Predictors of Chewing Difficulty Onset Among Dentate Adults: 24-month Incidence

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Abstract

Objectives: *Chewing ability is an important measure of health-related quality of life, yet few studies have examined predictors of chewing difficulty in community-based samples. This study describes longitudinal patterns of chewing difficulty and identifies predictors of chewing difficulty onset.* ***Methods:*** *The Florida Dental Care Study (FDCS) was a longitudinal study of oral health and related behaviors. Interviews and a clinical exam were conducted with a sample that included persons who had at least one tooth and were aged 45 years or older (n=873). The five-item chewing index of Leake (1990), with minor revision, was the outcome of interest.* ***Results:*** *Approximately 21 percent of baseline participants reported chewing difficulty and about 34 percent reported difficulty during the study. Having infected or sore gums, loose tooth, loose crown or bridge, toothache pain, lower numbers of opposing pairs of teeth, dry mouth, and being female were significant predictors of incident chewing difficulty.* ***Conclusions:*** *Self-reported oral disease and tissue damage and toothache pain were strong predictors of decline in chewing ability. Additionally, women were identified as a high-risk group for incident chewing difficulty. Future research should elaborate further the pathways through which these factors affect oral function. [J Public Health Dent 2002;62(4):214-21]*

Key Words: mouth diseases, longitudinal studies, mastication, oral health, quality of life.

The ability to chew is a central aspect of oral function, representing an important ability in the everyday lives of almost all adults. Chewing difficulty is a fundamental indicator of diminished oral health and plays a key role in conceptual models of oral health. Understanding how other aspects of oral health may influence chewing difficulty first requires an understanding of the multiple dimensions of oral health. We have previously proposed, developed, and tested the construct validity of a multidimensional model of oral health shown in Figure 1 (1).

The model posits a sequential causal process that involves specific antecedents and consequences, and strongly parallels the biomedical conception of the natural history of disease. The model consists of five dimensions of oral health and oral health-related quality of life: (1) oral disease and tissue damage; (2) oral pain and discomfort; (3) oral functional limitation; (4) oral disadvantage; and (5) self-rated oral health. Two recent conceptual innovations by Locker (2), and by Johnson and Wolinsky (3) have influenced the conceptual scheme depicted in Figure 1. Locker (2) adapted the multidimensional model of overall physical health used by the World Health Organization (4) to an oral health context, while Johnson and Wolinsky (3) extended a model by Nagi (5) to include self-rated health as a dimension.

Identification of oral health problems associated with changes in chewing ability has the potential to assist oral health care providers who wish to prevent onset of chewing difficulty, by identifying the specific aspects of oral disease, tissue damage, and oral pain associated with impaired oral function. Existing research has demonstrated that social factors affect oral health outcomes (e.g., oral function, oral health attitudes, and dental service use), even when various diseases and tissue damage are taken into account (1,6,7). Variation in incidence of chewing difficulty across socially and demographically defined groups enables further assessment of the processes responsible for prevalence of poor oral health outcomes among high-risk populations (e.g., African Americans and persons of lower socioeconomic status).

While previous studies have contributed significantly to our knowledge of the correlates of chewing ability (e.g., 8), none to date have used a longitudinal design to examine the predictors of change in chewing ability. Longitudinal analysis based on a prospective design can enhance our understanding of the processes underlying oral health by providing temporal ordering that is necessary to establish causality. Assessment of the impact of time-varying factors, such as changes in other aspects of oral health, can be accomplished much more directly using longitudinal data.

Several approaches have been used to evaluate chewing ability, including bite force, number of chewing strokes needed to process a food bolus, and self-assessments. In this study, we relied on self-reported measures of chewing ability. Research over the last decade has shown that self-reported data from patients can provide reliable and valid information on health status (9,10). Furthermore, self-reports are particularly useful for subjective assessments of oral health and gauging

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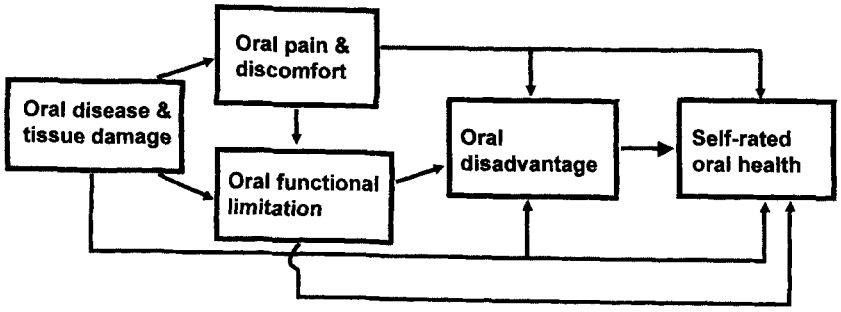
FIGURE 1
Multidimensional Model of Oral Health
[Adapted with revision from Locker (1988) and Johnson and Wolinsky (1993). Appears in Gilbert, Duncan, Heft, Dolan, Vogel. Multidimensionality of oral health in dentate adults. Med Care 1998;36:988-1001.]



the impact of oral health problems on the daily lives of individuals.

Using data from the Florida Dental Care Study (FDCS), a longitudinal study of oral health and dental service utilization conducted in north Florida, this analysis investigated the oral health and social factors associated with changes in chewing ability. Specifically, we (1) describe the incidence and longitudinal patterns of chewing difficulty, and (2) identify predictors of chewing difficulty onset.

Methods

Sampling and Interview Methods. The goal of the sampling design was to ensure that a large number of persons at a hypothesized increased risk for oral health decrements would be included—namely, African Americans, residents of rural areas, persons 45 years old or older, and persons living below the US poverty level (11). Details of the sampling methodology and selection are provided in an earlier publication (12). The 873 subjects who participated at baseline resulted in a sample of only modest bias with respect to the population of interest (12). Also, this sample had dental care recency similar to recent National Health Interview Survey (NHIS) data, and conclusions drawn from the FDCS and the NHIS regarding determinants of dental care recency were similar (12).

Subjects participated in a baseline in-person interview that was followed immediately by a clinical dental examination. We previously described the examination protocol, clinical diagnostic criteria, quantified interexaminer reliability for the clinical examination, and quantified test-retest reliability of questions from the baseline interview, all of which we judged to be satisfactory (6,13-15). The baseline interview and clinical examination were followed by telephone interviews at 6, 12, and 18 months following the baseline. At 24 months after baseline, the interview was again done in person, and was followed by a clinical examination identical to the one conducted at baseline.

By 24 months, 764 subjects remained in the study. Of the 109 subjects who did not participate in the 24-month interview, 35 refused to participate, 29 were deceased, 10 were medically unable to participate, and 35 could not be located. We compared the baseline oral health of those who participated in the 24-month interview and those who did not. The issue of bias due to attrition is addressed elsewhere (7). Subjects with poorer oral health were more likely to have left the study during its initial 24 months, but the total impact of this selective attrition appears to be modest. A detailed report of the characteristics of persons lost to follow-up is available from the authors upon request. Briefly, however, as an example of the typical magnitude of the bias, 20.6 percent of the 873 participants at baseline reported chewing difficulty at the beginning of the study. Had the sample been limited to those who ultimately participated at 24 months, the figure would have been 21.1 percent.

Description of Variables. Chewing ability was measured using a revised version of an index of chewing ability introduced by Leake (16). This measure identifies a range of foods different enough to allow subjects to discriminate reliably among them. Subjects were asked about ability, at the time of the interview, to chew or bite: (1) a whole fresh apple without cutting it; (2) steaks, chops, or firm meat; (3) fresh carrot or celery sticks; (4) fresh lettuce or spinach salad; and (5) boiled peas, carrots, or green or yellow beans. Our adaptation of this approach was to add the phrase "or something very similar to that" to the question. This was done to decrease the likelihood that a subject would answer "have not tried" to these questions. A dichotomous summary variable was constructed for each post-baseline interview coded 1 if the subject reported any chewing difficulty (at the time of the interview) and coded 0 otherwise (8).

During the baseline interview and subsequent follow-ups, respondents were asked whether they had, in the past six months, experienced problems with a range of oral disease and tissue damage (broken filling, broken tooth or crown, cavities, abscessed tooth, infected or sore gums, bleeding gums, loose tooth, loose crown or bridge); and oral pain (toothache pain, dental sensitivity). Additional variables reflect baseline measures of demographic characteristics (age, sex, race, place of residence); approach to dental care, socioeconomic status (education, present financial situation, dental insurance coverage); and condition of mouth (full upper, partial upper, partial lower, dry mouth, number of opposing anterior pairs, number of opposing posterior pairs). Measurement and coding information is provided in the footnotes of relevant tables. The actual questionnaires are available at the Internet site listed in the Acknowledgments section.

Data Analysis. Descriptive statistics include (1) univariate distribution of the patterns of self-reported chewing difficulty over the 24-month period and (2) bivariate associations between conditional probability of chewing difficulty onset, and the predictor variables identified in the previous section. The joint occurrence of chewing difficulty and other time-varying variables (oral disease and tissue damage, oral pain), is reported for each interval. These temporal associations were based on the 3,374 intervals experienced by the 873 participants who began at baseline. For variables that do not vary over time (e.g., demographic characteristics, socioeconomic status, and baseline condition of

mouth), conditional probabilities of onset and recovery are reported for the baseline values. Probability of onset reflects the likelihood that a chewing difficulty is reported during the 24-month study period and is based on the 767 subjects who did not report difficulty chewing at baseline. The chi-square statistic and Mantel-Haenszel chi-square trend test were used for bivariate comparisons when variables were nominal or ordinal, respectively.

Discrete-time proportional hazards models were used to examine the influence of predictor variables on the conditional probability of reporting a change in chewing ability (17,18). The dependent variable in these models reflects onset of chewing difficulty among those subjects who had not reported chewing difficulty for one observation interval or more. Because a variety of factors potentially influence oral function, it is possible for subjects to experience trajectories of chewing ability that include multiple periods of difficulty. Therefore, repeated transition events were permitted in all models (i.e., respondents were permitted to reenter the risk group for onset of chewing difficulty if they experienced difficulty and subsequently recovered).

Because participants could contribute multiple observations, the General Estimation Equation (GEE) was used to address the effects of time dependence. The GEE approach was used to account for lack of independence among multiple observations contributed by the same subject by adjusting the standard errors of the parameter estimates using the observed correlation structure in the data (19-21). Data management and analyses were conducted in a microcomputer environment using the SAS System for Windows®, versions 6.12 and 8.2 (22,23).

TABLE 1
Pattern of Self-reported Chewing Difficulty

Baseline	6-month	12-month	18-month	24-month	% of Sample w/ Each Pattern (n=757)
No	No	No	No	No	63.4
No	No	No	No	Yes	5.1
No	No	No	Yes	No	1.0
No	No	No	Yes	Yes	1.1
No	No	Yes	No	No	2.1
No	No	Yes	No	Yes	0.3
No	No	Yes	Yes	No	0.4
No	No	Yes	Yes	Yes	0.8
No	Yes	No	No	No	1.7
No	Yes	No	No	Yes	0.5
No	Yes	No	Yes	No	0.1
No	Yes	No	Yes	Yes	0.4
No	Yes	Yes	No	No	0.3
No	Yes	Yes	No	Yes	1.2
No	Yes	Yes	Yes	No	0.4
No	Yes	Yes	Yes	Yes	0.6
Yes	No	No	No	No	3.0
Yes	No	No	No	Yes	0.9
Yes	No	No	Yes	No	0.4
Yes	No	No	Yes	Yes	1.4
Yes	No	Yes	No	No	0.3
Yes	No	Yes	No	Yes	0.6
Yes	No	Yes	Yes	No	0.2
Yes	No	Yes	Yes	Yes	0.4
Yes	Yes	No	No	No	0.9
Yes	Yes	No	No	Yes	1.4
Yes	Yes	No	Yes	No	0.2
Yes	Yes	No	Yes	Yes	0.9
Yes	Yes	Yes	No	No	1.1
Yes	Yes	Yes	No	Yes	1.2
Yes	Yes	Yes	Yes	No	0.8
Yes	Yes	Yes	Yes	Yes	7.3

*To eliminate permutations that include missing data, this aspect of the analysis is based on the 757 (weighted) subjects who provided information on chewing difficulty at baseline and at every follow-up during the 24- month observation period.

Results

Approximately one-fifth of the sample (20.6%) reported difficulty chewing at baseline, while one-third (33.8%) of subjects reported difficulty during at least one of the follow-up interviews. As expected, the incidence of chewing difficulty among those who reported a difficulty at baseline was higher (49.5%) than among those who did not (29.3%). Among the 767 respondents who reported no chewing difficulty at baseline, 20.0 percent developed difficulty chewing over the 24-month observation period. Of the 3,374 person-intervals experienced by the 873 subjects who began at baseline, 2,698 began with no chewing difficulty and 654 began with some chewing difficulty (22 intervals had missing data on this measure). For those intervals that began with no chewing interval, 8.4 percent ended with onset of chewing difficulty.

More can be learned about the dynamics of chewing ability by examining the temporal pattern of self-reports. In Table 1, the pattern of self-reports of chewing difficulty demonstrates the labile nature of self-reported chewing ability. Each of the 32 possible patterns occurred at least once (for a dichotomous variable, the number of permutations over five repeated measures is 2^5 or 32). The majority of subjects (63.4%) did not experience any chewing difficulty during the 24-month observation period. Only 7.3 percent of subjects reported chewing difficulty at each interview. Among those whose reports were characterized by some variation from interval to interval, approximately half (54.5%) reported two or more changes in chewing ability.

The bivariate association between

chewing difficulty onset and self-assessments of oral disease and tissue damage and oral pain are shown in Table 2. Among intervals that began free of chewing difficulty, those who experienced any form of oral disease, tissue damage, or oral pain were consistently more likely to experience chewing difficulty at the conclusion of the interval. The conditions associated with the highest probability of developing chewing difficulty were abscessed tooth, infected or sore gums, loose tooth, and toothache pain.

The bivariate relationships between onset of chewing difficulty and sociodemographic characteristics are shown in Table 3. Each of the demographic characteristics examined in this study was significantly associated with the onset of chewing difficulty among subjects who did not report chewing difficulty at baseline. Women, older adults, African Americans, and residents of rural areas were more likely to have reported a chewing difficulty at some point during the 24-month observation period. Likewise, each of the three measures of socioeconomic status had a significant association with chewing difficulty onset among subjects who did not report chewing difficulty at baseline. Those who did not graduate from high school, those who indicated they did little more than "manage to get by" financially, and those without dental coverage were at greater risk of developing a chewing difficulty.

We also wanted to take the baseline condition of the mouth into consideration. The conditional probability of chewing difficulty onset for six aspects of baseline condition of the mouth are shown in Table 4. Greater numbers of opposing anterior and posterior teeth were associated with decreased likelihood of developing a chewing difficulty. Subjects who reported having a dry mouth during the baseline interview or who wore a full or partial denture at baseline were more likely to develop a chewing difficulty. Approach to dental care was also significantly associated with developing chewing difficulty. Those who reported never visiting a dentist experienced the highest probability of chewing difficulty onset. Subjects who visited the dentist only because they experienced a problem had a higher probability of experiencing chewing difficulty than subjects who visited the

TABLE 2
Conditional Probabilities of Chewing Difficulty Onset, by Self-reported Measures of Oral Disease and Tissue Damage and Oral Pain*

	Weighted Number of Intervals	Probability of Chewing Difficulty Onset†
Oral disease and tissue damage		
Broken filling		
Yes	256	.14‡
No	3,007	.08
Missing	110	
Broken tooth or crown		
Yes	467	.12‡
No	2,795	.08
Missing	111	
Cavities		
Yes	485	.15‡
No	2,760	.07
Missing	127	
Abscessed tooth		
Yes	156	.22‡
No	3,105	.08
Missing	113	
Infected or sore gums		
Yes	445	.18‡
No	2,830	.07
Missing	98	
Bleeding gums		
Yes	294	.14‡
No	2,984	.08
Missing	95	
Loose tooth		
Yes	379	.19‡
No	2,894	.07
Missing	101	
Loose crown or bridge		
Yes	123	.15‡
No	3,144	.08
Missing	106	
Oral pain		
Toothache pain		
Yes	529	.19‡
No	2,743	.07
Missing	102	
Dental sensitivity		
Yes	858	.12‡
No	2,412	.07
Missing	104	

Note: The self-reported measures of oral disease & tissue damage and oral pain were measured at the conclusion of each interval. Participants answered in the affirmative if a decrement was experienced since the previous interview.

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal. Weighted distribution of number of intervals shown in brackets (may not sum to 3,374 due to rounding).

†Conditional probability that a chewing difficulty was reported at the end of an interval, based on the 2,698 intervals in which no chewing difficulty was reported at the beginning of the interval. Subjects could contribute more than one interval.

‡$P<.05$.

TABLE 3
Conditional Probabilities of Chewing Difficulty Onset, by Demographic Characteristics and Socioeconomic Status Measured at Baseline*

	Weighted Number	Probability of Chewing Difficulty Onset†
Demographic characteristics		
Sex		
Women	491	.26‡
Men	382	.13
Age (years)		
45–54	269	.13‡
55–64	243	.22
65–74	257	.24
75+	104	.26
Race		
African American	243	.28‡
White	627	.17
Missing	3	
Place of residence		
Rural	437	.23‡
Urban	436	.17
Socioeconomic status		
High school graduate		
Yes	688	.17‡
No	184	.36
Missing	1	
Present financial situation		
Can't make ends meet	36	.16‡
Manage to get by	386	.29
Enough to manage plus extra	306	.15
Money not a problem	138	.16
Missing	8	
Dental coverage		
Yes	293	.15‡
No	578	.23
Missing	1	

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal. Weighted baseline distribution shown in brackets (may not sum to 873 due to rounding).
†Any report of an occurrence during at least one of the four 6-month follow-up interviews. Based on portion of the sample (n=676) that reported no chewing difficulty at baseline.
‡P<.05.

dentist on an occasional or regular basis.

A series of discrete-time hazards models, shown in Table 5, was estimated to quantify the relative effects of oral disease and tissue damage, oral pain, demographic characteristics, and socioeconomic status on the incidence of chewing difficulty. Baseline measures of condition of mouth also were included in the most fully specified model. To minimize multicollinearity, a single measure for number of opposing pairs (sum of anterior and posterior) and a dichotomous indicator of whether dentures were worn are included in the multiple regression models. Having an abscessed tooth also was omitted from the regression models because it was collinear with experiencing toothache pain. Hazard ratios, the coefficients presented in the regression models, convey the relative likelihood of experiencing a chewing difficulty onset given a one-unit increase in the independent variable. A hazard ratio >1 indicates an increase in the risk of experiencing an event, while a hazard ratio of <1 indicates a decreased risk. A hazard ratio of 1 indicates no difference in the risk of experiencing an event.

In the first model of Table 5, self-reported measures of oral disease and tissue damage and oral pain are included. Five decrements were positively associated with the incidence of chewing difficulty: cavities, infected or sore gums, having a loose tooth, having a loose crown or bridge, and toothache pain. In model 2, the relationship between approach to dental care and oral function was examined. Subjects who visit the dentist less frequently were generally more likely to experience chewing difficulty. Demographic and socioeconomic variation in incidence of chewing difficulty were examined in model 3. Age and sex were the only variables in this category that were associated with onset of chewing difficulty. Older subjects and women were significantly more likely to develop difficulty chewing. Finally, in model 4, all measures used in models 1, 2, and 3 were included. Measures of condition of mouth at baseline also were included in model 4. In the most fully specified model, infected or sore gums, having a loose crown or bridge, toothache pain, and sex remained significantly associated with onset of chewing difficulty. The effects of age, approach to dental care, and reporting one or more cavities failed to maintain significance in model 4. Additionally, two aspects of condition of mouth at baseline were predictors on chewing difficulty onset: lower numbers of opposing pairs of teeth and having a dry mouth.

Discussion

The purpose of this study was to examine the predictors of onset of chewing difficulty. Specifically, self-reports were used to investigate the role that certain measures of oral health (disease, tissue damage, and pain), and social and demographic risk factors played in predicting onset. Although not as common as other oral health decrements (24), chewing difficulty was not a rare event in this sample. Approximately one-third of the participants experienced compromised chewing ability at some point during the 24-month study period, and one in five of those reporting no

TABLE 4
Conditional Probabilities of Chewing Difficulty Onset, by Baseline Measures of Condition of Mouth and Approach to Dental Care*

	Weighted Number	Probability of Chewing Difficulty at Onset†
Condition of mouth at baseline		
Number of opposing anterior pairs		
0–2	155	.47‡
3–5	135	.29
6	579	.16
Missing	5	
Number of opposing posterior pairs		
0–3	329	.38‡
4–7	336	.15
8–10	203	.11
Missing	5	
Wears full upper denture		
Yes	81	.55‡
No	798	.18
Missing	2	
Wears removable partial upper denture		
Yes	99	.21
No	770	.20
Missing	4	
Wears removable partial lower denture		
Yes	118	.39‡
No	752	.18
Missing	3	
Dry mouth		
Yes	190	.37‡
No	679	.16
Missing	4	
Approach to dental care		
Never visits dentist	29	.46‡
Visits dentist only for problems	367	.27
Visits dentist occasionally	86	.11
Visits dentist regularly	387	.16

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal. Weighted baseline distribution shown in brackets (may not sum to 873 due to rounding).
†Any report of an occurrence during at least one of the four 6-month follow-up interviews. Based on portion of the sample (n=676) who reported no chewing difficulty at baseline.
‡P<.05.

chewing difficulty at baseline experienced some impediment during the observation period.

Oral disease, tissue damage, and oral pain clearly play an important role in predicting changes in chewing ability. In bivariate analyses, the occurrence of each measure of oral disease, tissue damage, and oral pain was associated with an increased likelihood of the onset of chewing difficulty. In the most fully specified model, four decrements stood out as particularly salient risk factors: infected or sore gums, loose tooth, loose crown or bridge, and toothache pain.

The lack of significance in the multivariate models of some measures of oral disease, tissue damage, and oral pain that were significant predictors at the bivariate level suggests there are primary mechanisms through which these factors may operate. Although all of the measures of oral disease, tissue damage, and oral pain were significantly associated with onset of chewing difficulty at the bivariate level of analysis, only a subset of these measures was significant when other factors were taken into account. The consistent relationship (in the multiple regression context) between proximal aspects of oral health and chewing difficulty suggests there are subsets of predictive pathways within these dimensions of oral health. For instance, a number of oral disease and tissue damage decrements may have led to toothache pain, which in turn affected chewing ability.

As expected, demographic characteristics and socioeconomic status act as important risk factors for developing chewing difficulty. Each of the demographic measures was significantly associated with onset of chewing difficulty. Women, older adults, African Americans, and subjects living in rural areas were more likely to develop chewing difficulty during the study. Subjects with access to fewer socioeconomic resources were also at increased risk for developing chewing problems. Even when other predictors of oral health were taken into account, women were more than two-and-one-half times as likely as men to report chewing difficulty. With the exception of sex, each of the demographic characteristics and socioeconomic status measures that were significantly associated with onset in the bivariate analysis failed to maintain significance in the multiple regression model. This finding suggests these variables may exert indirect influences on chewing ability by producing differences in other aspects of oral health (such as oral disease or tissue damage).

Many important questions have yet to be addressed regarding the relationships between chewing difficulty and other dimensions of oral health. Future investigations in this area may wish to elaborate further the specific pathways through which oral disease, tissue damage, and oral pain affect oral function. A better understanding of the indirect effects of demographic and socioeconomic risk factors on oral function may provide additional insight into the ways that health behaviors influence oral function. Few studies have attempted to specify the ways that changes at one level of oral health influence changes at other levels. Understanding how changes in oral disease, tissue damage, and oral pain affect chewing ability permits greater in-

TABLE 5
Discrete-time Proportional Hazards Models Regressing Conditional Likelihood of Chewing Difficulty Onset on Oral Disease and Tissue Damage, Oral Pain, Approach to Dental Care, Demographic Characteristics, Socioeconomic Status, and Condition of Mouth*

	Model 1	Model 2	Model 3	Model 4
Oral disease and tissue damage†				
Broken filling	1.19			1.39
Broken tooth or crown	1.08			1.02
Cavities	1.57‡			1.34
Infected or sore gums	1.87‡			1.67‡
Bleeding gums	1.27			1.49
Loose tooth	1.71‡			1.71‡
Loose crown or bridge	2.00‡			2.18
Oral pain†				
Toothache pain	1.94‡			2.17‡
Dental sensitivity	1.16			1.28
Approach to dental care				
Never visits dentist		2.97‡		2.55
Visits dentist only for problems		2.28‡		1.13
Visits dentist occasionally		0.76		0.74
Visits dentist regularly		—¶		—
Demographic characteristics				
Age§			1.02‡	1.02
Sex•			2.58‡	2.77‡
Race∞			1.49	1.09
Place of residence#			1.01	0.78
Socioeconomic status				
High school graduate**			0.63	1.16
Present financial situation††			0.78	1.06
Dental coverage‡‡			0.84	1.09
Baseline condition of mouth				
# of opposing pairs of teeth¶¶				0.84‡
Wears any denture‡‡				0.71
Dry mouth§§				2.15‡
Intercept	0.06‡	0.07‡	0.04‡	0.05‡
Model chi-square	39.9‡	19.5‡	48.9‡	132.0‡
Model df	10	4	8	23

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal. Models are based on the 2,214 intervals in which a subject did not report difficulty chewing at the beginning of the interval. Coefficients are hazards ratios in which a ratio larger than 1.00 suggests the likelihood of chewing difficulty is increased. Ratios less than 1.00 suggest that the likelihood is decreased.
†Experienced in past 6 months=1; not experienced in past 6 months=0; measured at each interview.
‡$P<.05$.
¶Omitted category.
§Years of age; measured at baseline.
•Women=1, men=0.
∞African American=1, white=0.
#Urban=1, rural=0.
**Graduated high school=1, did not graduate high school=0.
††Can't make ends meet=1, manage to get by = 2, enough to manage plus extra = 3, money is not a problem=4.
‡‡Yes=1, no=0; measured at baseline.
¶¶Measured at baseline.
§§Experienced within 6 months of baseline=1; not experienced within 6 months of baseline=0.

sight into the relationships among various levels of oral health.

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