

Hopelessness, depression and oral health concerns reported by community dwelling older Australians

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Objectives: The purpose of this analysis was to explore whether, and if so to what extent, there is an association between self-reported oral and mental health problems, and if this association exists after controlling for self-rated physical health and age. **Research Design:** A large cross-sectional population-based telephone health survey with participants selected using random stratified sampling. The response rate was 71%. Survey weights were used for estimating proportions and for all statistical inferences. **Setting and Participants:** Participants (n=8,881) were community-dwelling older people (65+ years) living independently in New South Wales, Australia. **Measures and Analysis:** The following measures were used in the analysis: physical health (1 item); oral health (5 items), mental health (2 items). Trends in prevalences across groups were analysed using the Cochran-Armitage trend test. Logistic regression modelling was conducted to account for the main confounders of age and self-rated physical health, and attributable fractions calculated. **Results:** Both measures of mental health, feeling hopeless and feeling depressed, were significantly and positively associated with increased reporting of oral health concerns in both males and females. Logistic regression modelling showed that most of the oral health items remained strongly associated with mental health after controlling for self-rated physical health and age. The attributable fractions demonstrated that a proportion of the mental health problems identified in older people would be reduced if oral health concerns were adequately addressed. **Conclusions:** The findings highlight the association between oral and mental health, and provide evidence to support the expansion of publicly funded dental health services.

Key words: Australia, mental health, older adults, oral health.

Introduction

While there are well-established links between general physical health and mental health, and increasingly between physical health and oral health (eg, Chalmers 2003), little research has been conducted to examine if a link exists between oral health and mental health, and if this link remains after controlling for physical health.

There is a small amount of research on the association between oral diseases and mental health with particular emphasis on the personality trait of negative affectivity (eg Kressin *et al.* 2001), or depression increasing the likelihood of not caring appropriately with oral hygiene and dental treatment, thereby increasing the likelihood of caries, periodontal disease and tooth loss (Friedlander *et al.* 2003; Kressin 2002; Weyant *et al.* 2004). Furthermore, in older people, late-life depression commences after 65 years and has been described by Friedlander *et al.* (2003) as 'a mental illness in which mood, thought content, and behavioural patterns are impaired causing individual distress, compromising social function and impairing self-maintenance skills...'. These studies hypothesise the causal direction as mental health problems causing inadequate attention to oral health care resulting in oral health problems.

However, some research has investigated how oral diseases or problems can impact adversely on a person's self-esteem and quality of life (eg Locker *et al.* 2000). Nitschke and Muller (2004) note that both oral function

and aesthetics are important to older people, and that 'Dental treatment could further improve oral appearance of the elderly individual, which might improve self-esteem and thus contribute to their psychological well-being. Even social aspects like communication and social interactions could be heavily influenced by dental care.'

In the health and gerontological literature, research has repeatedly demonstrated that social interaction is critical for maintaining a positive attitude and quality of life (eg Kahn & Antonucci 1980). Oral health questions used to tap into quality of life have included experience of toothache, problems with mouth and dentures (Nitschke and Muller 2004) and the adverse impact of concern with appearance of teeth, mouth and dentures, and inability to eat certain foods limiting social interaction (eg Quine *et al.* 2004). While most of these studies are small scale and non-random, limiting generalisability, they do provide support for hypothesising that oral health concerns (about the appearance of teeth, mouth or dentures, and problems with teeth, mouth or dentures making it difficult to eat certain foods) may limit social interaction and thereby contribute towards mental health problems (feelings of hopelessness and depression). The study reported here sought to investigate the association in this causal direction on a large-scale population basis.

Methods

Data

The Older People's Health Survey (OPHS) was a Computer Assisted Telephone Interview survey of non-institutionalised and cognitively intact community dwelling older people. Conduct of the survey was approved by the Ethics Committee of the NSW Health Department which conducted the study from late 1999 through 2000. The sample comprised approximately 500 respondents aged 65+ years randomly selected from each of the 17 Area Health Services in NSW, to produce a total sample exceeding 8,500. The survey response rate was 70.7%, and the final sample size was 8,881. As a consequence of the stratified sampling frame, survey weights were calculated by NSW Health to make the sample representative of the 65+ year population across NSW overall (NSW Health, 2001). These weights were used here for calculating proportions and for inferential statistical analyses, although the raw survey numbers are reported for the sample categories analysed.

As the OPHS was both a health and well-being survey the data items collected on each respondent were broad ranging, including: socio-demographic information, self-rated oral health, physical health, psychological health, lifestyle and activity levels.

There were five questions on oral health which had been used in previous Australian oral health surveys. The first question established whether respondents had all, some or none of their natural teeth missing. This was followed by four questions on the frequency of experiencing oral health problems or concerns in the last 12 months. These were: toothache; problem with mouth or dentures; concern about the appearance of teeth, mouth, dentures; avoidance of eating some foods because of problems with teeth, mouth or dentures. In Australian oral health surveys, responses to these questions have been reported descriptively as prevalences for each individual question and analysed by socio-demographic characteristics (eg Australian Institute of Health and Welfare 2007). However, these surveys did not collect data on mental health concerns, whereas the more broad ranging topics covered by the OPHS survey provided the opportunity to analyse responses to these oral health questions by self-reported mental health, whilst controlling for self-rated physical health and age. For the measure of general health status the survey asked the widely used global self-rated health question: 'In general, would you say your health is excellent, very good, good, fair or poor?'

Responses to two questions were used to tap into psychological morbidity and emotional well-being (in this paper referred to as mental health), one on hopelessness and one on depression. The question on hopelessness was from the Kessler 6 scale of psychological morbidity (Kessler *et al.* 2002), 'In the last four weeks, about how often have you felt hopeless?' This individual item has been used with other populations and found to have predictive power for sequelae known to be associated with hopelessness (eg Strine *et al.* 2005). Also included was a question on depression which has been used in several health surveys: 'In the last four weeks about how often have you felt depressed?' Each question had a range of frequency of occurrence during the

four week period, from 'all of the time' to 'none of the time'. We have used the individual item on depression in previous analyses of data from the OPHS survey and found it to be strongly associated with other outcomes, for instance fear of nursing home admission (Quine and Morrell 2007).

We examined hopelessness as well as depression for a number of reasons. Hopelessness has been hypothesised as a subtype of depression (Abramson *et al.* 1989), and recently hopelessness has been reported as a defining feature of double depression in an older population (Joiner 2007). Hopelessness is also viewed as a key component of mood disorder associated with lack of control over one's destiny and giving up (Joiner *et al.* 2006) which may be relevant to maintenance of personal hygiene including oral care.

Analysis

Prevalences of the four self-reported oral health problems by frequency of occurrence over the previous 12 months were examined with regard to prevalences of reporting feeling hopeless and of feeling depressed 'most' or 'all the time' during the previous four weeks. Cochran-Armitage trend tests were conducted to test for the significance of prevalence trends of feeling hopeless or of feeling depressed 'most' or 'all the time' against five categories of reported frequency of each of the four oral health problem occurring in the last 12 months: 'never', 'hardly ever', 'sometimes', 'often' and 'very often'. 95% confidence intervals were calculated by the exact binomial and are displayed on the graphs of plotted prevalences (Figures 1-4).

Logistic regression modelling of reporting feeling hopeless and of reporting feeling depressed was conducted to account for the main confounders of oral and mental health: physical health and age. This was to test the extent that any links found between oral and mental health were not simply proxies for links between general physical health and mental health. Oral ill-health was dichotomised into occurring 'often' or 'very often' versus not. Finally, if the statistically significant adjusted odds ratios are regarded as estimators of relative risk and are combined with corresponding prevalences of oral health problems in those with hopelessness or depression, then attributable fractions (AFs) can be estimated. AFs indicate the extent that hopelessness and depression in older people would be reduced if exposure to each oral health problem were eliminated (Kleinbaum *et al.* 1982).

Results

Of the 8,881 respondents, 3,836 (43.2%) were male and 5,045 (56.8%) female. Age distribution and other characteristics of the sample have been reported in detail elsewhere (NSW Health 2000).

Of the dentate respondents (71.3%), less than 1 in 10 reported experiencing toothache in the last 12 months, slightly higher in males (9.4%) than females (8.6%). Appearance of teeth, mouth or dentures was reported by one in five respondents (21.1%) as being a concern sometimes, often or very often over the past 12 months, and was higher in females (21.9%) than males (17.8%). A slightly smaller proportion (17.6%) reported experienc-

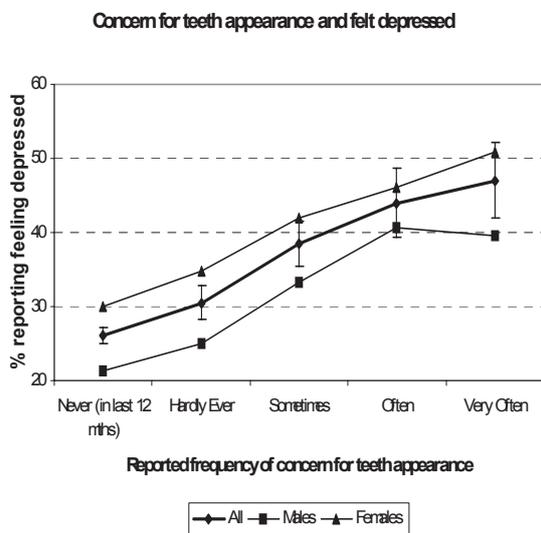
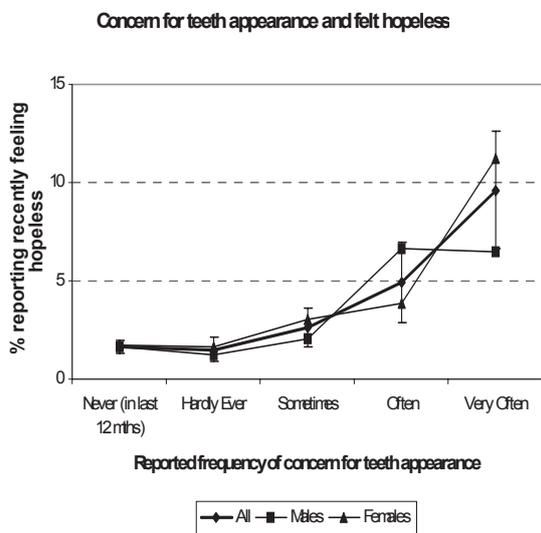


Figure 1. Proportions (%) feeling hopeless or depressed in last 4 weeks and concern with appearance of teeth, mouth or dentures over past 12 months, 65+ yr males and females, with 95% confidence intervals for 'All'

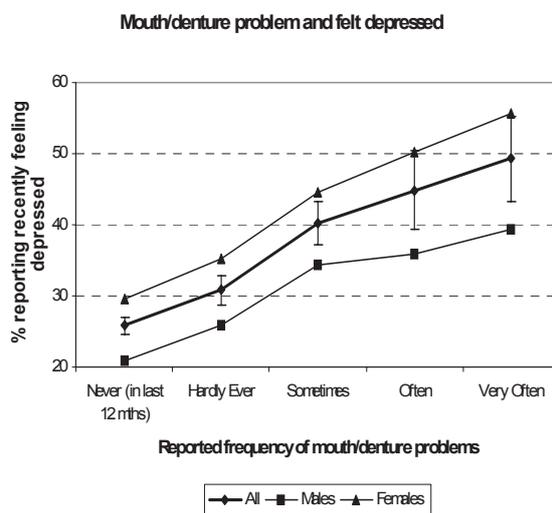
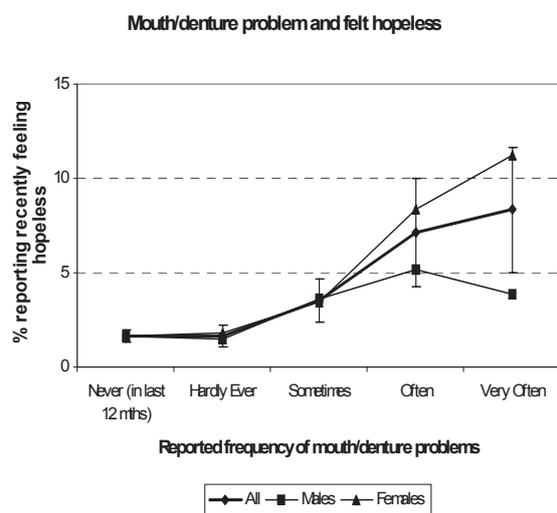


Figure 2. Proportions (%) feeling hopeless or depressed in last 4 weeks and problems with teeth, mouth or dentures over past 12 months, males and females aged 65+ years, with 95% confidence intervals for 'All'

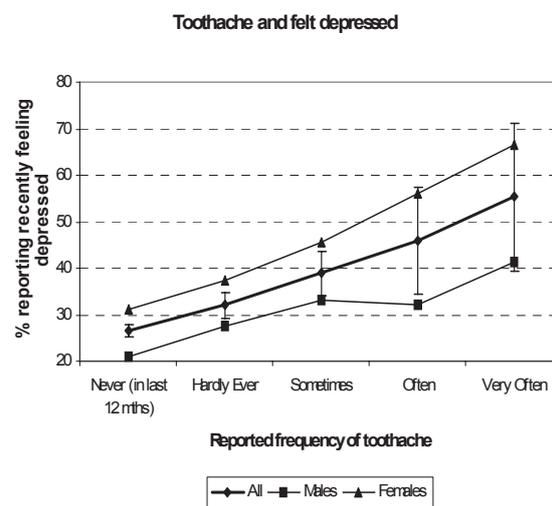
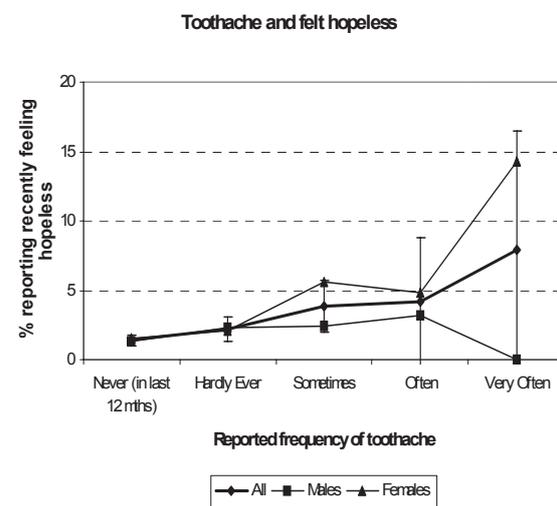


Figure 3. Proportions (%) feeling hopeless or depressed in last 4 weeks and tooth ache over last 12 months, males and females aged 65+ years, with 95% confidence intervals for 'All'

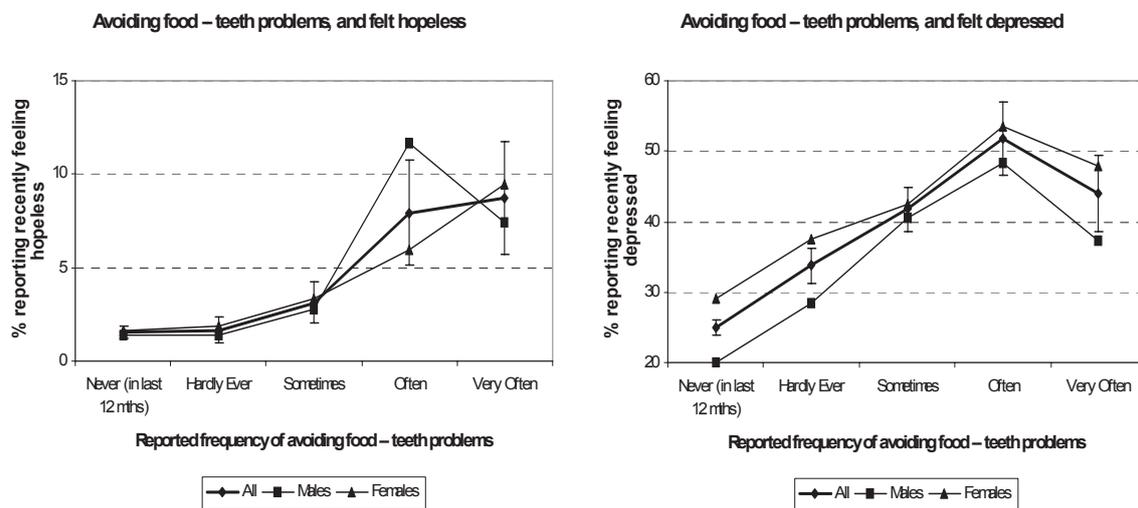


Figure 4. Proportions (%) feeling hopeless or depressed in last 4 weeks and problems with teeth, mouth or dentures causing difficulty eating over past 12 months, males and females aged 65+ years, with 95% confidence intervals for 'All'

ing problems with mouth or dentures sometimes, often or very often, but gender differences were not marked (18.1% for females, 17.0% for males). Just under one in five respondents (18.7%) reported avoiding certain foods sometimes, often or very often, because of problems with teeth, mouth or dentures over the past 12 months, which was higher among females (21.1% versus 15.5%).

Of those respondents who reported an oral health problem, around two-thirds (66% males and 61% females) reported only one problem, less than a quarter (22% males and 24% females) reported two problems, one in eight (10% males and 13% females) reported three problems and less than two percent reported all four problems (1% males and <2% females). This distribution indicates that it was not the same respondents who complained about everything.

Overall, there were substantially higher rates of reporting feeling depressed all or most of the time in the last four weeks (23.6% of male and 34.4% of female respondents) than feeling hopeless (1.7% of males and 2.6% of females). However, in both male and female respondents, the higher the reported frequency of occurrence of concern about appearance of teeth, mouth, dentures over the last 12 months, the higher the proportion reporting feeling hopeless and of feeling depressed in the last four weeks (Figure 1). The trend in both these associations was highly significant for both males and females ($p < 0.0001$). In respondents reporting that they were often or very often concerned with the appearance of their teeth, mouth, dentures, over 50% of females and 40% of males reported feeling depressed in the last four weeks, compared to only 30% of females and 20% of males who reported no such appearance concerns.

Feeling hopeless and feeling depressed were also strongly associated with reported frequency of mouth or denture problems over the last 12 months (Figure 2), although in males the association was not as strong for hopelessness ($p = 0.0012$) as in females or overall, or as with feeling depressed in the last four weeks ($p < 0.0001$, males and females). Reported frequency of toothache

was more strongly associated with feeling depressed ($p < 0.0001$, for both males and females) than feeling hopeless (Figure 3), with hopelessness in males only weakly associated with toothache ($p = 0.10$) compared to strongly associated in females ($p < 0.0001$). Reported frequency of avoiding foods because of having teeth, mouth or denture problems over the last 12 months was also strongly associated with higher proportions reporting feeling hopeless ($p < 0.0001$) and with feeling depressed ($p < 0.0001$) in the last four weeks, in both males and females (Figure 4).

Logistic regression modelling of feeling hopeless and feeling depressed against the four oral health items separately, after adjusting for self-rated physical health and age, showed that most of the oral health items remained strongly associated with hopelessness and with depression (Table 1). The exceptions were toothache which was no longer significantly associated with hopelessness in females, and mouth or denture problem which was no longer significantly associated with hopelessness in males.

Using the adjusted odds ratios in conjunction with the surveyed prevalences of oral ill-health within those reporting feeling hopeless or depressed, the resulting attributable fractions (AF) indicate 20%-21% of males and 19%-22% of females reporting feeling hopelessness would no longer feel hopeless if their oral health problems were adequately addressed. AFs for depression against these three oral health problems were all lower, of the order of 2%-6%, but these are against a background of relatively higher reporting rates of feeling depressed very often or all the time in the last four weeks versus lower prevalences of oral health problems.

Discussion

The present study shows that self-reported oral health is associated with feeling hopeless and feeling depressed in older people, after controlling for self-rated physical health and age. The associations found were not all

Table 1. Odds ratios, unadjusted and adjusted for age and self-rated health with attributable fractions, for hopelessness and depression by oral health problems, OPHS, 1999-2000

Oral health item	Hopelessness				Depression			
	OR unadjusted		OR, adjusted for age & self-rated health (Attributable Fraction %)		OR unadjusted		OR, adjusted for age & self-rated health (Attributable Fraction %)	
	Males	Females	Males	Females	Males	Females	Males	Females
Concern for appearance of teeth, mouth or dentures	4.24***	4.33***	2.82*** (19.6)	3.32*** (21.7)	2.22***	1.95***	1.95*** (6.0)	1.70*** (6.3)
Mouth/denture problem	2.51**	5.72***	1.42 ^(ns)	4.01*** (18.1)	1.94***	2.27***	1.53** (2.9)	1.91*** (4.9)
Toothache	1.06 ^(ns)	3.67**	0.65 ^(ns)	2.55 ^(ns)	1.75 ^(ns)	2.92***	1.44 ^(ns)	2.54*** (1.7)
Teeth/mouth/denture problems causing difficulty eating	7.00***	4.30***	3.98*** (21.0)	2.90*** (18.7)	2.50***	2.14***	1.93*** (4.6)	1.78*** (5.9)

*** significant at $p < 0.001$

** significant at $p < 0.01$

* significant at $p \# 0.05$

^(ns) not significant ($p > 0.05$)

uniform, particularly with males who showed a weaker association between hopelessness and mouth and denture problems and with toothache than females. However, the association with depression was strong, against higher background rates of reporting feeling depressed. A similar pattern of association with hopelessness emerged, although this association was generally stronger than for depression, albeit against lower background rates of reporting feeling hopeless.

A methodological weakness of the present study is its cross-sectional design that limits inferences about the causal direction in the associations found. Nevertheless, the attributable fraction analysis indicates that a proportion of reported mental health problems in older people would be reduced if their oral health concerns were adequately addressed. It should also be borne in mind that the questions on oral health and mental health referred to different recall periods, the past 12 months in the case of oral health problems, but the last four weeks for feeling hopeless or depressed which reflects the shorter duration of negative mood states in non-clinical mental health cases.

The intensity of oral health concerns reported as occurring often or very often over the last 12 months indicates that these problems were persistent, and for some respondents are likely to have existed for longer than the 12 month period specified, suggesting that the oral health problems preceded the mental health problems reported. Support for the hypothesis that oral health problems contribute to mental health problems, rather than vice-versa, is found in the characteristics of the population surveyed. In this study respondents were not institutionalised or cognitively impaired, but living independently in the community and cognitively intact. It is therefore unlikely that the oral health problems reported were attributable to simply stopping routine oral care once the respondents felt hopeless or depressed. Clearly more specific information than that collected in

this general survey, including the time of onset of the oral and mental health problems reported, is required to investigate further the issue of causal direction.

The strengths of the present study are that the findings are based on data from a large scale population based survey which used a rigorous sampling and weighting system, and the associations identified are strong. Another advantage is that this survey included both females and males, whereas many published studies are based on males only, and some specifically on male veterans. It also presents findings on older independently-living community dwellers, rather than patients or residents in institutional care (eg Locker *et al.* 2002).

The findings presented add to a rather limited literature published on the association between mental and oral health and are particularly important because the analyses established that the associations remained for both males and females after controlling for self-rated physical health and age. They also highlight how older people's subjective assessment of both the aesthetics of the appearance of their teeth, mouth or dentures, as well as the functional aspects of the ability to eat food without discomfort, may contribute to their mental health. While only a minority of older people reported experiencing one or more of these oral health problems at the intensity of 'very often' or 'often', this experience extended over a lengthy period (12 months in this study) suggesting one or more pervasive and ongoing problem.

Currently in Australia, while there is a Commonwealth-funded health service, there is only very limited Commonwealth-funded dental service for older people. Free dental health care is only provided for primary school children and Veteran card holders, and those on low incomes willing to wait (often up to several years) to receive public services. Consequently, if older Australians wish to obtain dental health services they must pay either indirectly through their private health insurance or directly through payment per visit. The magnitude of the problem

will increase as the baby boomer generation moves into this older age group (65+) in less than four years. The association identified in this paper, on a population basis, between oral health problems and mental health provides further support for the need to address oral health concerns by increasing the availability of Commonwealth-funded dental services to maintain the health and wellbeing of older people (Chiva and Stears 2001).

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