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ORIGINAL ARTICLE

Personality, xerostomia and OHRQoL among 35–54-year-olds

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ABSTRACT

Objective: Personality characteristics mean that people may interpret similar symptoms differently, complicating the measurement of self-reported oral health, and so we tested the hypothesis that controlling for aspects of personality makes a difference to the association between xerostomia and oral-health-related quality of life.

Material and methods: A cross-sectional study was conducted of a representative adult population sample in Dunedin (New Zealand). Data were collected on xerostomia, OHRQoL and personality characteristics, using (respectively) the 5-item Shortened Xerostomia Inventory (SXI), the OHIP-14 and the Positive and Negative Affect Schedule (PANAS). Negative binomial regression was used to model the association between the SXI and the OHIP-14 scores, and models with and without the PANAS score were compared.

Results: The participation rate was 51.3%, with complete OHIP-14 data available for 250 individuals (56.5% female). The SXI score (mean 6.9, sd 1.8) was strongly and positively associated with the OHIP-14 score (in both models), as was the PANAS negative affect score in the second model, which also explained slightly more of the observed variance than the first model. However, the difference in model deviance fell short of the amount required to reject the hypothesis that adding the PANAS variables to the model made a significant difference.

Conclusions: Considering aspects of personality in investigating OHRQoL remains a theoretically important undertaking, but adjusting for it in analyses of associations between xerostomia and OHRQoL is unlikely to be necessary.

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Introduction

Recognition that health is a subjective state has led to the use of self-report measures being very common in oral epidemiological and health services research [1]. They are used to determine not only the occurrence of symptom-defined conditions but also the impact of those on the day-to-day lives of sufferers. However, measuring subjective health states is complicated by the fact that people may interpret similar symptoms differently, and that personality characteristics appear to be an important modifier of their self-reports [2].

Stable and able to be validly and reliably measured, personality traits can be readily assessed [3]. However, most current instruments for measuring such characteristics involve a considerable respondent burden, and this usually precludes personality measurement in all but the most comprehensive oral health studies. In demonstrating a strong and important association between oral health and personality characteristics in a longstanding birth cohort study, Thomson et al. [4] highlighted the need for a short measure of personality traits to be used concurrently with self-report oral health measures, enabling them to be adjusted for in studies of the impact of oral conditions. They identified one such short measure, the PANAS (Positive And Negative Affect Schedule [5]), which comprises two 10-item scales representing traits known respectively as positive affect (PA) and negative affect (NA). It was suggested that these scales could be useful when used concurrently with a self-report oral health instrument, but that there was a need for further research on the utility of the PANAS in self-reported oral health studies.

Xerostomia—the symptom(s) of dry mouth—is a subjective oral condition which is moderately prevalent and has been shown [6] to adversely affect oral-health-related quality-of-life (OHRQoL). Since its effect on OHRQoL has also been shown to be modified by personality characteristics, most notably negative affect [7], xerostomia is a useful condition with which to examine the utility of the PANAS in such research. Accordingly, the aim of this study was to determine whether personality traits measured with the PANAS modify the association between xerostomia and OHRQoL in a representative sample of adults in early middle age. Specifically, we tested the hypothesis that controlling for the PANAS scale scores (as measures of aspects of personality) makes a difference to the association between xerostomia and OHRQoL.

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Supplemental data for this article can be accessed here.

Material and methods

The University of Otago Human Ethics Committee granted ethical approval for a cross-sectional survey to be conducted of a representative adult population sample in Dunedin, New Zealand (ethical approval number: 12/341). Participants were 35–54-year-olds randomly sampled from the Dunedin South Electoral Roll, which was obtained from the Electoral Enrolment Centre in Wellington. The required sample size was calculated using data from the 2009 New Zealand National Oral Health Survey [8]. Among those in the target age range, the prevalence of xerostomia was 13.2% (95% CI 11.2, 15.5). Among non-xerostomics, the mean OHIP-14 score was 4.0 (SE 0.2); among xerostomics, it was 6.6 (SE 0.9). Assuming an effect size of 0.2 and 95% power to detect a difference, 314 was the estimated sample size likely to demonstrate that difference; with an assumed 60% response rate, the required sample size was calculated to be 523. Accordingly, the questionnaire was mailed (with cover letter, information sheet and a free-post envelope) to 523 35–54-year-olds people selected using simple random sampling. Six weeks after the first mail-out, those who had not yet responded were sent an additional questionnaire and covering letter. Data collection ended four weeks after the second mail-out.

OHRQoL was measured using the OHIP-14 [9]. The OHIP-14 comprises 14 items relating to the 7 dimensions of OHRQoL, where participants answered to how often they experienced a problem in the previous 4 weeks. Responses were coded as 'Very often' (scoring 4), 'Fairly often' (3), 'Occasionally' (2), 'Hardly ever' (1) or 'Never' (0). The OHIP-14 score was computed by summing responses for all 14 items (with a possible range of 0–56). Higher scores are interpreted as greater OHRQoL impact. A standard single-item global self-rated oral health measure ('How would you describe the health of your teeth or mouth?' with the ordinal response options 'Excellent', 'Very good', 'Good', 'Fair' or 'Poor'; [1]) was used as a concurrent validity check for the OHIP-14.

Xerostomia was measured using the Shortened Xerostomia Inventory (SXI), a 5-item scale [10] which collects data on dry mouth symptoms, and is used to place respondents on a continuum of xerostomia experience, with possible scores ranging from 5 (no xerostomia symptoms) to 15 (the most severe symptoms possible). Higher scores are interpreted as more severe xerostomia. A standard single-item xerostomia measure ('How often does your mouth feel dry?') was also used [11], in order to provide a concurrent validity check for the SXI.

Aspects of personality were measured using the Positive and Negative Affect Schedule (PANAS), a scale with 10 items measuring positive affectivity (PA), and 10 items measuring negative affectivity (NA) [12]. Higher scores on the NA subscale are interpreted as greater negative affectivity, while higher scores on the PA subscale represent greater positive affectivity. To test the validity of the PANAS in the current study sample, confirmatory factor analysis (CFA) was used, employing principal component analysis as the extraction method, with Kaiser normalization. This was followed by an assessment of the scale's internal consistency using coefficient alpha. Those data are presented in Supplementary Table S1.

Socio-economic status (SES) was estimated for each participant using the New Zealand Socio-economic Index 2006 (NZSEI-06) [13] which employs a six-interval classification, and provides an occupationally derived indicator of socioeconomic status. For the purposes of the analyses in this study, the six NZSEI-06 categories were collapsed into three, giving low-, medium-, and high-SES groups.

Data were analysed using SPSS (version 24 for Windows). After the computation of descriptive statistics, associations for continuous variables were tested for statistical significance using analysis of variance. Chi-square tests were used to examine the statistical significance of differences observed with categorical variables. Negative binomial regression was used to model the association between the SXI and the OHIP-14 scores.

Missing data

Three items on the PANAS NA and 8 for the PA scale were left unanswered. A total of five items were left blank for the OHIP-14. In all cases, the missing values were recoded to the lowest possible one.

Results

Of the 523 questionnaires which were originally sent, there were 32 households that could not be contacted by mail. These were considered to be 'out of frame', taking the effective sample down to 491. Of the remainder, 253 were completed and returned; two indicated that they did not wish to participate in the study, and two had died. The participation rate for this study was computed as the total number of completed and returned questionnaires less those whose reason for not responding was unknown, divided by the participation rate. This was therefore calculated as 253 divided by $253 + 233 + 2$, giving 51.8%. Complete OHIP-14 data were available for 250 individuals. A comparison of the characteristics of responders and non-responders (using data available in the Electoral Roll database) is presented in Supplementary Table 2; it shows that those in the 35–44 age group were relatively under-represented, but there were no differences by sex or ethnicity.

Overall, there were similar proportions of participants educated to university level and school level (Table 1). Most of the university degree holders and the higher SES group were females. On the other hand, males made up the highest proportion of trade or polytechnic qualification holders.

Concurrent validity checks for the OHIP-14 and SXI scales showed gradients in mean scores which were in the expected direction (Table 2). That is, mean OHIP-14 scores showed an ascending gradient across the ordinal response categories of the global oral health item, and mean SXI scores showed an ascending gradient across those for the standard dry mouth question. Both of those gradients were statistically significant.

Table 1. Participants' socio-economic characteristics, by sex.

	Sex		
	Female Number (%)	Male Number (%)	All combined Number (%)
Age group			
35–44	54 (62.1)	33 (37.9)	87 (34.4)
45–54	89 (53.6)	77 (46.4)	166 (65.6)
Education level			
University	70 (71.4)	28 (28.6)[b]	98 (38.7)
Trade/Polytechnic	17 (30.9)	38 (61.9)	55 (21.7)
Primary or secondary	56 (56.0)	44 (44.0)	100 (39.5)
Socio-economic status			
High	50 (66.7)	25 (33.3)[b]	75 (29.6)
Medium	56 (47.1)	63 (52.9)	119 (47.0)
Low	37 (62.7)	22 (37.3)	59 (23.3)
CSC[a] holder			
No	110 (54.2)	93 (45.8)	203 (80.2)
Yes	33 (66.0)	17 (34.0)	50 (19.8)
All combined	143 (56.5)	110 (43.5)	253 (100.0)

[a]Community Services Card.
[b]$p < .05$.

Table 2. Concurrent validity check: mean OHIP-14 scores and mean SXI scores by their respective global items.

	Number responding	Mean scale score
How would you describe the health of your teeth or mouth?		OHIP-14[a] (sd)
Excellent	25	7.1 (6.7)[b]
Very good	78	9.1 (7.2)
Good	103	11.1 (7.5)
Fair	30	12.7 (7.4)
Poor	13	22.0 (11.1)
How often does your mouth feel dry?		SXI[c] (sd)
Never	84	5.6 (0.9)[a]
Occasionally	150	7.3 (1.5)
Frequently	17	8.4 (1.7)
Always	2	15.0 (0.0)

[a]Oral Health Impact Profile (short-form).
[b]$p < .05$.
[c]Shortened Xerostomia Inventory.

Mean OHIP-14 scores showed consistent gradients by education level and SES, whereby scores were highest among those with the least education or with the lowest SES (Table 3). Xerostomia affected about 1 in 14 participants, and there were no sociodemographic differences in prevalence, although mean SXI scores showed consistent gradients by education level and SES, whereby (as with the OHIP-14) scores were highest among those with the least education or with the lowest SES. Mean PANAS scores for positive affect showed consistent gradients by education level and SES, whereby scores were lowest among those with the least education or with the lowest SES. While there were no SES gradients observed with the PANAS negative affect scores, the latter were higher among females and those in the younger age group.

The correlation matrix for the main variables is shown in Table 4. The OHIP-14 had a moderate positive correlation with the SXI score, and a weak positive correlation with the PANAS negative affect score, and a weaker negative correlation with the PANAS positive affect score (as did the SXI score). The PANAS negative affect and positive affect scores showed a weak negative correlation.

Negative binomial regression models for the OHIP-14 score are presented in Table 5. The first model did not control for aspects of personality but the second one did. The SXI score was strongly and positively associated with the OHIP-14 score (in both models), as was the PANAS negative affect score in the second model, which also explained slightly more of the observed variance than the first model. However, the difference in model deviance fell short of the amount required to reject the hypothesis that adding the PANAS variables to the model made a significant difference.

Discussion

We set out to determine whether, in adults in early middle age, personality traits measured with the PANAS modify the association between xerostomia and OHRQoL, and hypothesising that controlling for the PANAS scale scores makes a difference to the association between the SXI and OHIP-14 scores. We found that, while the PANAS NA score was indeed associated with both of those and could therefore be considered to be a confounder of the association between the two, controlling for it statistically made little difference to the overall association.

Before discussing the findings, the weaknesses and strengths of the study should be considered. At just over 50%, the participation rate was lower than had been anticipated, and this affected the number of responses. Countering this is the fact that the power calculation had been undertaken based on the number of responses needed to demonstrate a statistically significant association between

Table 3. Mean OHIP-14 score, prevalence of xerostomia and mean SXI score, by socio-demographic characteristics.

	Mean OHIP-14[a] score (sd)	Number xerostomic (%)	Mean SXI[b] score (sd)	Mean PANAS PA[c] score (sd)	Mean PANAS NA[d] score (sd)
Sex					
Female	10.4 (7.9)	8 (5.6)	6.8 (1.7)	33.5 (7.8)	18.9 (6.7)[f]
Male	11.3 (8.3)	11 (10.0)	6.9 (1.8)	32.3 (8.2)	17.3 (5.6)
Age group					
35–44	10.0 (8.6)	8 (9.2)	6.7 (1.7)	32.5 (8.7)	19.4 (6.7)[e]
45–54	11.2 (7.8)	11 (6.6)	6.9 (1.8)	33.2 (7.6)	17.5 (6.0)
Education level					
University	9.4 (6.8)[e]	6 (6.1)	6.6 (1.4)[e]	34.5 (7.6)[e]	19.2 (6.7)
Trade/Polytechnic	9.9 (8.0)	3 (5.5)	6.9 (1.9)	32.9 (7.6)	16.9 (5.2)
Primary or secondary	12.6 (9.0)	10 (10.0)	7.2 (2.0)	31.4 (8.4)	17.9 (6.3)
SES group					
High	9.1 (6.5)[e]	5 (6.7)	6.6 (1.4)[e]	35.0 (7.2)[e]	18.9 (6.7)
Medium	10.6 (7.8)	6 (5.0)	6.8 (1.6)	32.7 (7.8)	17.5 (6.0)
Low	13.3 (9.8)	8 (13.6)	7.4 (2.3)	30.8 (8.8)	18.7 (6.3)
All combined	10.8 (8.1)	19 (7.5)	6.9 (1.8)	33.0 (8.0)	18.2 (6.3)

[a]Oral Health Impact Profile (short-form).
[b]Shortened Xerostomia Inventory.
[c]Positive and Negative Affect Schedule, Positive Affect subscale.
[d]Positive and Negative Affect Schedule, Negative Affect subscale.
[e]$p < .05$.
[f]$p = .05$.

Table 4. Correlation matrix for the main variables (data are Pearson's *r*).

	OHIP[a] score	SXI[b] score	PANAS PA[c] score	PANAS NA[d] score
OHIP score	1.00			
SXI score	0.53	1.00		
PANAS PA score	−0.23	−0.22	1.00	
PANAS NA score	0.36	0.24	−0.21	1.00

[a]Oral Health Impact Profile (short-form).
[b]Shortened Xerostomia Inventory.
[c]Positive and Negative Affect Schedule, Positive Affect subscale.
[d]Positive and Negative Affect Schedule, Negative Affect subscale.

Table 5. Negative binomial models for mean OHIP-14 score (showing Incidence Rate Ratio).

	IRR (95%CI)	*p* Value
With PANAS scores omitted		
Female sex[a]	0.92 (0.78, 1.09)	.33
Age (continuous)	1.01 (0.99, 1.03)	.27
Medium SES[b]	1.07 (0.87, 1.31)	.52
Low SES[b]	1.14 (0.90, 1.43)	.28
SXI score (continuous)	1.20 (1.15, 1.24)	<.0001
Model deviance =189.80[c]; Pseudo-R^2 = .042		
With PANAS scores included		
Female sex[a]	0.90 (0.76, 1.06)	.21
Age (continuous)	1.02 (1.00, 1.03)	.06
Medium SES[b]	1.11 (0.91, 1.37)	.30
Low SES[b]	1.19 (0.94, 1.50)	.15
PANAS PA score (continuous)	1.00 (0.98, 1.01)	.37
PANAS NA score (continuous)	1.02 (1.01, 1.04)	.002
SXI score (continuous)	1.15 (1.11, 1.20)	<.0001
Model deviance =184.94[c]; Pseudo-R^2 = .048		

[a]Reference category = male.
[b]Reference category = high SES.
[c]Difference in model deviance [or −2Log(likelihood)] was 4.86, which is less than the 5.99 required (with the 2 extra degrees of freedom) to reject the hypothesis that adding the PANAS variables makes a difference at the 5% level.

xerostomia and OHIP-14 scores; that we were easily able to demonstrate this with the 250 responses achieved suggests that the lower participation rate did not affect the study's statistical power. The other issue in respect of the participation rate is whether there were systematic differences between responders and non-responders. There were no differences by sex or ethnicity, but those in the 35–44 age group were relatively under-represented, and so the findings may not be generalizable to the source population. Another weakness of the study is that we did not use an alternative measure for personality, such as the 177-item Multidimensional Personality Questionnaire (MPQ) [14] which was used in the Dunedin study [4]. With hindsight, this might have been useful, but we were careful to minimize the respondent burden for the current study. Another issue is whether the prevalence of xerostomia in the sample was typical of the age groups involved. The confidence intervals overlap for the current study estimates and nationally representative estimates [6] for 35–44-year-olds (respectively: 9.2% [95% CI 3.1, 15.3]; and 9.5% [95% CI 6.7, 13.3]), while those for 45–54-year-olds (respectively: 6.6% [95% CI 2.8, 10.4]; and 14.2% [95% CI 10.4, 19.2]) are very close. This suggests that the occurrence of xerostomia in the sample is reasonably typical of the general population aged 35–54 years. Finally, it would have been useful to have undertaken clinical dental examinations of the participants so that we could have controlled for the experience of conditions such as dental caries and tooth loss, which are known to have a negative impact on OHRQoL [15]. Resource and practical constraints precluded this, however.

Turning to the findings, the expected strong association between xerostomia and OHRQoL was indeed seen. This confirms observations from other studies of adults in their middle years [6,7], and it supports the assertion that xerostomia is not a trivial condition. The strong, positive association between the OHIP-14 score and the PANAS negative affect score indicated that those with more negative affect tended to report greater impacts of their oral condition on their day-to-day lives. They also tended to have higher SXI scores, meaning that negative affect can be considered to be a confounder of the xerostomia-OHRQoL association (because it was associated with both exposure and outcome). Thus, it was theoretically appropriate to adjust for it in modelling the OHIP-14 score but, in practical terms, adding the PANAS variables to the model made no significant difference to it.

The findings imply that investigations of xerostomia and OHRQoL need not concurrently measure and adjust for

aspects of personality, although confirmation of the findings with other populations, age groups, settings and oral conditions is needed before a definitive statement on this can be made. In the meantime, the PANAS questionnaire is short, at 20 items in total, and simple to complete. Using it alongside an OHRQoL measure (particularly a short-form version) would not unduly add to respondent burden in the typical socio-dental study, and so (pending confirmation of our findings) researchers would be wise to consider doing so.

There was a predictable gradient in OHIP-14 scores by socio-economic position (SEP), represented by education level and SES group, but it is noteworthy that a similar gradient in SXI scores was apparent. The difference in mean scores between the lowest SEP group and the highest represents a moderate effect size (calculated by dividing the difference between the two means by the standard deviation), regardless of the SEP indicator used. Accounting for such a difference is challenging, but it may be relevant that there were also gradients in mean PANAS PA score by SEP (with similar effect sizes), whereby those of lower SEP had lower scores for positive affect. The 35–54-year-old participants in this study were in what has been characterized as midlife, a life stage where people's achievements—in terms of earnings, work position, family leadership, agency and self-confidence, and how they compare to others—have largely consolidated [16]; one's prospects for the rest of the life course are likely to be largely apparent. It may be that this has influenced how lower SEP individuals score not only on measures of positive affect but also those of a symptom set such as dry mouth.

In conclusion, considering aspects of personality in investigating OHRQoL remains a theoretically important undertaking, but adjusting for it in analyses of associations between xerostomia and OHRQoL is unlikely to be necessary. However, confirmation of our findings with other populations, age groups, settings and oral conditions is needed.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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References

[1] Locker D. Oral health indicators and determinants for population oral health surveys. Toronto: University of Toronto; 2001.
[2] Watson D, Pennebaker JW. Health complaints, stress, and distress: exploring the central role of negative affectivity. Psychol Rev. 1989;96:234–254.
[3] Israel S, Moffitt TE, Belsky DW, et al. Translating personality psychology to help personalize preventive medicine for young adult patients. J Pers Soc Psychol. 2014;106:484–498.
[4] Thomson WM, Caspi A, Poulton R, et al. Personality and oral health. Eur J Oral Sci. 2011;119:366–372.
[5] Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol. 1988;54:1063–1070.
[6] Benn AML, Broadbent JM, Thomson WM. Occurrence and impact of xerostomia among dentate adult New Zealanders: findings from a national survey. Aust Dent J. 2015;60:362–367.
[7] Thomson WM, Lawrence HP, Broadbent JM, et al. The impact of xerostomia on oral-health-related quality of life among younger adults. Health Qual Life Outcomes. 2006;4:86.
[8] Ministry of Health. Our oral health. Key findings of the 2009 New Zealand Oral Health Survey. Wellington: Ministry of Health; 2010.
[9] Slade GD. Derivation and validation of a short-form oral health impact profile. Community Dent Oral Epidemiol. 1997;25:284–290.
[10] Thomson WM, van der Putten G-J, de Baat C, et al. Shortening the Xerostomia Inventory. Oral Surg Oral Med Oral Pathol Oral Radiol Endodontol. 2011;112:322–327.
[11] Thomson WM, Brown RH, Williams SM. Medication and perception of dry mouth in a population of institutionalised elderly people. N Z Med J. 1993;106:219–221.
[12] Watson D, Clark LA. Negative affectivity: the disposition to experience aversive emotional states. Psychol Bull. 1984;96:465–490.
[13] Milne BJ. New Zealand socio-economic Index 2006 (NZSEI-06): an introduction for social science researchers. N Z Sociol. 2012;27:112–127.
[14] Tellegen A. Brief manual for the multidimensional personality questionnaire, Minneapolis: University of Minnesota; 1982.
[15] Gerritsen AE, Allen PF, Witter DJ, et al. Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. Health Qual Life Outcomes. 2010;8:126.
[16] Lachman ME, Teshale S, Agrigoroaei S. Midlife as a pivotal period in the life course: balancing growth and decline at the crossroads of youth and old age. Int J Behav Dev. 2015;39:20–31.