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Self-reported and clinically determined oral health status predictors for quality of life in dentate older migrant adults

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Abstract – *Objective:* This paper reports the impact of oral health on the quality of life (QOL) of Southern European, dentate older adults, living independently in Melbourne, Australia. Participants were recruited through ethnic social clubs and interviewed about oral health, general health, socio-demographics, and QOL using the Medical Outcomes Study Short-Form 12 (SF-12). The SF-12's physical and mental health component summary scores (PCS and MCS, respectively) were computed. The Oral Health Impact Profile (OHIP-14) assessed the specific impact of oral health on QOL. Participants were also given a clinical oral examination. *Results:* A total of 603 eligible older adults volunteered; 308 were from Greek background and 295 were from Italian background. Mean age was 67.7 years (SD 6.2), with 63.7% being female. The PCS score had a mean value of 45.8 (SD 11.8), and MCS had a mean of 47.8 (SD 5.7). PCS was associated with, periodontal status, chronic health condition, self-perceived oral health needs, self-assessed oral health status, oral health impact score and the interaction between gender and level of education [$F(11\ 552) = 10.57$; $P < 0.0001$]. These independent variables accounted for 16% of the variance in PCS. The multivariate model predicting MCS had only one significant variable (self-reported gingival bleeding), explaining 1.5% of the variance. The OHIP-14 ranged from 0 to 48 with a mean score of 5.6 (SD 9.3). The model predicting OHIP-14 contained four significant variables: perceived oral health treatment needs, number of missing natural teeth, reports of having to sip liquid to help swallow food, and gender [$F(4576) = 33.39$; $P < 0.0001$], and explained 18% of the variance. The results demonstrated a negative association between oral health indicators and both the oral health-related QOL and the physical component of the SF-12. *Conclusion:* The present findings support a growing recognition of the importance of oral health as a mediator of QOL. However, the self-selected sample and modest predictive power of the multivariate models suggest that further research is needed to expand this explanatory model.

Key words: Australia; migrant populations; older adults; oral health; impact profile; quality of life

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Studies exploring the relationship between oral health and quality of life (OHRQOL) indicate that oral problems have a negative impact on emotional well-being and quality of life (QOL) (1–4). Experiences of oral pain and problems with eating, chewing, smiling, and communication because of mouth or teeth problems tend to substantially affect well-being (5). This finding has also been demonstrated in a few community-based studies of the elderly (2, 6, 7). However, little research has been undertaken on this relationship among older migrant populations in Australia or elsewhere. The

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need for such assessment among older populations who are potentially at higher risk has been noted (8). In addition, oral health care researchers and policy-makers have recognized that the assessment of oral health outcomes in terms of QOL is crucial to planning oral health care program and resources allocation (9, 10).

Considerable work has been undertaken on measuring self-reported oral health and on the development of specific OHRQOL measures (10, 11). Among them, the Oral Health Impact Profile (OHIP), developed in South Australia, offers a reliable and valid instrument for the measurement of the social impact of oral disorders (6). There has been wide use of OHIP questionnaires to assess oral health, ranging from international comparative population surveys through to clinical trials (12). The OHIP-14 has been used effectively to measure adverse impacts of oral health on well-being in three national population surveys (Australia, United Kingdom, and Finland) (13–15). Findings indicated that diminished OHRQOL is related to tooth loss, untreated dental caries, extensive periodontal disease, and limited access to oral health services (7).

Other researchers have used the OHIP to compare subjective oral health status and general health status, with results suggesting that oral health is perceived as a distinct dimension within general health. For example, in a study of adolescents in New Jersey, Broder et al. (16) found only weak to moderate correlations between OHIP scores and the SF-36, a widely used measure of subjective health status (17). Importantly, the SF-36 was not associated with clinical oral status, whereas the OHIP was. These findings suggest a need to examine more specifically the relationship between oral health indicators, and both OHRQOL and general QOL.

Several oral health, health behavior and demographic factors have been associated with OHRQOL. These include dental visits, tooth retention, clinical conditions, socio-economic status, age, gender, cultural factors, dental anxiety, and smoking (18). However, we know less about how oral health factors are relevant to QOL among older adults (18). In particular, the impact oral health for older migrant adults has not been examined. Despite this, there are indications that social and cultural factors exert independent influences on an individual's reaction to oral diseases and its social impact (4, 7).

To increase our understanding of oral health factors associated with high or low QOL in older migrant adult populations, this paper sought to examine the relationship between oral factors and QOL among older Greek and Italian migrants living independently in Melbourne, Australia. The specific study aims were to describe both the QOL and adverse impact of oral conditions in this older migrant sample. The study also sought to examine oral health, self-assessed oral health and demographic predictors of the impact of oral health conditions on both OHRQOL and general QOL.

Materials and methods

Sample

The study received ethics approval from the University of New England (Armidale, NSW) and Dental Health Services Victoria (DHSV) Ethics Committees. This study includes a convenience sample of men and women who satisfied the following criteria: (a) dentate; (b) aged 55 years or older; (c) from Greek and Italian backgrounds; and (d) who were members of senior citizens' ethnic social clubs in Melbourne, Australia. Lists of Greek ($n = 59$) and Italian ($n = 90$) senior clubs were obtained through the Greek and Italian welfare associations in Victoria.

Procedure

Trained bicultural and fully bilingual Greek/Italian–English research assistants contacted each club coordinator and arranged a meeting to discuss the project. Once individual written consent was obtained, volunteers were asked to participate in a structured interview, and to undergo a clinical examination. Participants were not paid for their participation in this study. Data collection extended from October 2000 to mid-June 2001.

The interview schedule contained 107 questions covering a variety of topics including the following: socio-demographic and immigration characteristics; use of oral health care services; perception of oral health status and oral health needs; and oral hygiene habits. The interview also included questions about attitudes to oral health, and knowledge of causes and risk factors for dental caries, periodontal disease, and oral cancer. Questions were developed in English and translated into the target languages (Greek and Italian) following Brislin's methodology (19).

Dental examinations were conducted at the clubs' facilities using overhead light, dental

mirrors, and Community Periodontal Index probes (20). Clinical dental data were recorded following the National Institute for Dental Research criteria and recommendations (21). Periodontal status was assessed following the World Health Organization (WHO) criteria and recommendations (20). The Community Periodontal Index is an index developed by the WHO to establish the needs of a community for periodontal treatment (20).

Radiographic examinations were not performed and teeth were not dried before scoring.

A team of three examiners received training and calibration in making clinical measurements. Intra- and inter-examiner reliability was checked using Cohen's Kappa statistics. Inter-examiner reproducibility achieved in the duplicate examinations of 20–23 individuals were higher than 0.83 for dental examinations, which indicates substantial to almost perfect agreement (22). Intra-examiner reliability was assessed by the repetition of exams in 20–23 individuals by each examiner; Kappa statistics were higher than 0.90, which indicates an almost perfect level of agreement on diagnosis of dental caries, according to Landis and Koch's criteria (23).

Measures

Self-assessments of oral health were recorded. Participants were asked to classify themselves on a 5-point ordinal scale ranging from 'Much better' to 'Much worse', according to the response that best described their oral health status compared with people of their age. However, because of a lack of responses in the extreme categories, responses were collapsed into two categories 'Better' and 'Worse'.

Additionally, participants were asked seven questions regarding self-perception of oral health problems and conditions. These included gingival bleeding, dental caries, toothache, loose teeth; and three items of dry-mouth symptoms (Do you think that your mouth is generally dry?; Do you sip liquid to aid in swallowing dry food?; Do you have difficulties swallowing any foods because of dry mouth?) (24). Responses were coded as 'Yes' and 'No'.

Another suite of questions assessed the perceived need for oral health care. Participants were asked to indicate, from a list of seven alternatives, the type of dental treatment they thought they may need. Treatments included tooth extraction, relief of dental pain, dental crowns or fillings, dentures, soft-tissue consultation, gum treatment, and other treatments. An oral health treatment needs score was created by summing positive responses.

Clinical data used in this analysis included decayed surfaces, filled surfaces, number of teeth present, and periodontal status.

QOL was investigated using the Medical Outcomes Study Short-Form 12 (SF-12), which covers many aspects of health and has been validated for adults of all ages (25, 26). Physical and mental health component summary scores (PCS and MCS, respectively) were calculated for each participant (27). The scores are standardized to range between 0 (low score) and 100 (high score). In both cases, higher scores indicate better mental and physical health.

Oral health impact was measured using the OHIP-14 (28). The OHIP-14 is a shortened version of a scale which assesses seven dimensions of impact of oral conditions on people's QOL. This includes functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap (28). Respondents answered on a five-point ordinal scale ranging from 'Never' to 'Very often'. In the OHIP-14, summed scores ranged from 0 to 56; a lower score indicated a lower oral health impact.

The health status variables included the self-assessment of general health. To keep results comparable with other studies, participants were asked to classify themselves using a one-item measure from the SF-12 on general health: 'In general, would you say your health is…?'. This question is widely used as a stand-alone generic measure of health status and QOL. Respondents answered on a five-point ordinal scale ranging from 'Excellent' to 'Poor'. A checklist of nine medical conditions (diabetes, epilepsy, stroke, lung diseases, psychiatric treatments, kidney problems, arthritis, heart conditions, and liver diseases) was used to compute a medical history score by summing the positive answers to these conditions.

In addition to age and gender, information on living arrangements and level of education was collected. Living arrangement was classified into four groups: 'Living alone'; 'Living with spouse'; 'Living with spouse and daughter/son'; and 'Other living arrangements' which included those living with daughter/son only and those living under other arrangements. Participants were classified according to their educational level using three categories: 'No formal education or incomplete primary education'; 'Complete primary education or

incomplete secondary education'; and 'Complete secondary or postsecondary education'.

Data analysis

Data were analyzed to statistically compare results between QOL scores and various socio-demographic, self-assessed, and clinical variables. For nominal or ordinal variables, chi-square analyses were used. For variables on an interval scale, results were analyzed using one-way analysis of variance (ANOVA). A significant ANOVA was followed by *post hoc* comparisons using Tukey's Honestly Significant Differences tests. Pearson's correlations were performed for univariate associations between continuous variables and QOL scores.

Finally, data were analyzed using a general linear model (GLM). Model selection involved a backward procedure to identify the variables that accounted for a significant proportion of the variance in participants' QOL scores. Variables considered for the model were chosen based on the results of bivariate analyses. All two-way interactions between the factors were considered. However, only variables and interactions which significantly improved the model in the presence of the other variables were kept in the final model. Data were analyzed using SPSS V 14.0. There was no violation of the assumptions underlying general linear models, assessed by examining the residuals of the final models (29).

Results

A total of 603 dentate older adults volunteered to participate in the study and satisfied the inclusion criteria; 308 were from Greek backgrounds and 295 from Italian backgrounds, with 63.7% being female. The mean age was 67.7 years (SD 6.2). The largest proportion had no formal education or incomplete primary education (45.6%), with 40.6% having completed primary education. The remaining 13.8% had higher levels of education. The majority of the participants lived with their spouse (59%); another 13.3% lived alone; 18.7% lived with their children; and 9% were in other living arrangements.

More than one-third (42.2%) of the participants self-assessed their oral health as 'Much better' or 'Better' than people of the same age, 42% reported being 'About the same', and 15.8% self-assessed as being 'Worse' or 'Much worse'. Almost half of participants (46.7%) reported that they had decayed teeth and 33.3% bleeding gums. In addition, 28.7% indicated suffering from dental pain; and 18.9% indicated that they had loose teeth. One-third (33.7%) reported that they had no need for dental treatment; 30.8% reported need for one dental treatment; and 19.4% reported need for two dental treatments, with the remaining 16.1% reporting need for between three and five dental treatments. The most frequent treatments nominated by participants were fillings (40.1%), and dentures (34.7%), and 72.9% of participants indicated the need for a dental check-up.

About one-third (32.2%) of all participants thought that their mouth was generally dry; 21% indicated that they needed to sip liquid to aid in swallowing dry food; and 25.2% indicated having difficulties swallowing any food. Seventy participants (11.6%) reported one dry mouth condition; 5.7% reported two; and 18.2% reported three dry mouth conditions. The remaining 64.5% of participants reported having no symptoms of dry mouth.

When asked about their general health, 18% considered it to be 'Excellent' or 'Very good'; 44.1% assessed their general health as 'Good'; and 33.9% as 'Fair'. Only 4.0% assessed his/her health as 'Poor'. Forty-one percent of participants ($n = 248$) reported no medical conditions; 35.3% reported one condition; and 16.3% reported two medical conditions. The remaining 7.4% reported between three and five conditions. Medical conditions most commonly reported were arthritis (51.4%), heart condition (43.0%), diabetes (19.1%), and lung disease (8.4%).

Clinical findings indicated that the mean number of missing teeth was 9.3 (SD 6.5), ranging from 0 to 26. About half (47.1%) of participants had 21 teeth or more, including 3.6% with full natural dentition. On the contrary, 14.6% of participants had 10 teeth or fewer. The mean number of coronal decayed surfaces and filled surfaces was 0.8 (SD 1.5) and 10.5 (SD 10.3), respectively. Eighty-three participants (14.3%) were assessed as having no need for periodontal treatment. Bleeding after probing occurred in 42 participants (7.2%). Approximately 50% had supra- or subgingival calculus, and 20.8% had gingival pockets between 3 and 5 mm. Only a small percentage (7.6%; $n = 44$) of participants had pockets greater than 5 mm as the highest score. Fewer than 4% of the dentate participants were excluded because they had fewer than 2 teeth on each of the 6 mouth sextants in which the natural dentition was divided for this assessment.

The impact of oral disease (OHIP-14)

Among respondents, 45.5% reported experiencing some negative impact of their oral health on QOL occasionally or more often in the last 4 weeks for at least one aspect measured by the OHIP-14. Stratifying by each of the seven dimensions of the OHIP index, over a third of the participants (35%) reported being affected by oral pain. Just over a quarter felt that their diet had been poor or that they had had to interrupt meals because of their oral condition (25.5%). A similar proportion reported that their oral condition had made them feel self-conscious or tense (22.7%). About a fifth (20.5%) said that they had had some trouble pronouncing words, or that their sense of taste had changed; another 21.6% found that their oral condition made it difficult to relax or they felt embarrassed; and 20% reported that their oral condition made them irritable or created difficulties in doing their usual jobs. Only a few (14.5%) reported being affected functionally by their oral condition.

The OHIP ranged from 0 to 48 with a mean score of 5.6 (SD 9.3). As shown in Table 1, self-assessed

Table 1. Distribution of Physical Health QOL (PCS) and Oral Health Impact (OHIP-14) mean (SD) scores by select sociodemographic, self-assessed, and clinical variables

	n	OHIP-14	PCS 12
Self-assessed oral health status		***	*
Much better or better	252	3.89 (7.44)	46.29 (21.02)
About the same	251	6.07 (10.24)	46.42 (11.35)
Worse or much worse	94	8.78 (10.38)	42.91 (12.43)
Dry mouth symptoms		***	*
No symptoms	389	4.25 (8.24)	46.84 (11.61)
1 symptom	70	4.02 (6.49)	44.72 (11.47)
2 symptoms	34	10.18 (11.88)	43.86 (11.70)
3 or more symptoms	110	10.14 (11.63)	43.64 (12.44)
Self-reported dental treatment needs		***	***
No need for dental treatment	203	2.57 (5.67)	47.72 (10.74)
1 dental treatment	186	4.86 (8.70)	47.08 (11.51)
2 dental treatments	117	6.81 (10.12)	44.24 (12.90)
3 dental treatments	53	8.28 (10.30)	45.22 (11.90)
4 dental treatments	27	16.25 (11.91)	36.50 (9.24)
5 or more dental treatments	17	19.67 (13.12)	37.65 (12.37)
I have teeth, mouth, or swallowing problems which make it hard for me to eat		***	***
True	98	11.61 (12.27)	42.20 (11.53)
False	500	4.49 (8.20)	46.12 (11.94)
Self-assessed general health status		***	[a]
Much better or better	110	3.86 (9.01)	
About the same	262	4.79 (8.38)	
Worse or much worse	225	7.63 (10.31)	
Self-reported chronic health conditions		*	***
No chronic conditions	248	5.45 (9.26)	47.69 (11.18)
1 chronic condition	213	4.92 (8.51)	45.76 (11.87)
2 chronic conditions	98	6.17 (9.69)	43.81 (12.54)
3 or more chronic conditions	44	8.93 (12.21)	40.27 (12.64)
Gender		**	*
Male	218	4.18 (8.21)	47.39 (11.28)
Female	382	6.12 (9.52)	44.92 (12.05)
Level of education			*
No formal education or incomplete primary	274	5.27 (8.73)	44.38 (12.04)
Some secondary or complete and primary	244	5.66 (9.21)	46.73 (11.76)
Secondary complete and tertiary	83	6.63 (11.40)	47.99 (10.73)
Periodontal status			*
Sound gums	83	5.84 (9.84)	42.87 (12.94)
Bleeding gums	42	6.68 (11.08)	46.64 (11.93)
Calculus	291	5.12 (8.62)	45.76 (11.99)
Shallow pockets	121	5.57 (9.12)	46.36 (11.09)
Deep pockets	44	8.16 (11.95)	49.12 (9.89)

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

[a]self-assessed general health is part of the PCS score.

oral health status was significantly negatively related to the OHIP score. Those who assessed their oral health as 'Worse' than most had significantly higher OHIP scores than those who assessed themselves as 'Better' or 'About the same' ($P < 0.001$). Higher OHIP scores were significantly associated with number of symptoms of dry mouth ($P < 0.001$) and greater oral health needs ($P < 0.001$). In the same way, those who assessed their general health as 'Worse' than most had significantly higher OHIP scores than those who assessed themselves as 'Better' or 'About the same' ($P < 0.001$).

Among the clinical variables, those who had more missing teeth had higher OHIP scores, and a higher mean number of decayed tooth surfaces than those with lower scores ($P < 0.001$ and $P < 0.01$, respectively). Higher unmet dental needs were associated with higher OHIP scores ($P < 0.02$). Gender was the only demographic variable significantly associated with OHIP score, with males (4.2) reporting lower oral health impact than females (6.1) ($P < 0.01$).

Oral health and QOL

The PCS score had a mean value of 45.8 (SD 11.8) and ranged from 18.1 to 62.6. Variations in PCS scores according to selected oral health, clinical, and demographic variables are presented in Table 1. Those who assessed their oral health as 'Better' had significantly higher PCS scores (better QOL) than those with 'Worse' self-assessed oral health or 'About the same' ($P < 0.05$). Those who indicated symptoms of dry mouth had lower PCS scores than those who did not ($P < 0.01$), and those who reported more chronic conditions had lower PCS scores ($P < 0.001$). With respect to their clinical conditions, PCS score was positively associated with the number of teeth ($P < 0.001$). Periodontal health was also associated with the PCS score. Interestingly, those with no periodontal treatment needs were associated with significantly lower PCS scores ($P < 0.05$). Two socio-demographic variables (gender and level of education) were significantly associated with PCS: higher physical health-related QOL was reported by more males than females ($P < 0.01$) and by those with higher (compared with lower) levels of education ($P < 0.05$).

The value of the MCS scores ranged from 22.8 to 67.3. Participants had a mean of 47.8 (SD 5.7). One oral health variable was significantly associated with MCS: self-reported bleeding gums. Those with bleeding gums had higher MCS scores than those who did not (48.8 versus 47.3; $P < 0.01$). The number of physical health conditions was also associated with MCS; those with three or more self-reported health conditions had higher MCS scores than those with fewer health conditions ($P < 0.05$).

The combination of socio-demographic variables (age, gender, education level, occupation before retirement, and living arrangement), psychosocial variables (self-perceived oral health needs, self-assessed oral health status), the oral health impact profile score, and clinical variables (number of filled tooth surfaces, number of decayed tooth surfaces, and number of teeth) were entered into a GLM to explain the variance in PCS scores.

The PCS score was independently associated with two socio-demographic variables (gender and level of education), two clinical variables (periodontal status and chronic health conditions), two psychosocial variables (self-perceived oral health needs, self-assessed oral health status), and the oral health impact score. All two-way interactions between the factors were considered, but only the interaction between gender and education was significant. An interaction plot for these variables suggests that while males and females had similar PCS score if they both had education beyond primary school, females had lower PCS than males when they had less education, particular if they had no formal education. Additionally, the resulting model indicated that, after controlling for other independent variables, participants who had the highest PCS scores were more likely to express lower impact of oral conditions, have fewer general health conditions, fewer oral health treatment needs, and assess their oral health status as about the same as other people of a similar age. Clinically, they were likely to have more advanced periodontal disease (periodontal pockets of more than 5 mm). As shown in Table 2, these independent variables accounted for 16% of the variance in PCS score (adjusted $r^2 = 0.16$) [$F(11\ 552) = 10.57$; $P < 0.0001$]. Examination of the residuals of the model confirmed that the modeling assumptions were satisfied.

In the GLM analysis predicting MCS, only one variable was significantly associated with MCS; self-reported presence of gingival bleeding ($\beta = 1.51$; constant = 47.14), explaining only 1.5% (adjusted $r^2 = 0.015$) of the variance [$F(1583) = 9.76$; $P < 0.01$].

The results of the GLM for the OHIP score are presented in Table 3. The model contained four significant variables: perceived oral health

Table 2. Final multivariate model identifying physical health component of the SF-12 (PCS) score

Independent variable	Multiple regression coefficient *B*(SD)	*P*-value
OHIP-14 score	−0.302 (0.06)	0.0001
Number of self-reported health conditions	−2.236(0.51)	0.0001
Female with less than completed primary education (No = 0; Yes = 1)	−4.185 (1.26)	0.001
Self-reported oral health need (No = 0; Yes = 1)	−1.084 (0.41)	0.008
Deep periodontal pockets (more than 5 mm) (No = 0; Yes = 1)	4.346 (1.76)	0.014
Self-assessed oral health status as 'About the same'	2.954 (1.42)	0.038
Intercept	54.192 (2.44)	0.0001
Adjusted $r^2 = 0.160$		

Table 3. Final multivariate model identifying the social impact of oral conditions (OHIP)

Independent variable	Multiple regression coefficient *B* (SD)	*P*-value
Number of self-reported oral health need	2.35 (0.29)	0.0001
Do you sip liquid to aid in swallowing dry food? (No = 0; Yes = 1)	3.00 (0.82)	0.0001
Number of missing teeth	0.24 (0.05)	0.0001
Female gender	−1.78 (0.72)	0.014
Intercept	3.35 (1.00)	0.001
Adjusted $r^2 = 0.184$		

treatment needs, number of missing natural teeth, reports of having to sip liquid to help in swallowing food, and gender [$F(4576) = 33.39$; $P < 0.0001$]. This model explained 18% (adjusted $r^2 = 0.184$) of the variance in OHIP score among the dentate participants. A lower OHIP score, that is, a lower impact of oral health, was attained by male participants, those who expressed fewer oral health treatment needs, had fewer natural teeth missing, and who did not need to sip liquid to swallow food. All two-way interactions between the factors were considered but none of these were significant. Investigation of the residuals of the model confirmed that the modeling assumptions were satisfied.

Discussion

As the first Australian study examining the impact of oral health on QOL among older migrant populations, as well as the influence between socio-demographic, tooth loss, dental status and self-perceived oral health needs and status, this study addresses an important area of action in oral health (8).

The strength of the study was the inclusion of a general QOL measure, the SF-12, as well as a specific OHRQOL measure. The SF-12 is a widely used measure of both physical and mental aspects of QOL and thus it allows us to compare current scores with other populations. Mean PCS score was similar to that found in the South Australian general population aged 65–74 years [44.4 (SD 12.4)] (30). Conversely, the MCS was lower than that of the South Australian norm for this age group [MCS = 53.8 (SD 8.4)] (30). Self-assessed general health in our migrant sample scored better than the Australian population of older people as a whole (31), with around 12% of 65- to 84-year-old Australians, reporting 'Poor' general health (31), compared with only 4% in the present sample. However, it is difficult to draw conclusions about whether this effect is related to ethnicity, as our convenience sample of volunteers recruited from senior citizen clubs may not be representative of the older Italian or Greek adult population. For instance, those who attend clubs may be more physically and socially active than those not participating. If this was the case, our results may underestimate effects.

With the exception of gender and level of education, none of the socio-demographic variables yielded statistically significant multivariate effects for any of the QOL scores. In line with other studies (1, 30), males had higher PCS scores than females. Other studies have indicated that PCS tends to decline with age (30). In the present study, there was neither a univariate nor multivariate age effect. This could be because of the limited age range studied. On the contrary, the number of self-reported chronic health conditions was

significantly associated with QOL, so age could have been confounded with medical history in that chronic diseases and conditions increase with age.

The current research found no socio-demographic associations with the MCS score. Avery et al. (30) also found that MCS tends to stabilize in older ages with no differences by gender. Still, the present sample had a lower MCS than an Australian population of comparable age. However, as little research has been reported on the use of SF-12 on migrant populations in Australia, it is also possible that differences between this study and the others are because of the different cultural background only. For example, it is possible that older migrants may have poorer mental health than the general population because of their history of cultural and geographic dislocation. Alternatively, self-selection may account for this result, as it is possible that this effect may underestimate the true difference, because those with the poorest mental health may be less likely to attend their clubs and participate in this research. Further research in a representative sample of this population group is needed to explore reasons for the apparently poor mental health and seek information about culturally appropriate ways to address the issue.

The multivariate models indicated that self-rated oral health variables (i.e. oral health needs and status) have statistically independent associations with physical health-related QOL (PCS) regardless of age and gender. Additionally, there was a significant association between the OHIP and PCS scores, indicating that decreased oral health impact is associated with improved QOL. In contrast to the findings of Broder et al. (16), the current study found that a clinical variable, (i.e. periodontal pockets of more than 5 mm) reached significance in the multivariate analyses with the PCS score as the dependent variable. This would demonstrate that oral health contributes in a measurable way to physical functioning. However, the study's cross-sectional design makes it difficult to draw any conclusion about causality of the association.

Consistent with studies conducted on determinants of OHRQOL among older adult populations (18, 32, 33), current findings suggest that gender, teeth retention, symptoms of xerostomia, and self-reported oral health needs have important independent effects on the OHIP score. In the present sample, the mean OHIP score among female participants is similar to the Australian norm for this age group (6.0) (14). Interestingly, the current men's mean is lower to the norm reported for older Australians (7.1). It is possible that the method of data collection (interview versus mail questionnaires) may have influenced these results. Additionally, generalization of results in this study should be viewed with caution and not considered representative for the general Southern European migrant population as our study population was a convenience nonrandomly selected sample.

The use of health measures in different linguistic and socio-cultural environments raises questions about cultural orientation and values reflected in these measures (34). Thus, the consistency of predictors in the OHIP score was an interesting result, in view of the culturally specific nature of peoples' perceptions of health, indicating that the cross-cultural relevance of these findings needs to be further explored. Previous studies exploring this issue (34, 35) have found that the nature and magnitude of impacts could vary between populations of different cultural backgrounds. On the contrary, present results would indicate that interventions design for the broad Australian community might also have a significant effect in the QOL of older migrants. However, not all older adults have equal access to oral health care programs. Over the past two decades, the proportion of older Australians reporting use of dental health services in the previous 12 months has increased substantially, from 36.4% in 1988 to 59.5% in 1999. However, a significantly lower proportion (42.6%) of this population used dental services in the previous 12 months (36). This pattern of use places these groups in a highly inequitable situation. These disadvantages will not be addressed without a more proactive role of oral health services in meeting the needs of culturally and linguistically diverse (CALD) patients.

We noted that the multivariate models explained more of the variance in the oral health impact score than in the SF-12 scores. However, their predictive power was not large (between 16% and 18% of the variance), thus providing a basis for future research in this area. Given differences in the predictive power of clinical and subjective indicators, future oral health assessment should include both professionally determined clinical parameters as well as subjective indicators. Improved prediction could increase the outreach capacity of public oral health services to respond to oral health treatment needs in high-risk older adult populations living independently in the community.

Present findings support the growing recognition of the importance of oral health as a mediator of

QOL, in particular in the physical component of older adults' QOL. The study provides initial data about oral health and QOL status among older Italian and Greek Australians, and, importantly, about the associations between oral health status and QOL. This knowledge may then be used to suggest ways to improve oral health care in older populations and as baseline information for future interventions in oral health in this population (8, 35).

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