Socioeconomic and psychosocial correlates of oral health

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Background: It has been proposed that psychosocial variables are important determinants of oral health outcomes. In addition, the effect of socioeconomic factors in oral health has been argued to work through the shaping of psychosocial stressors and resources. This study therefore aimed to examine the role of psychosocial factors in oral health after controlling for selected socioeconomic and behavioural factors. **Methods:** Logistic and generalised linear regression analyses were conducted on self-rated oral health, untreated decayed teeth and number of decayed, missing and filled teeth (DMFT) from dentate participants in a national survey of adult oral health (n = 5364) conducted in 2004–2006 in Australia. **Results:** After controlling for all other variables, more frequent dental visiting and toothbrushing were associated with poorer self-rated oral health, more untreated decay and higher DMFT. Pervasive socioeconomic inequalities were demonstrated, with higher income, having a tertiary degree, higher self-perceived social standing and not being employed all significantly associated with oral health after controlling for the other variables. The only psychosocial variables related to self-rated oral health were the stressors perceived stress and perceived constraints. Psychosocial resources were not statistically associated with self-rated oral health and no psychosocial variables were significantly associated with either untreated decayed teeth or DMFT after controlling for the other variables. **Conclusion:** Although the role of behavioural and socioeconomic variables as determinants of oral health was supported, the role of psychosocial variables in oral health outcomes received mixed support.

Key words: Social determinants, oral health, psychosocial factors, socioeconomic inequalities

Based in social determinants research, psychosocial predictors of health have been receiving increasing attention. At its heart, a social determinants approach eschews traditional epidemiological perspectives which seek to identify biomedical and behavioural risk factors. Instead, it moves the focus of enquiry from what are called the 'downstream' factors in disease aetiology to 'upstream' factors such as the underlying psychosocial, environmental, economic and political determinants[1]. Underlying this change of focus is the belief that individual behaviours proximal to the disease state cannot be divorced from the context within which they take place. Those health behaviours which are, or can be, most related to pathophysiological changes are grounded within the social, psychological, work and material environment of an individual[2].

Oral diseases can have a significant negative impact on a person's quality of life[3,4] and have links to chronic health conditions such as diabetes and cardiovascular disease[5,6] and to all-cause mortality[7]. Further, there are profound and consequential inequalities in oral health[8]. A number of studies have now examined the associations between oral health and various psychosocial factors. For example, both neighbourhood socioeconomic conditions[9–12] and stress[13–16] have been found to predict oral health outcomes. In perhaps the most extensive study to date, Finlayson and colleagues found that higher levels of chronic stress, depressive symptoms, material hardship and fewer neighbourhood resources were associated with poorer self-rated oral health, while higher levels of self-esteem and mastery were positively associated with better self-rated oral health[13]. They also found that adults with lower income and education reported poorer oral health.

Research has also investigated the role of psychosocial factors such as social support and perceptions of self-efficacy and mastery. Social support has been hypothesised to contribute to good mental and physical health as a result of the various benefits following from increased social integration[17]. Studies have shown social support to be related to having more functional teeth[18], better oral health-related quality of life[19] and lower experience of and increment of caries[20]. Mastery, which relates to one's capacity to

influence relevant or important outcomes in one's life, has also been found to be related to self-rated oral health[13]. Among children, a greater sense of coherence, related to perceiving the world as comprehensible and manageable, has been shown to predict the impact of oral health on dental symptoms and quality of life[21].

Epidemiological theories of the social production of disease propose that relative economic and social positioning determine an individuals' exposure to health-damaging stressors and allow improved access to various resources that aid in avoiding risks and minimise the impact of disease[2,22,23]. All such economic and social factors are believed to provide a context for an individual's life circumstances, with low socioeconomic status (SES) exposing individuals to a greater number of and more severe stressors as well as to fewer resources with which to cope with these[13]. It has also been proposed that adult psychosocial attributes mediate the association between familial circumstances, such as socioeconomic position, and adult oral health[16]. Given that oral health disparities are most pronounced among the socially disadvantaged, and that psychosocial attributes are seen as important explanatory mechanisms for socioeconomic inequalities[24], exploring associations between self-rated oral health perceptions and psychosocial stressors after taking into account SES may contribute to the knowledge base of oral health social determinants.

Based on previous research and theory we hypothesised that: adults with greater psychosocial stressors and fewer psychosocial resources would have poorer self-rated oral health and worse clinically assessed dental health; individual behavioural risk factors would not be significantly associated with self-rated and clinical oral health after accounting for psychosocial factors; and psychosocial factors would not be significantly associated with oral health after controlling for the effects of socioeconomic factors.

METHODS

Sampling

The study used a three-stage, stratified, clustered random sample from an electronic version of the Australian national telephone listings. Postcodes were selected from 15 strata, with probability-proportional-to-size selection; 30 households were selected per metropolitan postcode and 40 households were selected per non-metropolitan postcode. One person aged 15+ years was selected per household. Participants first completed a computer-assisted telephone interview (CATI) as part of the National Survey of Adult Oral Health (NSAOH), conducted in Australia between 2004 and 2006. Details of the study are available elsewhere[25]. Participants completing the CATI and who reported having natural teeth were asked to attend a dental examination, and those completing the oral examination were subsequently sent a self-complete questionnaire.

The NSAOH was reviewed and approved by both the University of Adelaide Human Research Ethics Committee and the Australian Institute of Health and Welfare Ethics committee. Verbal consent was provided by the participants for the CATI component and written consent was obtained for the dental examination component. The research was conducted in full accordance with the World Medical Association Declaration of Helsinki.

Measures

Socioeconomic information was collected on the person's income, their highest educational attainment, perceived social standing and current employment status. Total household income was dichotomised from eight categories to <$60,000 per year or ≥ $60,000 per year, representing the closest possible median-split based on the available categories. Highest level of education was dichotomised to those people without a tertiary qualification or those people with at least a university degree or diploma. Subjective perception of social standing was measured using the MacArthur Scale of Subjective Social Status[26], a 10-cm long visual ladder representing where people stand in society. Participants were asked to mark where on the ladder they thought they stand and these responses were then dichotomised to the bottom 50% (0–50%) or the top 50%. Finally, participants were asked whether they were currently employed. People who responded that they worked either part-time or full-time were categorised as employed, while the rest of the respondents indicated that they were not employed.

Perceived stress was measured using the 14-item version of the Perceived Stress Scale (PSS-14), which measures the degree to which situations in one's life are appraised as stressful[27]. Items referred to feelings and thoughts that might have occurred during the past year, with possible responses ranging from 0 'Not at all' to 4 'Very often'. Reversed items were recoded so that higher scores corresponded to greater perceived stress. Cronbach's alpha for the scale was 0.85.

Perceived constraints and personal mastery were assessed using subscales of a sense of control measure[28], which were based on work done by Pearlin & Schooler[29]. 'Perceived constraints' indicates the extent to which a person believes that there are obstacles beyond their control that interfere with them reaching their goals, whereas 'Personal mastery' refers to a

person's sense of efficacy or capability in achieving their goals. Responses for all items ranged from 1 'Strongly disagree' to 5 'Strongly agree'. The internal consistency of the four-item Personal Mastery sub-scale, assessed with Cronbach's alpha, was 0.74 while the internal consistency of the 8-item Perceived Constraints subscale was 0.87.

Social support was assessed using the Multidimensional Scale of Perceived Social Support, which was developed in order to measure perceived social support from family, friends and any significant other person[30]. Responses were recorded on a five-point scale with higher mean scores corresponding to higher self-assessed social support. The internal consistency of the scale was high, with a Cronbach's alpha of 0.93.

Perceived oral health was assessed using the single global question 'How would you rate your own dental health?', with possible responses being 'Excellent', 'Very good', 'Good', 'Fair', 'Poor' or 'Don't Know'. Higher scores corresponded to poorer self-rated oral health and the outcome was dichotomised as either 'Good/Very Good/Excellent' or 'Fair/Poor'.

Clinically assessed oral health was determined using visual criteria, and a count of the number of decayed, missing and filled permanent teeth (DMFT) was calculated for each participant. For people aged less than 45 years, examiners distinguished between teeth missing because of decay or periodontal disease and teeth missing for some other reason. However, for participants aged older than 45 years no such distinction was made and all absent teeth for these people were counted as missing and contributed to calculation of the DMFT score.

Data analysis

Data were weighted by state/territory and metropolitan/non-metropolitan residence to correct for varying probability of selection, and by age and sex of participants. Final weights were computed so that the sample characteristics approximated those of the Australian population. Analysis of variance (ANOVA) was used to assess the bivariate associations between the sociodemographic, behavioural and SES variables and self-rated oral health, untreated decay and DMFT. Pearson *r*-correlations indicated the associations between the continuous variables household size and psychosocial factors, and the oral health outcomes. Multivariate models were constructed such that the sociodemographic and behavioural variables were entered at Step 1, psychosocial variables at Step 2 and SES variables at Step 3. Multivariate logistic regression modelling examined associations with the dichotomised self-rated oral health measure, while generalised linear modelling was used to analyse the associations of all the variables with untreated dental decay and DMFT scores.

RESULTS

A total of 14,123 adults completed the telephone survey interview (participation rate = 49.0%) and 4,549 dentate adults aged 18 years or older undertook the dental examination and completed the questionnaire, which represents 35.4% of the 12,861 dentate adults completing the CATI. The mean age was 44.2 years (age range 18–91 years), with 50.5% being male and 49.5% being female.

Associations between the categorical demographic, behavioural and socioeconomic variables and self-rated oral health, untreated decay and DMFT are shown in *Table 1*. Except for differences in self-rated oral health between males and females, all other differences were statistically significant.

Table 2 shows correlation coefficients between the continuous independent variables and self-rated oral health, number of decayed teeth and DMFT. Pearson *r*-correlations between the psychosocial variables were all statistically significant and moderate in size. Greater perceived stress and more perceived constraints were associated with poorer self-rated oral health and number of decayed teeth. As expected, the hypothesised protective psychosocial variables social support and perceived mastery were associated with better self-rated oral health, fewer decayed teeth and lower DMFT. While many of the correlations between the psychosocial variables and dental health outcome variables were statistically significant, most were small in size and none exceeded 0.17.

A series of multivariate analyses were conducted for each of the three dependent variables. In the logistic regression model for self-rated oral health as fair or poor, Model 1 included just the sociodemographic and behavioural variables, Model 2 added in the psychosocial variables, while Model 3 also included the socioeconomic variables (*Table 3*). Except for gender, the unadjusted odds ratios for all variables were statistically significant. In Model 1, visiting a dentist less frequently and tooth brushing at least twice a day were statistically significant predictors of self-rated oral health after controlling for gender, age and household size. In Model 2, the behavioural variables remained significant after controlling for the other variables. However, the odds ratios for all the psychosocial variables were attenuated with the sociodemographic and behavioural variables in the model. While perceived stress, perceived constraints and social support remained significant, perceived mastery ceased to demonstrate a statistically significant association with self-rated fair or poor oral health. In Model 3, the SES variables were all statistically significant independent

Table 1 Descriptive statistics and bivariate associations with self-rated oral health, untreated decay and decayed, missing, filled teeth (DMFT)

Variables	n	%	Self-rated oral health as fair to poor	Untreated decay		DMFT	
			%	Mean	SD	Mean	SD
Sociodemographic							
Gender							
Male	2,296	50.5	15.9	0.69***	1.64	12.11**	8.92
Female	2,253	49.5	14.3	0.48	1.30	12.96	9.42
Age (years)							
18–29	1,108	26.7	12.6**	0.68**	1.68	3.74***	4.33
30–45	1,339	32.3	16.7	0.61	1.50	9.29	6.60
46–60	1,010	24.4	17.6	0.52	1.39	19.72	5.56
>60	691	16.7	17.5	0.42	1.14	23.31	4.95
Behavioural							
Frequency of visiting a dentist							
<12 months	2,535	56.1	11.5***	0.43***	1.25	13.60***	9.24
>12 months	1,983	43.9	19.7	0.77	1.72	11.22	8.94
Tooth brushing							
Less than two times per day	2,015	44.5	18.1***	0.81***	1.87	11.53***	9.09
Two or more times per day	2,518	55.5	12.7	0.41	1.05	13.31	9.18
Socioeconomic							
Income							
<$60,000	2,177	53.4	21.1***	0.72***	1.67	15.05***	9.19
$60,000+	1,900	46.6	9.9	0.44	1.24	10.64	8.33
Education							
No tertiary degree	3,187	70.1	16.3**	0.72***	1.66	12.92***	9.28
Tertiary degree	1,362	29.9	12.3	0.28	0.87	11.62	8.89
Social standing							
Bottom 50%	1,267	28.7	21.7***	0.91***	2.06	12.99*	9.17
Top 50%	3,150	71.3	12.7	0.46	1.17	12.38	9.16
Employment							
Not employed	2,534	35.2	15.2**	0.68**	1.70	17.10***	9.24
Employed	1,377	64.8	18.7	0.53	1.37	11.27	8.46
All	4549	100.0	15.1	0.59	1.48	12.53	9.19

*P < 0.05; **P < 0.01; ***P < 0.001.

Table 2 Pearson r correlation coefficients between study variables

		I	II	III	IV	V	VI	VII
I	Perceived stress	–	–	–	–	–	–	–
II	Perceived constraints	0.63***	–	–	–	–	–	–
III	Social support	−0.40***	−0.44***	–	–	–	–	–
IV	Perceived mastery	−0.46***	−0.58***	0.37***	–	–	–	–
V	Household size	0.11***	0.05***	−0.02	−0.03*	–	–	–
VI	Self-rated dental health	0.14***	0.15***	−0.14***	−0.10***	−0.05***	–	–
VII	Decayed teeth	0.10***	0.10***	−0.06***	−0.06***	0.05**	0.19***	–
VIII	DMFT	−0.16***	0.01	−0.02	−0.03*	−0.22***	0.17***	0.09***

*P < 0.05; **P < 0.01; ***P < 0.001. DMFT, decayed, missing, filled teeth.

predictors of self-rated oral health, but of the psychosocial variables only perceived stress and perceived constraints remained as significant predictors of self-rated oral health.

The results from the series of generalised linear regression models of the sociodemographic, behavioural, psychosocial and socioeconomic variables on number of untreated decayed teeth is shown in *Table 4*. In all regression models, the unstandardised beta coefficients for both of the behavioural variables remained statistically significant. However, in Model 2, the beta coefficients for the psychosocial variables were not statistically significant after controlling for the sociodemographic and behavioural variables. In

Model 3, the SES variables were all significantly associated with fewer untreated decayed teeth even after controlling for the sociodemographic, behavioural and psychosocial variables.

The final series of generalised linear regression models, using DMFT as the dependent variable, are shown in *Table 5*. In Model 1, the behavioural variables were still statistically significant after controlling for gender, age and household size, although the strength of the associations were considerably reduced, as determined from a comparison with the unadjusted beta values. In Model 2, the only psychosocial variable that remained significant after controlling for the sociodemographic and behavioural variables was

Table 3 Unadjusted odds ratios (and 95% CIs) and adjusted odds ratios from logistic regression models of self-rated oral health as fair or poor

Variables	Unadjusted OR	95% CI	Model 1		Model 2		Model 3	
			Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
Sociodemographic								
Female	0.88	0.75, 1.03	0.99	0.83, 1.17	0.96	0.80, 1.15	0.86	0.71, 1.04
Age (Ref 18–29), years								
30–45	1.38**	1.10, 1.74	1.42*	1.02, 1.98	1.41	1.00, 1.98	1.04	0.71, 1.52
46–60	1.48**	1.17, 1.88	1.88***	1.35, 2.61	1.94***	1.38, 2.72	0.39	0.95, 2.03
61+	1.47**	1.13, 1.92	1.87***	1.32, 2.63	2.26***	1.57, 3.25	1.19	0.78, 1.81
Household size	0.83***	0.78, 0.89	0.92	0.86, 0.99	0.94	0.87, 1.01	1.00	0.92, 1.09
Behavioural								
Frequency of visiting a dentist >12 months	2.12***	1.81, 2.49	1.97***	1.66, 2.34	1.87***	1.57, 2.23	1.70***	1.41, 2.06
Brush two or more times per day	0.63***	0.54, 0.74	0.67***	0.57, 0.80	0.72***	0.61, 0.86	0.78**	0.65, 0.94
Psychosocial								
Perceived stress	2.15***	1.87, 2.49	–	–	1.81***	1.46, 2.23	1.78***	1.42, 2.22
Perceived constraints	1.97***	1.75, 2.21	–	–	1.32**	1.12, 1.58	1.28**	1.06, 1.53
Social support	0.63***	0.57, 0.71	–	–	0.87*	0.76, 0.99	0.89	0.78, 1.02
Perceived mastery	0.58***	0.51, 0.67	–	–	0.94	0.78, 1.12	1.01	0.84, 1.21
Socioeconomic								
Income $\geq$ \$60,000	0.43***	0.36, 0.52	–	–	–	–	0.63***	0.50, 0.80
Tertiary degree	0.69***	0.57, 0.82	–	–	–	–	0.91	0.74, 1.13
Social standing top 50%	0.46***	0.39, 0.54	–	–	–	–	0.78*	0.64, 0.96
Not employed	1.70***	1.45, 2.00	–	–	–	–	1.36**	1.10, 1.70

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Table 4 Generalised linear regression models for number of untreated decayed teeth

Variables	B	95% CI	Model 1		Model 2		Model 3	
			B	95% CI	B	95% CI	B	95% CI
Sociodemographic								
Female	−0.19***	−0.27, −0.11	−0.13**	−0.22, −0.05	−0.13**	−0.21, −0.04	−0.16	−0.25, −0.07
Age (Ref. 18–29), years								
30–45	0.00	−0.14, 0.15	0.00	−0.14, 0.14	−0.01	−0.15, 0.14	−0.10	−0.26, 0.07
46–60	−0.08	−0.22, 0.06	−0.06	−0.20, 0.09	−0.05	−0.19, 0.10	−0.18	−0.35, −0.01
61+	−0.10	−0.24, 0.04	−0.09	−0.24, 0.07	−0.07	−0.23, 0.08	−0.26	−0.45, −0.07
Household size	−0.00	−0.03, 0.03	−0.03	−0.06, 0.01	−0.02	−0.06, 0.01	−0.01	−0.05, 0.03
Behavioural								
Frequency of visiting a dentist >12 months	0.38***	0.30, 0.45	0.34***	0.26, 0.42	0.33***	0.25, 0.41	0.28***	0.19, 0.36
Brush two or more times per day	−0.31***	−0.39, −0.23	−0.24***	−0.32, −0.16	−0.23***	−0.31, −0.14	−0.21***	−0.30, −0.13
Psychosocial								
Perceived stress	0.15***	0.08, 0.22	–	–	0.07	−0.03, 0.17	0.09	−0.02, 0.19
Perceived constraints	0.12***	0.06, 0.17	–	–	0.04	−0.05, 0.12	−0.04	−0.13, 0.05
Social support	−0.10***	−0.16, −0.05	–	–	−0.03	−0.09, 0.04	−0.02	−0.09, 0.05
Perceived mastery	−0.07*	−0.14, −0.00	–	–	−0.02	−0.10, 0.07	0.00	−0.09, 0.09
Socioeconomic								
Income $\geq$ \$60,000	−0.25***	−0.33, −0.17	–	–	–	–	−0.15**	−0.25, −0.04
Tertiary degree	−0.26***	−0.34, −0.18	–	–	–	–	−0.16**	−0.25, −0.06
Social standing top 50%	−0.37***	−0.46, −0.29	–	–	–	–	−0.21***	−0.31, −0.11
Not employed	0.08*	0.01, 0.17	–	–	–	–	0.04	−0.07, 0.14

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

social support. In Model 3, however, after adding in the socioeconomic variables, none of the psychosocial variables remained significant. In addition, tooth brushing ceased to have a significant association with DMFT. The SES indicators were all statistically significant predictors of DMFT after controlling for the sociodemographic, behavioural and psychosocial variables.

DISCUSSION

This study found few and mostly non-significant associations between a number of psychosocial variables and oral health outcomes after controlling for behavioural and socioeconomic variables. In contrast, the behavioural variables (visiting a dentist and tooth-brushing) as well as the socioeconomic variables were

Table 5 Generalised linear regression models for number of decayed, missing and filled teeth (DMFT)

Variables	B	95% CI	Model 1		Model 2		Model 3	
			B	95% CI	B	95% CI	B	95% CI
Sociodemographic								
Female	−0.29	−0.82, 0.23	0.80***	0.53, 1.25	0.89***	0.53, 1.25	0.72***	0.34, 1.10
Age (Ref. 18–29), years								
30–45	6.14***	5.55, 6.74	6.28***	5.69, 6.87	6.26***	5.66, 6.85	5.50***	4.80, 6.21
46–60	16.49***	15.91, 17.08	16.56***	15.97, 17.16	16.46***	15.85, 17.06	15.58***	14.87, 16.30
61+	19.95***	19.35, 20.55	20.03***	19.40, 20.67	19.60***	19.30, 20.62	18.48***	17.67, 19.29
Household size	−2.18***	−2.37, −1.99	−0.06	−0.20, 0.09	−0.13	−0.16, 0.14	0.05	−0.11, 0.21
Behavioural								
Frequency of visiting a dentist >12 months	−1.79***	−2.31, −1.27	−0.99***	−1.33, −0.64	−0.99***	−1.33, −0.64	−1.33***	−1.69, −0.96
Brush two or more times per day	0.82**	0.29, 1.35	−0.39*	−0.75, −0.03	−0.39*	−0.75, −0.03	−0.33	−0.70, 0.05
Psychosocial								
Perceived stress	−2.45***	−2.92, −1.99	–	–	−0.28	−0.70, 0.15	−0.18	−0.63, 0.27
Perceived constraints	0.39*	0.10, 0.76	–	–	0.42	0.07, 0.77	0.24	−0.14, 0.62
Social support	−0.80***	−1.16, −0.43	–	–	−0.36**	−0.64, −0.09	−0.27	−0.56, 0.02
Perceived mastery	−0.40	−0.85, 0.06	–	–	0.18	−0.18, 0.54	0.19	−0.19, 0.57
Socioeconomic								
Income ≥ $60,000	−4.59***	−5.12, −4.06	–	–	–	–	−0.75**	−1.19, −0.32
Tertiary degree	−1.93***	−2.49, −1.37	–	–	–	–	−1.14***	−1.54, −0.75
Social standing top 50%	−0.73*	−1.30, −0.15	–	–	–	–	−0.16	−0.59, 0.27
Not employed	5.93***	5.41, 6.44	–	–	–	–	0.56*	0.11, 1.01

*P < 0.05; **P < 0.01; ***P < 0.001.

statistically significant predictors of self-rated oral health, untreated decayed teeth and DMFT in adjusted analyses.

The findings of this study are at odds with the results of Finlayson et al.[13] who found significant associations between a range of both psychosocial stressors (material hardships, chronic stress) and resources (self-esteem, mastery, church attendance) and the dependent variable of self-rated oral health after controlling for income, age, education and household size. However, this study differed from that of Finlayson and colleagues by using clinical measures of oral health and by controlling for behavioural variables. While the psychosocial variables in this study did have significant associations with both number of decayed teeth and DMFT, these associations were eliminated after controlling for toothbrushing and dental visiting. The implication is that there may still be considerable utility in taking into account the role played by individual behaviours in oral health outcomes, an argument also made by Brennan and colleagues[31]. Rather than dismissing the importance of dental health behaviours as 'victim-blaming reductionism'[1], a combined population and targeted approach may be more efficient in reducing the social gradient of health inequalities. This notion is consistent with the concept of proportionate universalism which aims to reduce the steepness of social gradients in health inequalities while making greater gains for the most vulnerable with the highest disease levels[32]. 'The Marmot Review' highlights that in order to move towards a more egalitarian distribution, health actions must be universal but with a scale and intensity that is proportionate to the level of disadvantage[32].

Although we did not find strong statistical associations between psychosocial measures and oral health outcomes, results from other studies point away from a proportionate universalism perspective. In particular, studies using indices of inequality show that inequalities in dental visiting are considerably worse than in other areas, and especially in a health-care environment where general health services are publically insured and oral health services are privately insured[33,34]. Such studies examine the inequality gradient itself and tend to support the proposition that actions must be universal, especially when the scale and intensity is very proportionate to the level of disadvantage, and that this must be tied to targeted programmes aimed at upstream interventions, such as income security and educational opportunity, that will influence oral health behaviours.

The associations between a number of socioeconomic variables and poorer self-rated and clinical oral health generally persisted after controlling for the behavioural, demographic and psychosocial variables. While socioeconomic inequalities in dental health have been well documented[35,36], it was hypothesised that these variables would not be statistically significant predictors of oral health after controlling for the psychosocial variables. This hypothesis was based on the argument that reduced psychosocial resources and increased stressors are contextualised by, and are consequences of, socioeconomic deprivation[13]. However, the finding that socioeconomic status was significantly

related to both self-rated oral health and clinically determined disease after controlling for toothbrushing frequency, visiting dentists and psychosocial factors underlines the pervasive nature of the socioeconomic inequalities in oral health.

It should be noted that while there are a number of potential psychosocial factors and several aspects of dental health behaviours that may have an influence on oral health, this study measured only a few of these variables. Given that social determinants research has only just recently commenced examining psychosocial factors that may be related to oral health, there is as yet no established list of those factors that are important and those that are less important. It is also possible that it is the combination of several particular psychosocial stressors, or the availability of a number of resources acting together, which influences health outcomes. For example, there is some evidence that social support may act as a buffer to alleviate the health effects of stress when optimism is low[19].

One of the strengths of this study is that it used a large, nationally representative sample, with characteristics closely matched to those indicated from national census data. The only other study of comparable size was carried out by Finlayson and colleagues[13]. Another strength is that it used clinically derived measures of oral health. National studies of dental health are relatively uncommon because of their expense and logistical difficulties, and few such studies incorporate questions relating to psychosocial characteristics. This study therefore presents a rare opportunity to examine the role of psychosocial factors, in addition to socioeconomic and behavioural factors, in clinically determined oral health. However, a limitation of this study is that it examined only a relatively small number of psychosocial variables. A greater number of variables might have revealed stronger associations or some level of effect modification among the variables.

Although this study did not find strong support for the role of psychosocial variables in oral health outcomes, research into psychosocial determinants is still relatively underdeveloped and has not yet explored the full array of potentially relevant factors. Nonetheless, behavioural and socioeconomic factors demonstrated strong associations with both self-rated oral health and clinical measures of disease. Social determinants research has been gaining in popularity because of the wider view of oral health determinants that it offers. Nevertheless, the results of this study indicated that it would be prudent to continue researching the complimentary role of socioeconomic factors and the more 'down-stream' behavioural factors, as these continue to provide explanatory power.

Conflicts of interest

None declared.

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