General Dentistry Department at Boston University Goldman School of Dental Medicine.

Data Collection. At prearranged times, research staff visited each clinic (general dentistry, endodontic, prosthodontic) and attempted to recruit subjects in the clinic waiting areas. Of the 122 subjects app-(RECALL = 51,ENDO = roached 39, DENTURE = 32), 43 subjects declined study participation (RECALL = 14, ENDO = 17, DENTURE = 12). The reasons provided for declining were inconvenience (n=20), no time (n = 14), or no reason given (n = 9). Five recall patients were under the age of 18 years and were excluded. Four DENTURE patients presented to the clinic for reasons other than the insertion of a removable prosthesis, and seven of the endodontic patients were not undergoing emergency endodontic treatment and were excluded. Ultimately, 63 patients (RECALL = 32, ENDO = 15, participated, DENTURE = 16) 44 completed follow-up.

Subjects in the recall and endodontic groups were asked to complete the baseline questionnaire at their initial dental visit. Patients in the denture group were asked to complete the baseline questionnaire immediately prior to the insertion of the removable prosthesis. All patients were asked to complete the instrument again 3 months later and return it by mail in the stamped addressed envelope provided. We attempted to reach all patients by phone as a reminder to send in the second questionnaire. We sent a second copy of the questionnaire to subjects not returning their questionnaire within the designated time period.

OQOL Measures. OQOL (16) was measured using the 6- and 12-item scales developed from items in the OHQOL, the GOHAI, and the OHIP. For details of development, please see the original article (16). Briefly, the 64 items from the combined three quality of life surveys were administered along with a clinical oral examination to two veterans study samples (n = 827). The hypothesized framework included four primary dimensions: physical function, psychosocial function (with three subdimensions of role function, distress, and worry), impairment, and perceptions.

Each of the 64 items from the three OOOL instruments was independently categorized into one of the theoretical domains by the authors. An iterative series of multitrait scaling analysis was conducted to examine the fit of the items to the hypothesized domains (20). These analyses examine item-level characteristics including internal consistency, equality of item-scale correlations, and discriminant validity. The results provide information about scale distribution characteristics, reliability of scale scores, and correlations among hypothesized scales.

The conceptual model was altered to include five dimensions: physical function, impairment/ disease, and three dimensions of psychosocial function: role function, distress, and worry. Five scales to correspond with the said dimensions, a separate denture subscale (3 items), and a summary scale comprised of all items were created.

Forward stepwise regression was conducted to develop a short-form version of the measure. For each scale, the total scale score was used as the dependent variable, with data from the two veteran samples. Items that explained either 80 percent of the variance or the first five items, whichever was greater, were selected resulting in five scales, each with five items. All of the scales had excellent internal consistency reliability, ranging from 0.78 to 0.92.

The five scales and three denture items were then administered to a sample of dental patients (n = 113). Using multitrait analysis, the number of items was reduced further by eliminating items contributing least to each scale's internal consistency reliability and retaining items which conceptually best represented the subscale. One 12-item measure (Cronbach's alpha = 0.90) and a second 6-item measure (Cronbach's alpha = 0.80) were developed.

The association of the 6- and 12-item measures with clinical indices was examined using the clinical data from the two sets of veterans. Both scales were significantly correlated overall with number of teeth (r = 0.35 and -0.23, for the 6and 12-item scales, respectively), coronal decay (r=0.09 and 0.14), periodontal status (r = 0.19 and 0.20), and root caries (r=0.14 and 0.12)(14). The associations detected between the 6- and 12-item scales and clinical indices are similar to those of other published findings (21.22).

The 12-item measure contains 3-item subscales for three scales: distress, worry and social function (role), and single items assessing dimensions titled physical function, denture, and pain. The 6-item measure includes single items assessing distress, worry, social function, physical function, denture, and pain as listed (see Table 1 for the scales).

We also included a separate single item that is not part of the 6- and 12-item scales. This 5-point global self-report of oral health (OH-1) has been used in prior studies and asks, "How would you describe the health of your teeth and gums? Would you say it is excellent, very good, good, fair or poor?" Responses are scored from 1 (excellent) to 5 (poor).

Scoring. Some items (GOHAI 10 and OHQOL B31) were reversed so that a higher score consistently indicated worse oral quality of life. GOHAI 10 score of 3 becomes a 1, score of 2 remains a 2, score of 1 becomes a 3; and OHQOL B31 score

of 5 becomes a 1, score of 4 becomes a 2, score of 3 remains a 3, score of 2 becomes a 4, and score of 1 becomes a 5.

All item scores were then converted to a scale of 0-100. Items scored on a 0-4 scale (all OHIP items) were converted to a scale of 0-100 by having 0 = 0, 1 = 25, 2 = 50, 3 = 75, and 4 = 100. The item initially scored on a 1-3 scale (GOHAI 10) was converted as follows after the item was reversed: 1 = 0, 2 = 50, and 3 = 100. Items scored on a 1-5 scale (OHQOL B31 and OH-1) were converted to a scale of 0-100 by having 1 = 0, 2 = 25, 3 = 50, 4 = 75, and 5 = 100.

Final scores for each scale (6- and 12-item) and subscales (distress, worry, and social function) were created by computing the mean of the responses to items represented by each scale.

Analysis. A combination of bivariable and multivariable statistical methods was used for this analysis. We measured differences in mean age by group using analysis of variance (ANOVA). Categorical demographic variables were tested using chi-squared and Fisher's exact tests to examine differences between groups. Demographic variables that differed between groups were adjusted for in the multivariate analysis. Baseline OQOL scores were computed and compared using ANOVA. Duncan's multiple range test was used to control the Type I error rate. We used general linear modeling to examine between-group effects in OQOL scores, mean change scores were reported as least squares means after adjusting for baseline OQOL score and covariates such as age and gender. Change scores were derived for individual items and total scores by subtracting posttreatment scores from baseline scores. Positive scores indicated an improvement and negative scores indicated deterioration following treatment. The magnitude of change was assessed as an effect size, calculated by dividing the mean of change scores by the standard deviation (SD) of the related baseline score (23).

During the past 3 months how often have you experienced the following difficulties because of problems with your teeth, mouth, or dentures? (Circle one answer)	Never	Hardly ever	Occasionally	Fairly often	Very often
1. Have you had to avoid eating some foods? (Physical function; OHIP 28)*	0	1	2	3	4
2. Have you found it difficult to relax? (Distress: OHIP 35)*	0	1	2	3	4
3. Have you felt depressed? (Distress; OHIP 36)	0	1	2	3	4
4. Have you been upset? (Distress; OHIP 34)	0	1	2	3	4
5. Have you felt uncomfortable about the appearance of your teeth, mouth, or dentures? (Worry; OHIP22)	0	1	2	3	4
6. Have you been worried by dental problems? (Worry; OHIP 19)	0	1	2	3	4
7. Have you had trouble getting along with other people? (Social function; OHIP 41)	0	1	2	3	4
8. Have you avoided going out? (Social function; OHIP 39)*	0	1	2	3	4
9. Have you been totally unable to function? (Social function; OHIP 48)	0	1	2	3	4
	Nev	er	Sometimes		Always
 In the past 3 months, how often did you feel nervous or self-conscious because of problems with your teeth, gums, or dentures? (Worry; GOHAI 10)* 	1		2		3
	None at all	A little bit	Some	Quite a bit	A great deal
11. During the past 3 months, how much pain or distress has your teeth or gums caused you? (Pain; OHQOL B31)*	1	2	3	4	5
If you have removable denture appliances, please answer the follow	ring question:				
During the past 3 months, how often have you had the following problem with your dentures?	Never	Hardly ever	Occasionally	Fairly often	Very often
12. Have you had uncomfortable dentures? (Denture; OHIP 18)*	0	1	2	3	4

Table 16- and 12-Item Short-Form Oral Health-Related Quality of Life Measures

* Indicate items in 6-item measure.

OHIP, Oral Health Impact Profile; GOHAI, General Oral Health Assessment Index; OHQOL, Oral Health Quality of Life.

All analyses were conducted in SAS version 9.1 (SAS Corporation, Cary, NC, USA). We used P < 0.05 as a cutoff for statistical significance.

Results

Characteristics of Participants. At baseline, 63 subjects participated, 32 in the recall group, 15 in the endodontic group, and 16 in the denture group. The sociodemographic characteristics (see Table 2) of the baseline sample demonstrate the expected association of age with treatment group; denture patients tended to be older whereas the recall group tended to be younger (P= 0.0002) and more highly educated

(P=0.003). The mean number of teeth by self-report was 26 in the recall group, 23 in the endodontic group, and 7.0 in the denture group. Approximately 31 percent of the denture group were completely edentulous.

Of the participants who completed the baseline questionnaire, 44 (70 percent) returned questionnaires after treatment. This sample averaged 45 ± 15.8 (SD) years, 49 percent male and 48 percent with some college education. Ethnic representation included 30 percent White, 38 percent Black, and 32 percent other. There were no differences on any of these dimensions between those who remained in the study and those who did not. Overall, the age, gender, race, and educational status of the sample remained constant over the period of the study (Table 2). No information was collected on those declining participation in the study.

Baseline Quality of Life Scores. There were no significant differences between the three groups in terms of their summary OQOL or subscale scores at baseline. Details of the summary and individual 6- and 12-item baseline scores for each group are shown in Table 3. Baseline scores for some individual items varied by group, in particular, items assessing pain and distress (P= 0.0001) and worry (P= 0.05). The

	Baseline			
	Total $(n = 63)$	RECALL* $(n = 32)$	ENDO ⁺ $(n = 15)$	DENTURE: $(n = 16)$
Age (mean and SD)	43 (14.9)	38.5 (13.5) ^A	40.9 (16.0) ^B	55.8 (8.3) ^B
Gender (%)				
Female	52	50	47	63
Male	48	50	53	38
Race (%)				
White	35	44	27	25
Black	33	25	27	56
Other	32	31	46	19
Education (%)				
High school graduate or less	46	25 ^A	67 ^в	69 ^в
Some college	54	75 ^a	33 ^B	31 ^B

	Table 2		
Demographic	Characteristics	of	Participants

	Follow-up		
	Participants returning second survey $(n = 44)$	Participants not returning second survey $(n = 19)$	
Age (mean and SD)	44.9 (15.8)	40.2 (12.3)	
Gender (%)			
Female	50	42	
Male	50	58	
Race (%)			
White	30	47	
Black	38	21	
Other	32	32	
Education (%)			
High school graduate or less	77	89	
Some college	23	11	

Values with same superscripts are not significantly different (P > 0.05 using Duncan's test).

* Regular users of diagnostic and preventive care and presented for a prophylaxis.

† Presented to the dental school setting in pain; to undergo emergency endodontic treatment.

‡ Will receive a removable prosthesis.

SD, standard deviation.

subjects in the endodontic group expressed more pain than subjects in the recall or denture groups. The denture group expressed less worry than the endodontic or recall groups.

Follow-up Quality of Life Scores. There were no significant differences between the three groups in terms of their follow-up, OH-1 scale, or subscale scores (Table 4). However, there were differences on individual items assessing being upset between the endodontic group and the denture group (P=0.05)and for the item assessing being depressed between the denture group and the recall group (P =0.05). Significant differences were also noted between the recall and denture groups (P=0.03) and the endodontic group and denture group (P=0.03) for the item assessing being uncomfortable with the appearance of the teeth or dentures.

Magnitude of Change in Quality of Life Scores Following Dental Intervention. The effect sizes describe the magnitude of change, and these effect sizes varied by group. Cohen (23) defined effect sizes as small = 0.2, moderate = 0.5, and large = 0.8. Using Cohen's criteria, effect sizes were characterized as minimal to small in the recall and endodontic groups, and borderline moderate in the denture group. There were significant differences between the denture and recall groups (P=0.03) for the subscale regarding social functioning. There were also significant differences between the denture and recall groups (P=0.03) for the items assessing feeling depressed and feeling uncomfortable about the appearance of the teeth, mouth, or dentures (Table 5).

Discussion

We examined whether a newly developed brief measure of OQOL is sensitive to changes in oral health status as a consequence of dental interventions. We hypothesized that patients receiving a removable prosthesis or endodontic care would show greater improvement in OQOL over a 3-month period than patients receiving only a prophylaxis. Our overall findings were that patients for removable prosthesis showed the greatest improvement in OQOL following dental treatment. The greatest

baseline scale scores and nems by oroup				
In the past 3 months, how often have you experienced the following difficulties because of problems with your teeth, mouth, or dentures?	RECALL§ $(n=32)$	$ENDO \bullet $ (<i>n</i> = 15)	$\begin{array}{c} \text{DENTURE} \\ (n=16) \end{array}$	
Summary scales		Mean (SD)		
OH-1	55 (27.4)	58 (32.3)	53 (32.7)	
6-item scale	42 (9.6)	41 (12.6)	45 (13.5)	
12-item scale	32 (14.3)	39 (17.1)	34 (19.4)	
Subscales				
Distress	26 (24.8)	45 (35.9)	26 (33.8)	
Worry	48 (15.5)	57 (18.4)	47 (21.9)	
Social functioning	10 (17.5)	16 (23.9)	12 (22.8)	
Individual items				
Have you been upset?†	32 (29.9)	55 (45.5)	35 (45.1)	
Have you found it difficult to relax?*†	27 (28.6)	45 (36.8)	25 (36.5)	
Have you felt depressed?†	17 (24.9)	35 (38.7)	14 (30.2)	
Do you feel nervous or self-conscious?*‡	69 (32.9)	63 (29.6)	80 (31.6)	
Have you been worried about dental problems?‡	44 (30.2) ^{AB}	60 (38.7) ^A	$28 (38.8)^{B}$	
Have you felt uncomfortable about the appearance of your teeth?	32 (36.0)	47 (39.9)	34 (39.6)	
Have you avoided going out?*¶	15 (25.2)	23 (33.3)	14 (27.3)	
Have you been totally unable to function?	4 (11.1)	10 (18.4)	6 (25)	
Have you had trouble getting along with others?¶	12 (22.8)	13 (24.7)	12 (18.5)	
How much pain or distress do you have?*	24 (26.5) ^A	63 (35.1) ^B	$22 (27.5)^{A}$	
Have you had uncomfortable dentures?*	38 (20.9)	25 (43.3)	35 (28.0)	
Have you had to avoid eating some foods?*	27 (33.2)	36 (42.4)	41 (35.2)	

Table 3Baseline Scale Scores and Items by Group

Values with same superscripts are not significantly different (P > 0.05 using Duncan's test).

* Items on 6-item scale.

Subscales:

† Distress.

‡ Worry.

¶ Social functioning.

§ Regular users of diagnostic and preventive care and presented for a prophylaxis.

• Presented to the dental school setting in pain; to undergo emergency endodontic treatment.

∞ Will receive a removable prosthesis.

OH-1, self-report of oral health; SD, standard deviation.

mean change in scores was observed among the denture group for social functioning, feeling depressed, and appearance. Subjects in both the recall and endodontic groups reported improvements which were only minimal to small.

Spilker (11) described health status measures as being discriminative, predictive, and evaluative. Discriminative instruments are used to measure differences between subjects at a point in time when no "gold standard" is available, and these differences can be interpreted as trivial, small, moderate, or large. The aim of predictive instruments is to classify individuals relative to a predefined "gold standard." Evaluative instruments are used to measure longitudinal change within, and between, samples. A major goal of using evaluative instruments is to better understand how dental conditions and subsequent interventions impact quality of life, and use of evaluative instruments is essential to planning health care at the individual and societal level (17).

A major property of an evaluative instrument is its sensitivity to change over time. Locker (24) describes four methods currently used to measure change. The first method is to compare baseline and follow-up measurements. Although this method is simple, it masks within subject change so that positive and negative changes cancel each other out. The second approach is by the use of change scores; obtained by subtracting post-intervention scores from pre-intervention scores. The third approach involves the use of global transition scores reflecting the patients' overall assessment of how their oral health has changed over the time period in question. The final approach is the use of global transition scales derived from a series of global transition statements applied to different dimensions of health. None of these methods is universally accepted. Our approach involved the use of change scores and standardized effect sizes to assess the magnitude of change. In this method the mean change is divided by the SD of the baseline score. Thus, the magnitude of change of individual items of the 6- and 12-item scales in response to dental intervention in this sample could be characterized as minimal to small in the recall and endodontic groups and borderline moderate in the denture group.

In the past 3 months, how often have you experienced the following difficulties because of problems with your teeth, mouth, or dentures?	RECALL§ $(n = 22)$	$ENDO \bullet $ (<i>n</i> = 12)	$\begin{array}{c} \text{DENTURE} \\ (n=10) \end{array}$
Summary scales		Mean (SD)	
OH-1	57 (26.8)	56 (30.3)	53 (32.0)
6-item scale	41 (18.7)	44 (17.0)	43 (12.5)
12-item scale	32 (14.6)	34 (18.5)	34 (17.0)
Subscales			
Distress	27 (22.0)	31 (35.4)	26 (18.3)
Worry	48 (15.6)	50 (18.8)	47 (18.0)
Social functioning	12 (17.0)	14 (26.2)	18 (25.3)
Individual items			
Have you been upset?†	30 ^{AB} (24.5)	40 ^B (32.3)	20 ^A (30.2)
Have you found it difficult to relax?*†	32 (30.0)	40 (35.3)	30 (32.1)
Have you felt depressed?	17 ^A (23.4)	21 ^{AB} (38.2)	27^{B} (24.2)
Do you feel nervous or self-conscious?*‡	72 (29.5)	64 (16.5)	84 (25.0)
Have you been worried about dental problems?‡	40 (35.1)	47 (24.2)	45 (40.4)
Have you felt uncomfortable about the appearance of your teeth?	34 ^A (28.2)	38 ^A (37.3)	21 ^B (17.5)
Have you avoided going out?*¶	17 (22.3)	24 (32.8)	20 (22.3)
Have you been totally unable to function?	7 (12.2)	4 (9.6)	15 (19.3)
Have you had trouble getting along with others?	11 (19.3)	14 (22.3)	19 (28.3)
How much pain or distress do you have?*	64 (31.6)	61 (37.6)	57 (27.3)
Have you had uncomfortable dentures?*	39 (32.2)	29 (43.3)	38 (35.2)
Have you had to avoid eating some foods?*	24 (30.1)	37 (44.4)	36 (43.2)

Table 4Adjusted Follow-Up Item and Scale Means by Group (Adjusted for Age, Gender, and Baseline Score)

Values with same superscripts are not significantly different (P > 0.05 using Duncan's test).

* Items on 6-item scale.

Subscales:

† Distress.

‡ Worry.

¶ Social functioning.

§ Regular users of diagnostic and preventive care and presented for a prophylaxis.

• Presented to the dental school setting in pain; to undergo emergency endodontic treatment.

∞ Will receive a removable prosthesis.

OH-1, self-report of oral health; SD, standard deviation.

This new brief 6- and 12-item instrument is a validated questionnaire, is responsive to differences in clinical status, and has been used in previous studies (16,25). In a study to examine the effects of tooth loss and denture-wearing on quality of life, Jones (25) found that the 6- and 12-item scales differentiated between dentition/denture groupings and that the item assessing avoidance of certain foods discriminated well between dentition groups. A limitation of that study was that it was conducted exclusively in male veterans.

An important limitation of this present study is the small sample size. However, one of the strengths of this study is the diverse sample in terms of age, gender, and ethnic background, and the fact that the same patients were analyzed before and after treatment. The response rate to this study of 70 percent was acceptable and indicated the feasibility of employing a short-form selfcompleted outcome measure in a dental school setting. Although the age composition, gender, and ethnic representation of subjects who did and did not remain in the study were virtually the same, potential bias because of loss of some participants in the study must be considered when interpreting the findings.

These results were also limited by floor effects (indicates best possible scores) and ceiling effects (indicates worst possible scores); hence, the results of magnitude of changes (effect sizes) following treatment need to be interpreted with caution as changes cannot be reliably estimated for individuals with extreme scores.

A final consideration is the limitations in the use of regression analyses in the development of short-form measures of OQOL measures as underlying assumptions of regression analyses are violated by these types of data. Locker and Allen (26) argue that the method of developing a short-form instrument is not as important as its content and that the items in the questionnaire and its measurement properties need to be appropriate to its purpose, the population to which it is applied, and the context in which it is being used.

The results from this study further support the use of these scales as a brief measure of OQOL in dental school clinical settings. Further research using this new instrument is needed in larger samples and different settings.

In the past 3 months, how often have you experienced the following difficulties because of problems with your teeth, mouth, or dentures?	RECALL§ $(n = 22)$	$ENDO \bullet (n = 12)$	DENTURE ∞ ($n = 10$)
Summary scales			
OH-1	-3.6 (53.9)	-7.6 (-7.7)	-8.4 (26.7)
6-item scale	-12.7 (66.1)	15.9 (68.9)	10.9 (82.9)
12-item scale	-11.1 (23.7)	4.5 (20.0)	6.3 (71.7)
Subscales			
Distress	-10.6 (24.1)	0 (0)	-2.7 (50.2)
Worry	3 (64.4)	-4.1 (13.9)	-13.8 (92.1)
Social functioning	-1.8 (28.9)	11.1 ^{AB} (37.0)	36.8 ^A (75.8)
Individual items			
Have you been upset?†	-25.3 (50.7)	-11.7 (39.1)	-38.8 (81.9)
Have you found it difficult to relax?*†	6.5 (31.4)	13.6 (45.4)	15.1 (59.4)
Have you felt depressed?	-7.1 (34.1)	0^{AB} (0)	24.4 ^A (55.1)
Do you feel nervous or self-conscious?*‡	7.1 (90.1)	-14.2 (47.2)	-17.3 (52.1)
Have you been worried about dental problems?‡	-6.3 (36.7)	6.3 (21.1)	20.9 (57.4)
Have you felt uncomfortable about the appearance of your teeth or dentures?	5.7 ^B (34.1)	0^{AB} (0)	26.4 (63.4)
Have you avoided going out?*	-3.9 (42.9)	24.6 (81.7)	27.1 (43.6)
Have you been totally unable to function?	12.6 (41.8)	0 (0)	58.1 (140.2)
Have you had trouble getting along with others?	-9.8 (47.3)	0 (0)	22.6 (71.7)
How much pain or distress do you have?*	-19.6 (72.1)	-6.8 (22.7)	-45.1 (95.1)
Have you had uncomfortable dentures?*	22.8 (45.7)	0 (0)	34.3 (137.7)
Have you had to avoid eating some foods?*	-12.1 (68.7)	20.9 (66.2)	20.9 (114.1)

Table 5Effect Size of Scale and Item Means by Group (Change as % Baseline SD)

Values with same superscripts are not significantly different (P > 0.05 using Duncan's test).

* Items on 6-item scale.

Subscales:

† Distress.

‡ Worry.

- ¶ Social functioning.
- § Regular users of diagnostic and preventive care and presented for a prophylaxis.
- Presented to the dental school setting in pain; to undergo emergency endodontic treatment.

∞ Will receive a removable prosthesis.

OH-1, self-report of oral health; SD, standard deviation.

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