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Discrepancies between self-ratings of and satisfaction with oral health in two older adult populations

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Abstract – *Objectives:* General health perceptions, usually measured by means of single-item indicators, are commonly included in health and oral health surveys. The aim of the study reported here was to assess the relationship between self-rated oral health and satisfaction with oral health in two studies of older adult populations. *Methods:* Participants in Study 1 were aged 50 years and over, the majority of whom had multiple chronic medical conditions and disabilities and lived within a multi-level geriatric care setting. They were recruited when attending a clinic in that setting for their annual dental screening. Participants in Study 2 were somewhat healthier community dwelling individuals, also aged 50 years and older, who took part. They were originally recruited by means of a telephone survey based on random-digit dialling. For Study 1, data were collected by means of personal interviews and a review of dental clinic charts, while for Study 2 personal interviews, clinical examination and self-completed questionnaires were used. Measures included self-rated oral health, satisfaction with oral health, oral health-related quality of life (OHRQoL) and tooth loss. *Results:* Data were obtained from 225 persons in Study 1 and 541 in Study 2. In both studies there was a significant association between self-ratings of oral health and satisfaction with oral health. However, also in both studies there was a discrepancy between the measures: approximately 10% of those with favourable oral health ratings were dissatisfied while approximately half of those with unfavourable ratings were satisfied. Those with apparently discordant responses had significantly higher scores on OHRQoL measures such as the GOHAI and the OHIP-14 than those with concordant responses. In Study 2, a similar discrepancy between self-rated general health and satisfaction with general health was also observed. *Conclusions:* There is degree of discordance between self-ratings of and satisfaction with both oral and general health status in the older adult populations studied here. This may be because of the expectations concerning health in later life. More needs to be known about the frames of reference people use in constructing their responses to questions designed to assess health perceptions.

Key words: older adults; oral health-related quality of life; satisfaction with oral health; self-rated health

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Research on subjectively perceived oral health has been enhanced considerably by the development of measures of oral health-related quality of life (OHRQoL). These assess the functional, psychological and social impacts of oral diseases and disorders. Prior to the development of these measures subjective perceptions of oral health were usually elicited by means of single-item global indicators. These included self-rated oral health, self-perceived need for dental treatment and satisfaction/dissatisfaction with oral health status. Although numerous multidimensional, multi-item

scales and indexes are now available, these apparently simple measures continue to be widely used in oral health research.

Single-item global ratings are powerful predictors of functional decline and survival (1, 2), even after controlling for clinically assessed health, and they are also important determinants of the use of health services. As summary indicators they are often treated as a 'gold standard' and used to test the criterion and construct validity of measures of HRQoL (3) and OHRQoL (4). As the scores from single-item global indicators and scores from multi-item scales and indexes are strongly correlated, it has been recommended that the former can substitute for the latter when time, expertise or funding is limited (5).

Wilson and Cleary (6) have suggested that the general health perceptions measured by single-item global ratings integrate and summarize several health concepts including biological and physiological states, symptoms and physical, psychological and social functioning. Consequently, they are included in conceptual models of disease and its consequences where they mediate between clinical variables and QoL outcomes. A modified and simplified version of Wilson and Cleary's model as applied to oral health is presented in Fig. 1. The main aim of such models is to delineate what are taken to be different dimensions of human experience as it relates to clinical conditions and their outcomes and specify what are probably the main causal relationships between them. Health surveys which implicitly or explicitly utilize this or similar models typically collect multiple types of data: (a) measures of oral disease based on conventional clinical indicators such as DMFT scores or assessments of periodontal attachment loss; (b) single-item subjective indicators such as self-rated oral health; (c) measures of OHRQoL such as the OIDP (7), OHIP (8) and GOHAI (9), and (d) surrogate measures of QoL such as morale and life satisfaction (10). Such data can be used to explore the linkages between different components of the model.

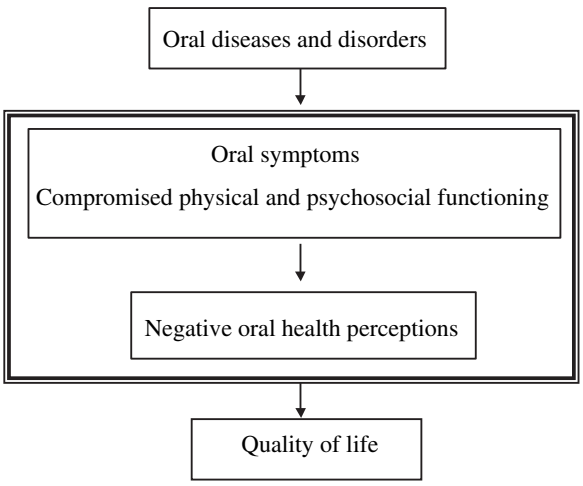

Fig. 1. Wilson and Cleary Model: adapted.

Early research on self-perceived oral health examined the associations between self-rated oral health and/or self-perceived needs for dental treatment and clinical judgements of an individual's oral health status and needs (11–13). As with similar studies in the medical literature (14), it was apparent that subjectively perceived and professionally measured health status were often discordant. Those studies that have examined satisfaction with oral health status reported similar findings (15, 16). More recent studies have indicated relatively weak associations between clinical indicators of oral health and scores derived from measures of OHRQoL (17).

Albrecht and Devlieger (18) have termed such discrepancies as 'paradoxes'. They studied people with relatively severe disabilities and found that the majority reported having a QoL that was good or even excellent. Their claim that this indicates the existence of a 'disability paradox' is, however, difficult to sustain. If the different levels of the model specified by Wilson and Cleary are deemed to represent different aspects of human experience, there is no *a priori* reason to suppose that they overlap to a substantial degree. In this respect, the arrows in the model do not mean 'causes', but 'may or may not lead to'. Both Locker (19) and Wilson and Cleary (6) are clear that the relationships between the component parts of these kinds of models are not direct but mediated by personal and environmental variables. For example, people who have lost many teeth may or may not experience functional and psychosocial impacts, and a person experiencing such impacts may or may not find that their QoL is compromised. In fact, it has been argued that chronic conditions leading to disability may even enhance the QoL (20).

Sprangers and Schwartz (21) have described the process of response shift, defined as changes in internal standards, values and meanings and the way in which they interact with personal dispositions to facilitate accommodation and adaptation to illness and the challenges it entails. Such processes can explain the apparent discordance between

clinical variables, psychosocial impacts and QoL outcomes. In short, when a paradox can be explained, it ceases to be a paradox (22).

However, what has not yet been examined, and which might with more justification be referred to as a paradox, are discrepancies between different types of subjective health indicator; i.e. discrepancies within a given level of the model specified by Wilson and Cleary (6). For example, while it seems reasonable to suggest that those who rate their oral health as only fair or poor will also be dissatisfied with their oral health status and perceive a need for dental treatment, this has not been explored empirically. Consequently, it is not known whether or not this is the case and, if not, why not. If, as Stewart and Ware (23) have suggested, general health perceptions not only integrate different components of health but also values, expectations and beliefs about what it is to be healthy to varying degrees, self-ratings of health and satisfaction with health may not coincide exactly. This issue does not arise in the Wilson and Cleary model as they do not specify exactly what they mean by the term 'general health perceptions', or whether this term refers only to self-ratings or includes expressions of satisfaction and dissatisfaction and perceived need for health care. Exploring these issues with respect to oral health may provide useful insights into how perceptions of oral health and their impact on everyday life are constructed.

Accordingly, this paper uses data from two studies of older adults to examine the relationships between self-rated oral health and expressions of satisfaction and dissatisfaction with oral health. The first (Study 1) included people aged 50 years and over, the majority of whom had multiple chronic medical conditions and disabilities and lived within a multi-level geriatric care setting. The second (Study 2) consisted of community dwelling individuals, also aged 50 years and over, who were somewhat healthier. As both studies involved people up to the age of 90–100 years the consistency of perceptions of oral health in different cohorts of older adults could be examined. Ettinger and Beck (24), in an early contribution to geriatric dentistry postulated that different cohorts of older people have grown up in different historical circumstances and had different life experiences, and this might well impact on their expectations and attitudes with respect to oral health.

The reason for using data from two studies was to determine whether or not both gave rise to similar findings. This allowed us to determine whether the patterns revealed by the data analysis were a sample specific phenomenon or a more general phenomenon concerning perceptions of oral health in older adults. Moreover, as Study 2 also included self-ratings of and satisfaction with general health status the phenomenon of interest could be examined with respect to general health.

Methods

Study 1

The data were collected during 1999–2000 as part of a study to assess the oral health and OHRQoL of residents of a large geriatric care centre. The centre is a large multilevel care setting and consists of an apartment building in which residents live more or less independently but with some support; a home for the aged and a chronic care hospital. The Centre has an in-house dental care facility that provides dental services to residents of the Centre and to some residents of other institutional settings. The facility also provides dental care to individuals living in the community through its out-reach program. Participants in the study were recruited when they attended the dental care facility for their annual dental examination. Only those individuals able to give informed consent were approached.

Data were collected by means of a personal interview conducted either at the dental care facility or the participant's residence. The questionnaire was concerned with self-perceived oral and general health and well-being. For dentate participants, limited clinical data such as the number of missing teeth were abstracted from the dental charts. The recruitment process, procedures for ensuring and obtaining informed consent and the data collection methods were approved by the University of Toronto Human Subjects Certification Committee.

Self-perceived oral health was measured by means of single-item self-ratings ratings of oral health status and satisfaction with oral health status. Two OHRQoL measures – the 12-item GOHAI (9) and the 14- item OHIP-14 (25) were also used. The single items used a Likert format with an 'excellent' to 'poor' 5-point range for self-rated oral health status, and a 'very satisfied' to 'very dissatisfied' 4-point range for satisfaction with oral health. To ensure sufficient cells sizes when comparing groups, these ratings were dichotomized as follows: 'excellent, very good,

good' versus 'fair, poor' and 'very satisfied, satisfied' versus 'dissatisfied, very dissatisfied'. The GOHAI and the OHIP-14 used the same reference period (1 year) and the same 6-point Likert format with responses ranging from 0 – 'never' (0) to 5 – 'all the time'. Scores were calculated for the OHIP-14 by summing the response codes for its 14 items. For the GOHAI they were calculated by summing the response codes for its 12 items after reversing the coding of the three positively worded items. This departs from the procedure recommended by Atchison and Dolan (9) who suggested reverse coding the nine negatively worded items prior to calculating scores. We did not comply with this recommendation for two reasons. First the data were easier to interpret and display if the OHIP-14 and the GOHAI were scored in the same direction. Second, as reverse coding is based on a number of untenable assumptions and can be problematic, we wished to minimize the number of items subject to this procedure. Consequently, for both the OHIP-14 and the GOHAI high scores indicated poorer OHRQoL. The questionnaire also contained three measures of well-being/QoL; a 7-point single-item rating of life satisfaction; the 23-item Perceived Stress Questionnaire (26); and a 6-item morale scale (27). Data on general health status and sociodemographic data were also collected. Further details of methods and measures used in the study can be obtained from previous papers (10, 28).

Study 2

The data from this study were collected in 1992–1993 and formed the second stage of a longitudinal study of the oral health of community-dwelling adults aged 50 and over. Participants were originally recruited by means of a telephone interview survey. At baseline and initial follow-up data were collected by means of a personal interview, clinical examination and a self-complete version of the 49-item OHIP that used a 1-year reference period (8). To be consistent across studies, OHIP scores were calculated using the items that comprise the OHIP-14. Self-rated health was assessed using the same question and response format as in Study 1 and dichotomized in the same way. Satisfaction and dissatisfaction with oral health was assessed using three questions that addressed ability to chew, ability to speak clearly and appearance. The response options were 'very satisfied', 'satisfied', 'dissatisfied' and 'very dissatisfied'. Those who responded with one of the last two options to at least one question were classified as dissatisfied and the remainder as satisfied. Self-ratings of general health were also obtained and scored using a 6-point scale (excellent, very good, good, fair, poor and very poor) as were ratings of satisfaction with general health status (very satisfied, somewhat satisfied, somewhat dissatisfied and very dissatisfied). Further details of study methods and measures have been reported previously (29, 30).

Data analysis

As the OHIP-14 and GOHAI scores from both studies were skewed and because some of the group comparisons undertaken involved relatively small cell sizes, the data were analysed using non-parametric statistical tests. These included the Mann–Whitney test for examining differences in the distributions of scores and the chi-square and Fisher's exact tests for examining difference in proportions. P-values of <0.05 were considered to indicate statistical significance. Logistic regression analyses were used to identify the independence of effects. The extent of agreement between self-ratings and satisfaction ratings was assessed using the kappa statistic and the null hypothesis that kappa $= 0$ assessed by P-values. Ninety-five percent confidence intervals for the kappa statistics were not presented as 'where samples are large the confidence intervals will be narrow and will not allow for much variation in interpretation' (31). The benchmarks suggested by Landis and Koch (32) were used to interpret the magnitude of agreement beyond chance.

Results

The characteristics of study subjects are summarized in Table 1. Overall, 225 people took part in the Study 1. They ranged in age from 52 to 100 years with 87.0% being aged 75 years and over and a mean age of 83.3 years. Three-quarters lived in the geriatric care centre and the remainder in the community. In general, their health was poor, with 99.0% reporting one or more chronic medical conditions (mean = 4.5), 93.0% taking one or more prescribed medications and 88.0% being limited in one or more activities of daily living. The majority, 69.0% were dentate, although one-third of the dentate had lost 20 or more teeth.

The questionnaire and clinical examination components of Study 2 were completed by 611 participants and 541 also completed the 49-item

Table 1. Characteristics of participants in Study 1 and Study 2

	Study 1 ($n = 225$)	Study 2 ($n = 541$)
Residential location	75% Geriatric care centre; 25% Community	100% Community
Age range (years)	52–100	53–91
Mean age (years)	83.3	65.7
% 75 years and over	87.0	15.5
% With 1+ chronic conditions	99.0	84.5
% Limited in activities of daily living	88.0	18.3
% Dentate	69.0	82.2

OHIP. Consequently, the analysis was confined to those with complete data. These 541 subjects ranged in age from 53 to 91 years. The mean age was 65.7 years and 15.5% were 75 years and over. The majority, 84.5% reported one or more chronic conditions (mean = 2.03) although only 18.3% had one or more limitations in activities of daily living. Four-fifths (82.2%) were dentate and among the dentate just over 10% had lost 20 or more teeth.

Two-thirds (67.4%) of Study 1 participants reported that their oral health was excellent, very good or good and one-third (32.6%) that is was only fair or poor. Eighty percent were very satisfied or satisfied with their oral health and only 20.0% dissatisfied or very dissatisfied. Just over one-fifth (22.8%) of participants in Study 2 reported that their oral health was only fair or poor and one-quarter (24.2%) reported dissatisfaction with some aspect of their oral health.

In both studies, there was a significant association between these two single-item global indicators of oral health (Table 2). For example, in Study 1, 83.3% of those rating their oral health as poor were dissatisfied compared with only 4.5% of those with ratings of excellent. In Study 2 the corresponding percentages were 61.3 and 6.9%, respectively.

However, cross-tabulations using the dichotomized variables indicated that in both studies there was a degree of discordance between these two global indicators. In Study 1, almost one in 10 (8.2%) of those rating their oral health as excellent, very good or good reported being dissatisfied, while over half (55.1%) of those rating their oral health as only fair or poor reported being satisfied (Table 3). This means that 23.3% had apparently discordant responses to these two seemingly similar global indicators. This extent of disagreement was also reflected in the kappa statistic of 0.41 ($P < 0.001$). Kappa values were also calculated for two age groups, 84 years and under and 85 years and over. They were 0.48 ($P < 0.001$) and 0.34 ($P < 0.001$), respectively. These values reflect that fact that in the younger age group, 41.9% of those rating their oral health as only fair or poor were satisfied, while in the older age group 65.8% of those with this self-rating were satisfied.

In Study 2, 24.3% had apparently discordant responses (Table 4). One in six (16.5%) rating their oral health excellent, very good or good were dissatisfied, while half (50.8%) of those rating their oral health fair or poor were satisfied. The kappa statistic of 0.32 ($P < 0.001$) indicated only fair agreement between the two measures. The kappa values for the three age groups, 50–64 years, 65–74 years and 75 years and over were 0.36 ($P < 0.001$), 0.29 ($P < 0.001$) and 0.30 ($P < 0.001$), respectively.

Table 2. Associations between self-rated oral health and satisfaction/dissatisfaction with oral health status

	Percent dissatisfied with oral health status	
Self-rated oral health:	Study 1 ($n = 225$)	Study 2 ($n = 541$)
Excellent	4.5	6.9
Very good	2.4	12.3
Good	12.2	23.2
Fair	31.4	45.1
Poor	83.3	61.3
P-value	<0.001	<0.001

P-values obtained from chi-squared test.

Table 3. Study 1: Agreement between self-rated oral health and satisfaction/dissatisfaction with oral health

Self-rated oral health:	Satisfied [% (*n*)]	Dissatisfied [% (*n*)]
Excellent, very good, good	A, 91.8 (134)	B, 8.2 (12)
Fair, poor	C, 55.1 (38)	D, 44.9 (43)

$P < 0.001$, chi-squared test; kappa = 0.41, $P < 0.001$.

Table 4. Study 2: Agreement between self-rated oral health and satisfaction/dissatisfaction with oral health

Self-rated oral health:	Satisfied [% (*n*)]	Dissatisfied [% (*n*)]
Excellent, very good, good	A, 83.5 (344)	B, 16.5 (68)
Fair, poor	C, 50.8 (62)	D, 49.2 (60)

$P < 0.001$, chi-squared test; kappa = 0.32, $P < 0.001$.

In order to explore these issues further, two sets of bivariate analyses were undertaken for each data set. In the first, participants who rated their oral health excellent, very good or good and were satisfied [Tables 2 and 3 (cell A)] were compared with those who rated their oral health excellent, very good or good and were dissatisfied [Tables 2 and 3 (cell B)]. In the second, those who rated their oral health as fair or poor and were satisfied [Tables 2 and 3 (cell C)] were compared with those who rated their oral health as fair or poor and were dissatisfied [Tables 2 and 3 (cell D)]. The aim of these analyses was to determine which variables distinguished participants whose responses were concordant and discordant. In Study 1, groups were compared using the following variables: age, gender, self-reported adequacy of income, dental insurance coverage, self-rated general health, number of medical conditions, number of problems in activities of daily living, dentate/edentulous, number of missing teeth, GOHAI score, OHIP-14 score and scores on the three surrogate indictors of well-being/QoL, i.e. morale, perceived life stress and life satisfaction. In Study 2, the groups were compared with respect to age, gender, dental status, number of missing teeth, OHIP-14 score, self-perceived general health status, number of chronic medical conditions, number of limitations in activities of daily living, self-reported life stress level, adequacy of income to meet needs, dental visiting pattern and time since last dental visit.

For Study 1, the only differences observed between the two groups rating their oral health excellent, very good or good were scores for the GOHAI and the OHIP-14. Subjects whose self-ratings and expressions of satisfaction/dissatisfaction were discordant had significantly higher scores, indicating more functional and psychosocial impact from oral disorders (Column B, Figs 2 and 3). There were also significant differences in GOHAI and OHIP-14 scores between the two groups rating their oral health as fair or poor. Here, the discordant group had significantly lower scores, indicating less impact from oral disorders (Column C, Figs 2 and 3). There was also a difference between these two groups with respect to whether or not their income was adequate to meet their needs. Those who were satisfied in spite of rating their oral health as only fair or poor were more likely to report an adequate income than those who rated their oral health as fair or poor and were dissatisfied (86.5% versus 51.6%; $P < 0.01$). The effect of adequacy of income was also reflected in the extent of agreement between the two global indicators of oral health. The kappa value for those reporting an adequate income was 0.34 ($P < 0.001$) compared with 0.65 ($P < 0.001$) for those reporting an income that was inadequate.

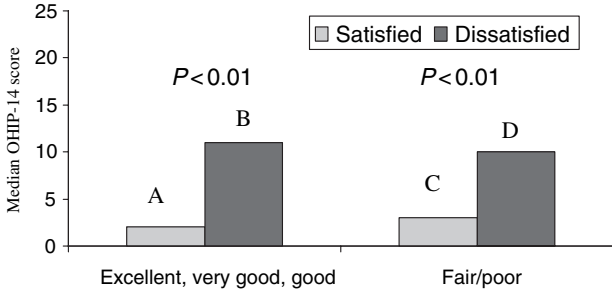

Fig. 3. Study 1: Median OHIP-14 scores.

The independent effects of the two psychosocial impact scores and adequacy of income with respect to the discordance between self and satisfaction ratings among those reporting only fair or poor oral health was confirmed in logistic regression analyses.

In Study 2, the first set of analyses indicated that subjects who rated their oral health as excellent, very good or good but who were dissatisfied had higher OHIP-14 scores ($P < 0.001$) (Column B, Fig. 4), more missing teeth ($P < 0.05$, more limitations in activities of daily living ($P < 0.05$); were more likely to visit a dentist only when having pain

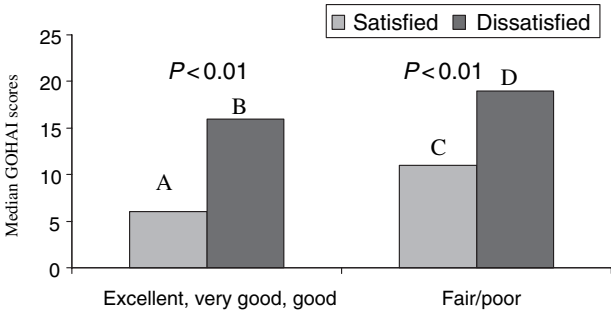

Fig. 2. Study 1: Median GOHAI scores.

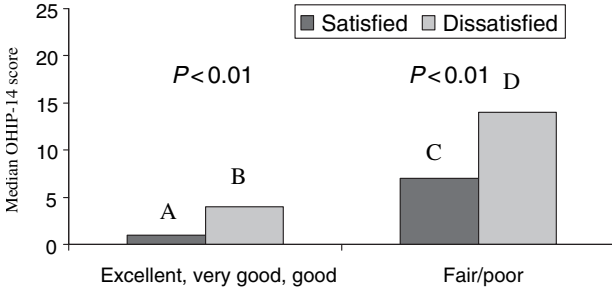

Fig. 4. Study 2: Median OHIP-14 scores.

or other problems ($P < 0.05$) and less likely to have an income that was adequate to meet their needs ($P < 0.05$) than those who were satisfied. However, in a logistic regression analysis predicting discordance, only the OHIP-14 score had a significant independent effect ($P < 0.001$). The second set of analyses indicated that subjects who rated their oral health as only fair or poor but were satisfied had lower OHIP-14 scores ($P < 0.001$) (Column C, Fig. 4) and lower scores on the index of activities of daily living ($P < 0.05$) than those who were dissatisfied. Again, a logistic regression analysis predicting discordance revealed that only the OHIP-14 score had a significant independent effect ($P < 0.002$).

When the association between the self-ratings of and satisfaction with general health status from Study 2 were examined, discrepancies were again noted. Of those rating their general health as excellent, very good or good, 9.8% were dissatisfied to some degree. Of those rating their health as fair, poor or very poor 48.3% reported being satisfied. Overall, 18.5% of subjects had discrepant responses and the kappa value was 0.43.

Discussion

The results of the two studies summarized here are remarkably consistent even though they included samples of older adults which differed with respect to age, medical status and living arrangements. There were also some differences between the studies in data collection methods and the dependent and independent variables used. However, in both there was a significant association between self-ratings of oral health and satisfaction/dissatisfaction with oral health status, although the agreement between these two measures was, when judged by kappa statistics, only fair to moderate. Moreover, the proportion of participants who gave what were apparently discordant responses was very similar, 23 and 24%, respectively. Perhaps the most striking observation from the two studies was that half of those reporting that their oral health was only fair or poor reported that they were satisfied with their oral health. Equally striking was the observation that a proportion, albeit much smaller, of those rating their oral health excellent or good reported being dissatisfied. As we anticipated that there would be a close association between these two global indicators of oral health, this gives rise to at least the appearance of paradox. A similar phenomenon was observed in Study 2 with respect to ratings of and satisfaction with general health, again giving the appearance of paradox.

One potential explanation of these discrepancies is expectations. Carr et al. (33) suggest that people assess their HRQoL by comparing their expectations and experience. These expectations vary between individuals and are influenced by a wide range of psychosocial and sociodemographic factors. They also suggest that evaluations of health and QoL are framed within 'horizons of possibilities' that are a component of identity. These specify what an individual sees as being normal and acceptable experiences given his/her age and other characteristics. Consequently, someone who experiences poor health whose expectations are low may not perceive their health to have much of an impact on their life and may then report being satisfied. Someone who had generally good health but high expectations may experience significant impact from even minor conditions and end up being dissatisfied.

Although we did not measure expectations in this study, the observation that, in both studies, there were significant differences in psychosocial impacts between the satisfied and the dissatisfied, irrespective of the level of self-rated health, is certainly consistent with this model. However, the results presented here do depart from the model, and from the cohort analysis presented by Ettinger and Beck (24), in that there were only some associations to suggest that sociodemographic variables such as age were important with respect to the level of agreement between the two global indicators. In Study 1 there were differences in kappa statistics according to age in the expected direction and also differences according to adequacy of income but these were not observed in Study 2.

A second relevant concept discussed by Carr et al. (33) and MacEntee et al. (34) is that of adaptation. Psychological adjustments such as changes in expectations, changes in lifestyles and living environments or the use of devices may mean that the effect of poor health on daily life can be minimized. This may help explain why many who rated their oral health as poor were nonetheless satisfied. It is less useful at explaining why some of those rating their oral health as excellent or good were dissatisfied.

However, characterizing the responses of individuals falling into cells B and C of Tables 3 and 4 as discordant or paradoxical assumes that the two global ratings used in these studies are measuring

the same underlying construct. This may not in fact be the case. At this time, it is not altogether clear what frame of reference people use when rating their oral health and the cognitive processes that lead to particular evaluations of oral health (35). Research on ratings of general health has indicated that respondents use different frames of reference in their answers to these questions (36–38). While some rate themselves according to their physical state, others refer to their emotional state. Some respondents base their rating on comparisons with others (as in a similar age cohort) (36), while some make reference to behaviours, which promote or compromise health. Kaplan and Baron-Epel (35) conducted in-depth interviews with adults and identified three models used to evaluate health status. These were the biomedical or disease model, the emotional or general feeling model and the functional model. Krause and Jay (37) identified nine conceptually distinct dimensions that provided the basis for self-assessments of health, with the presence or absence of specific medical problems being the most common. Both studies reported some variation according to the demographic characteristics of respondents. As comparable research has not been undertaken with respect to oral health, it is not known if there is a similar variation in the frame of reference that provides the basis for self-ratings. Similarly, it is not known what underlies expressions of satisfaction and dissatisfaction with oral health. Consequently, it is possible that self-ratings and satisfaction ratings are measuring different constructs so that discordance is not in fact paradoxical. Clearly, these issues can only be addressed by qualitative research directed at uncovering the meanings of oral health, how those meanings are constructed and how and why they vary across individuals and groups (33).

A final point that may be of relevance to understanding the data presented here concerns the ways in which models of disease and its outcomes are used in research on the relationships between biological and social realities. The adapted version of Wilson and Cleary's model depicted in Fig. 1, as with the ICIDH model used to inform oral health research (19), links key concepts in what appears to be a unidirectional sequence. However, Wilson and Cleary (6) are careful to point out that the model they depict is intended to identify what they refer to as 'the dominant associations'. They also state that the unidirectional character of the associations as implied by the model does not mean that relationships between component parts of the model are not reciprocal, nor does the absence of arrows between nonadjacent concepts mean that there are no direct relationships between these components. It is not inconceivable that an individual's QoL, whether good or bad from their perspective, shapes their perceptions of their health and functional status. Similarly, whether one is satisfied or not with one's oral health may determine the extent to which functional and psychosocial events are perceived and framed as oral health impacts. It is, perhaps for this reason that the theoretical model recently presented in the International Classification of Functioning, Disability and Health (39) makes no statements about the nature or direction of relationships between the concepts comprising the model. Rather, these are to be uncovered by means of empirical research, even though the methodological challenges posed by such research may prove to be formidable.

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