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Associations between adult attachment and: oral health-related quality of life, oral health behaviour, and self-rated oral health

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Abstract
Purpose Although adult attachment theory has been revealed as a useful theoretical framework for understanding a range of health parameters, the associations between adult attachment patterns and a range of oral health parameters have not yet been examined. The aim of this study was to examine potential associations between attachment insecurity and: (1) oral health-related quality of life (OHRQoL), (2) oral health behaviours, and (3) self-rated oral health. In association with this aim, sample characteristics were compared with normative data.
Methods The sample in this cross-sectional study was comprised of 265 healthy adults, recruited via convenience sampling. Data were collected on attachment patterns (Experiences in Close Relationships Scale-Short Form, ECR-S), OHRQoL (Oral Health Impact Profile-14, OHIP-14), oral health behaviours (modified Dental Neglect Scale, m-DNS), and self-rated oral health (one-item global rating of oral health). Multivariate regression models were performed.
Results Both dimensions of attachment insecurity were associated with lowered use of favourable dental visiting behaviours, as well as decreased OHRQoL for both overall well-being and specific aspects of OHRQoL. Attachment avoidance was linked with diminished self-rated oral health.
Conclusions This study supports the potential value of an adult attachment framework for understanding a range of oral health parameters. The assessment of a client's attachment pattern may assist in the identification of people who are at risk of diminished OHRQoL, less adaptive dental visiting behaviours, or poorer oral health. Further research in this field may inform ways in which attachment approaches can enhance oral health-related interventions.

Keywords Adult attachment · Oral health-related quality of life · Oral health behaviours · Self-rated oral health · Psychosocial factors

Introduction

Adult attachment theory provides a theoretical framework which assists our understanding of a range of health-related parameters such as quality of life [1], treatment adherence [2], health care utilisation [3], and self-reported health [4]. For each of these health-related parameters, accumulating evidence reveals more negative outcomes for people with an insecure attachment pattern [5–7]. While these parameters may also pertain to oral health, the associations between adult attachment patterns and relevant oral health parameters have not yet been examined. In this study, associations between insecure attachment patterns and: (1) oral health-related quality of life (OHRQoL), (2) protective oral health behaviours, and (3) self-rated oral health, are investigated in Australia.

Attachment theory posits that the responsiveness of a caregiver (i.e. an attachment figure) towards an infant affects the infant's developing perceptions of his/her self-worth and the supportiveness of others [8]. These perceptions become internalised as cognitive, emotional, and

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behavioural schemas, which are applied to different relationships throughout the lifespan [9]. Adult attachment theory represents an elaboration of the original theory, in which significant family, partners, and peers are considered attachment figures [10]. Unsupportive or inconsistent interactions with attachment figures, particularly in the parent–infant relationship, predispose individuals to negative schemas of self and/or others, classified as attachment insecurity [11].

While attachment insecurity may be conceptualised and measured in a variety of ways [12, 13], a well-accepted dimensional approach was adopted in the present study, with two attachment dimensions defined: attachment anxiety and attachment avoidance [14]. Attachment anxiety corresponds to an individual's perception of themselves as being unworthy of care, and excessive worry that a partner will abandon them or be unavailable in times of need [11], stemming from attachment figures who were inconsistently responsive [15]. Attachment avoidance, in contrast, arises from an individual's experience of attachment figures who was unresponsive to his/her needs and intolerant of expressions of vulnerability [15]. Individuals who are avoidantly attached perceive others as unavailable to provide care and are uncomfortable with emotional intimacy and dependence [12]. Attachment insecurity is relevant not only to the relational context; as noted earlier, there has been growing recognition that adult attachment theory may inform the understanding of a range of health parameters [16], including health-related quality of life [1, 17], health behaviours [3], and self-rated health [18]. These three parameters will be discussed below.

Health-related *quality of life* is a patient-reported outcome which reflects the subjective impact of a disease process on personal well-being [19]. In recent research, attachment insecurity has been associated with diminished health-related quality of life for people with inflammatory bowel disease [20, 21], breast cancer [1], and lupus erythematosus [17]. While the relationship between attachment and health-related quality of life for a variety of diseases has been examined, no studies evaluating this association in relation to oral health were located. The extent to which overall well-being, and well-being in specific domains of life (e.g. physical, psychological, social, functional), is compromised by oral health conditions is captured by the term "oral health-related quality of life" [19].

The second health parameter with which insecure attachment may be associated is *health behaviour*. Two health behaviours noted in the literature are: (1) health care seeking, related to visiting a health care professional, and (2) self-care behaviour, related to daily health care practices. Research regarding health care seeking suggests that attachment insecurity may be associated with more missed medical appointments for diabetic patients [3], as well as decreased participation in cervical screening [22]. For self-care behaviours, insecure attachment has been related to non-adherence to medical treatment for patients with diabetes (e.g. medication intake, foot care) [2] and lupus erythematosus (e.g. following doctor's instructions) [17]. The mounting empirical evidence of links between attachment patterns and health behaviours supports a model, proposed by Maunder and Hunter [23], in which attachment insecurity is associated with the disease process through several mechanisms including the altered use of protective health behaviours.

Despite this empirical evidence and theoretical support, only one study has investigated the associations between attachment insecurity and oral health behaviours [24], which revealed that attachment anxiety was associated with more periodontal treatment sessions for females with periodontitis (i.e. inflammatory gum disease). The results, however, lack generalisability to people without a chronic oral health condition, accessing a general dentist. Moreover, a wide range of protective oral health behaviours (e.g. tooth brushing and flossing frequency) were not assessed [24]. As these oral health behaviours contribute to the prevention of oral health problems [25–28], research examining the links between attachment and a wider range of oral health behaviours may support the development of attachment-informed oral disease prevention programmes. This highlights the need for research examining associations between adult attachment patterns and a range of preventative oral health behaviours for the general population.

Finally, attachment insecurity may be linked to *self-rated oral health*. Self-rated oral health reflects an individual's personal experience of the state of his or her oral health [29]. The construct is considered multidimensional [30] as the rating may be informed by physical oral health status, as well as functional and psychosocial dimensions [31]. Previous research has revealed links between attachment insecurity and increased reports of subjective health indices, such as self-reported symptoms [18, 32, 33], somatisation [34], and physical health conditions [4]. Associations between attachment and self-reported oral health have, however, not yet been investigated.

Consequently, associations between attachment insecurity and: (1) OHRQoL, (2) a range of protective oral health behaviours, and (3) self-rated oral health, require empirical investigation. The objective of the present study is to address this threefold need. In this study, three hypotheses are investigated which examine associations between attachment pattern and outcomes for three oral health parameters. First, it is hypothesised that attachment insecurity will be associated with decreased OHRQoL, in relation to overall and specific dimensions of well-being.

Second, it is hypothesised that attachment insecurity will be associated with lowered use of protective oral health behaviours. Third, it is hypothesised that attachment insecurity will be related to poorer self-rated oral health. As a supplementary aim, comparisons will be made between sample characteristics and Australian normative data to support interpretation of results.

Methods

Participants and procedure

Ethical approval was obtained from the Behavioural and Social Sciences Ethical Review Committee (Project number: 2012000994) at the University of Queensland. Over a 14-month period, 265 community-dwelling adults participated in this cross-sectional study. The mean and median participant ages were 31.97 years (SD = 14.39) and 26 years, respectively, and approximately 75 % of respondents were female. Individuals were included in the study if they: (a) were aged 18 years or more, (b) lived in Australia, and (c) had sufficient English proficiency.

Participants, recruited via convenience sampling followed by a snowballing approach, completed the self-administered questionnaire either online or in hard copy. The online questionnaire was conducted through a commercially available Internet survey instrument (SurveyMonkey [35]), with the hyperlink distributed via the investigators' personal social media forums (e.g. email, Facebook, Inc). The online method was chosen as Internet-based surveys are time and cost efficient, and improve accessibility [36]; the majority of participants completed online questionnaires (88.3 %). In addition, printed questionnaires were personally distributed by all investigators to people in their social networks (e.g. work colleagues, neighbours, church members). Written information about the study was provided prior to commencement of the questionnaire. Completion of the questionnaires was voluntary, and anonymity was assured. Submission of a completed survey implied informed consent. Data were collected on a range of sociodemographic characteristics, oral health status, and self-reported oral health behaviour.

Measures

The Experiences in Close Relationships Scale-Short Form (ECR-S) [37] was used to measure the two dimensions of attachment insecurity: attachment anxiety and attachment avoidance. The 12 items were derived from the original Experiences in Close Relationships Scale [38] and were rated on a seven-point Likert scale (1 = strongly disagree, to 7 = strongly agree). Higher mean dimension scores reflected higher levels of attachment insecurity. In a previous study [37], adequate internal consistency (attachment anxiety $\alpha = 0.77$–0.86, attachment avoidance $\alpha = 0.78$–0.88), test–retest reliability (attachment anxiety $r = 0.82$, attachment avoidance $r = 0.89$), and construct validity were reported for the ECR-S.

OHRQoL was measured by the Oral Health Impact Profile-14 (OHIP-14) [39]. The 14 items, derived from the OHIP-49 [40], are divided into seven subscales that relate specifically to oral health: (1) Functional Limitation (e.g. difficulties with pronunciation and loss of taste), (2) Physical Pain (e.g. aching in the mouth and discomfort when eating), (3) Psychological Discomfort (e.g. self-consciousness and tenseness due to oral health problems), (4) Physical Disability (e.g. unsatisfactory diet and meal interruption), (5) Psychological Disability (e.g. difficulties relaxing and embarrassment due to oral health problems), (6) Social Disability (e.g. irritability and difficulties performing tasks due to oral health problems), and (7) Handicap (e.g. decreased functioning capacity and life satisfaction due to oral health problems). Each item was rated with reference to the previous 12 months and scored on a five-point scale, where 0 = never, and 4 = very often. Mean scores for overall OHRQoL (OHIP-14S) and each subscale were calculated. Higher scores are indicative of more oral health impacts and, consequently, poorer OHRQoL. Acceptable internal consistencies for the OHIP-14 subscales have been demonstrated previously ($\alpha = 0.66$–0.89) [39].

Use of protective oral health behaviours was evaluated using a modified version of the Dental Neglect Scale (m-DNS) [41, 42]. The measure consists of ten items which are divided into two subscales: (1) Dental Visiting, evaluating health care seeking behaviours (e.g. frequency, intention to delay, and reason for dental visits), and (2) Dental Self-Care, measuring adherence to daily oral care (e.g. tooth brushing, flossing, adherence to dentist's instructions). Each item was rated on a five-point Likert scale (where 0 = disagree, to 4 = strongly agree), and lower mean subscale scores reflected decreased use of adaptive oral health behaviours. Sanders et al. [41] reported acceptable internal consistency of the subscales: Dental Visiting, $\alpha = 0.76$; and Dental Self-Care, $\alpha = 0.62$.

Self-rated oral health was measured with the single-item global question: "Overall, how would you rate your oral health?" The six response choices were coded between 0 = very poor, and 5 = excellent. Single-item questions are considered valid as they have been used in previous population-based oral health questionnaires [43, 44].

Additional data were collected on a range of self-reported oral health behaviours. Tooth brushing frequency was recorded as the number of times the participant bru-

shed his/her teeth over the past week. Flossing frequency was coded as a binary variable, where 0 = no flossing over the past week, and 1 = flossing at least once a week (Table 1). Participants were also asked their usual reason for visiting a dental professional, with responses coded as 0 = preventative-oriented dental visits (i.e. check-ups), and 1 = problem-focused dental visits (i.e. a dental problem). Data were also collected on demographic factors, such as age, gender, and total annual household income.

Normative data used

To determine the representativeness of the sample, the characteristics of the study sample were compared to Australian normative data, drawn from six studies [43, 47–52]. Data were nationally representative and collected by the Australian government. As Australian normative data were not available on the ECR-S, data from similar countries were used. These data were obtained from American university students ($N = 122$ [37], $N = 296$ [52]) and a British sample ($N = 150$) of mostly urban and highly educated participants [53].

Statistical analyses

Statistical analyses were performed using SPSS 22.0 [45], with a significance level of 0.05 adopted. While 322 participants completed questionnaires, 57 respondents (17.70 %) did not complete the ECR-S or the OHIP-14, so these data were excluded, resulting in a sample size of 265. There were no statistically significant differences for age and gender between the retained and excluded data. Descriptive statistics were used to examine the distribution of demographic variables and some of the scales (e.g. OHIP-14, m-DNS, and self-rated oral health). Internal consistencies were calculated for all scales using Cronbach's alpha. Single sample *t* tests and Chi-square tests using expected frequencies were used to compare study sample means and proportions to normative data. Independent-samples *t* tests and Chi-square tests were used to compare participants who completed the printed questionnaire with those who completed the online questionnaire. Pearson's correlation coefficients for the dependent and independent variables, and multivariate linear regression models for each of the oral health parameters, were computed. The multivariate linear regression models included either attachment anxiety or attachment avoidance, to avoid potential multicollinearity; and covariates, such as gender and oral health behaviours (e.g. tooth brushing frequency, flossing frequency, reason for dental visit). The covariates were chosen to control for the effect of sociodemographic and behavioural variables, based on preliminary correlational analyses and previous literature [41, 46]. For the models examining the m-DNS, behavioural covariates similarly assessed in the outcome variables (e.g. Dental Visiting or the Dental Self-Care subscales) were omitted from analyses to avoid duplication. Other variables (e.g. age, socioeconomic status, educational level) were not retained during multiple regression analyses due to the lack of significant correlations found. The residuals of the multivariate models were checked for normality and homoscedasticity.

Results

Demographic characteristics and responses to the scales

As shown in Table 1, the majority of participants were young women with private health insurance. The participants had high teeth retention, indicating favourable oral health status; and the majority of participants reported engaging in preventative oral health behaviours, such as visiting the dentist for check-ups, and brushing their teeth at least once a day. The participants who completed the printed questionnaire (age: mean = 47.04, SD = 3.45; 24.4 % male) were significantly older and included more males, compared to the participants who completed the online survey (age: mean = 30.31, SD = 0.85; 6.6 % male).

Descriptive information about OHIP-14, m-DNS, and self-rated oral health is presented in Table 2. The majority of participants rated their oral health as above average. Internal consistencies for all but one of the scales were sufficient (>0.65) and are reported in Table 3. For the Dental Self-Care subscale, the original result ($\alpha = 0.61$) was improved by substituting the original item 10 with an alternate item collected at the same time (i.e. "I look after my teeth very well", instead of "I control snacking between meals"), which increased internal consistency ($\alpha = 0.72$). This modified version was employed in the study.

Comparisons with normative data

The characteristics of the study sample were compared to Australian normative data (see Table 1). These results suggested that the study sample consisted of a higher percentage of females [47] and people with a tertiary degree [48], private health insurance [49], and teeth retention greater than 20 teeth [41]. While no differences were found for the majority of oral health behaviours, more participants visited the dentists for check-ups than in the Australian population [43, 50].

Table 1 Sociodemographic variables, oral health behaviours, and self-rated oral health

Demographic variables and oral health behaviours	Sample		Australian population	
	n	(%)	*n*	(%)
Gender				
Male	67	(25.3)	10,634,013	(49.4)*[a]
Female	198	(74.7)	10,873,704	(50.6)*[a]
Ethnicity/race				
Non-Aboriginal or Torres Strait Islander	259	(97.7)	20,959,348	(97.5)[a]
Aboriginal or Torres Strait Islander	6	(1.5)	548,369	(2.5)[a]
Marital status				
Never married	147	(55.5)	5,962,769	(34.3)*[a]
De facto, married, divorced, widowed	117	(44.1)	11,400,927	(65.7)*[a]
Education level				
Secondary or less	93	(35.1)	6994	(48.2)*[b]
Vocational or other	26	(9.8)	4179	(28.8)*[b]
Tertiary	144	(54.3)	3569	(24.6)*[b]
Health insurance				
Yes	164	(61.9)		(53.8)*[+, c]
No	92	(34.7)		(46.2)*[+, c]
Teeth retention				
1–20 teeth	12	(4.5)		(12.3)*[+, d]
>20 teeth	246	(92.8)		(87.6)*[+, d]
Reason for dental visiting				
Check-up	184	(69.8)		(59.7)*[+, d]
Dental problem	77	(29.4)		(40.3)*[+, d]
Dental visiting				
At least once every 12 months	166	(63.1)		(60.7)[+, d]
Less often than once every 12 months	97	(36.5)		(39.2)[+, d]
Tooth brushing				
<7 times per week	21	(7.9)		(7.4)[+, e]
≥7 times per week	242	(91.3)		(92.6)[+, e]
Interdental cleaning				
At least one interdental cleaning over 1 week	164	(61.9)		(61.9)[+, e]
No interdental cleaning over 1 week	100	(37.7)		(38.1)[+, e]
Self-rated oral health				
Good, very good, excellent	199	(75.4)		(76.8)[+, b]
Very poor, poor, average	62	(24.6)		(23.2)[+, b]

* Demonstrates statistically significant difference ($p < 0.05$) between study sample and Australian population

[+] Exact *n* values not available

[a] [47]

[b] [48]

[c] [49]

[d] [43]

[e] [50]

Comparisons to normative data were also conducted for OHIP-14 and self-rated oral health (Table 2). While no differences were found for overall OHRQoL, participants in the present study exhibited significantly lower oral health impacts for the dimensions/subscales of Physical Pain/Disability and Functional Limitation; and greater oral health impacts for Psychological Discomfort/Disability, and Handicap, when compared with an Australian population [51]. The results for self-rated oral health did not differ significantly from the Australian population data

Table 2 Descriptive statistics, and comparisons between study sample and normative data for Oral Health Impact Profile-14, modified Dental Neglect Scale, and Experiences in Close Relationships Questionnaire-Short Form

Scales	Sample *M* (SD)	Normative data *M* (SD)
Oral Health Impact Profile-14		
OHIP-14S	7.68 (0.69)	7.50[+, a]
Dimension scores		
Physical Pain/Disability	2.70 (0.91)	3.40*[+, a]
Psychological Discomfort/Disability	3.12 (1.03)	2.30*[+, a]
Functional Limitation	0.52 (0.63)	0.73*[+, a]
Social Disability	0.71 (0.79)	0.54[+, a]
Handicap	0.64 (0.77)	0.46*[+, a]
Modified Dental Neglect Scale		
Dental Self-Care	2.53 (0.75)	
Dental Visiting	2.78 (0.84)	
Adult attachment		
Attachment anxiety		
Total score	21.31 (7.09)	21.73 (7.04)[b], 21.93 (6.62)[c]
Individual score	3.57 (1.19)	3.48 (0.93)[d]
Attachment avoidance		
Total score	16.26 (6.90)	16.28 (6.97)[b], 15.75 (6.30)[c]
Individual score	2.72 (1.15)	2.49 (0.91)*[d]

* Demonstrates statistically significant difference ($p < 0.05$) between study sample and normative data

[+] Exact standard deviation or n values not available

[a] [51]

[b] [37]

[c] [52]

[d] [53]

[50]. While normative data on the ECR-S are yet to be published, the present study's mean score for attachment anxiety and attachment avoidance are generally comparable to those found in studies of American university students and a British sample (Table 2) [53].

Bivariate analyses

As seen in Table 3, both insecure attachment patterns were positively and significantly correlated with OHIP-14S and five of the seven OHIP-14 subscales. Only attachment anxiety was significantly correlated with the Social Disability subscale. The m-DNS Dental Visiting subscale was significantly negatively correlated with attachment anxiety. Only attachment avoidance was significantly correlated with self-rated oral health. Both patterns of attachment insecurity were significantly correlated with each other. Neither of the attachment patterns was significantly correlated with any of the covariates (e.g. gender, tooth brushing frequency, flossing frequency, reason for dental visit). Gender was significantly related to one OHIP-14 subscale (Functional Limitation), while age was unrelated to these variables.

Multivariate regression models with attachment anxiety

The results of multivariate regression models with attachment anxiety as the primary independent variable, when controlling for other variables, are detailed in Table 4. Attachment anxiety was positively associated with OHIP-14S and five of the seven OHIP-14 subscales (e.g. Functional Limitation, Psychological Discomfort, Psychological Disability, Social Disability, and Handicap) and negatively associated with the m-DNS Dental Visiting subscale. The adjusted R^2 values demonstrated that 9.3–21.4 % of the variation in the significant variables was explained by the models.

Multivariate regression models with attachment avoidance

Table 4 also shows the results of the multivariate regression models using attachment avoidance as the primary explanatory variable, when adjusting for covariates. Attachment avoidance was associated with OHIP-14S and four of the seven OHIP-14 subscales: Functional

Table 3 Internal consistency of variables, and Pearson correlations between independent and dependent variables

	Cronbach's α	Attachment anxiety, *r*	Attachment avoidance, *r*
OHIP-14			
Overall score (OHIP-14S)	0.93	0.24***	0.20**
Functional Limitation	0.71	0.17**	0.27***
Physical Pain	0.69	0.12*	0.13*
Psychological Discomfort	0.77	0.27***	0.20**
Physical Disability	0.78	0.07	0.08
Psychological Disability	0.75	0.24***	0.16**
Social Disability	0.82	0.22***	0.12
Handicap subscale	0.81	0.25***	0.19**
Modified Dental Neglect Scale			
Dental Self-Care	0.72	−0.06	−0.09
Dental Visiting	0.67	−0.16**	−0.11
Self-rated oral health		−0.12	−0.27***
Adult attachment			
Attachment anxiety	0.68		
Attachment avoidance	0.76	0.36***	

* $p < 0.05$; ** $p < 0.01$, *** $p < 0.001$

Limitation, Psychological Discomfort, Psychological Disability, and Handicap. Significant negative associations were demonstrated with the m-DNS Dental Visiting subscale and self-rated oral health. In models in which attachment avoidance was significant, 11.9–24.8 % of the variance was explained.

Discussion

This study is the first to assess the associations between patterns of attachment insecurity, operationalised as attachment anxiety and attachment avoidance, and: OHRQoL and self-rated oral health. The study also extends earlier research linking adult attachment to oral health behaviours by examining a wider range of protective oral health behaviours in a sample with favourable oral health status. As hypothesised, attachment insecurity was associated with decreased OHRQoL, in relation to overall well-being, as well as in the functional and psychosocial dimensions. For protective oral health behaviours and self-rated oral health, the findings also supported the hypotheses with attachment insecurity associated with less adaptive dental visiting patterns, and attachment avoidance linked with lower self-rated oral health. An explanation of the results and the implications for each of the findings are discussed in the following sections.

Oral health-related quality of life

Both patterns of attachment insecurity were associated with more oral health impacts and, thus, with diminished overall OHRQoL (i.e. OHIP-14S). This finding implies that insecurely attached people are more likely to perceive that their overall well-being is compromised due to their oral health. This result was revealed despite the study sample having characteristics (e.g. more than 20 teeth, private health insurance, positive oral health behaviours) that have been associated with increased OHRQoL in other studies [43, 50]. The results are in accord with other studies in which insecurely attached people with breast cancer [1], systemic lupus erythematosus [17], and inflammatory bowel disease [20, 21] reported poorer health-related quality of life. Two potential mechanisms for the association between attachment insecurity and lowered OHRQoL are the links between insecure attachment and less effective coping strategies [23] and the tendency to interpret experiences more negatively [38]. The present study supports the existing body of the literature that suggests that the subjective appraisal of overall well-being related to oral health may be linked with psychosocial factors, beyond sociodemographic variables and oral health status [54–57].

When examining the specific dimensions of OHRQoL, the results indicated that higher levels of attachment insecurity were linked with increased oral health impacts in the functional (i.e. Functional Limitation, Handicap) and psychological (i.e. Psychological Discomfort, Psychological Disability) dimensions. Additionally, anxiously attached individuals were likely to perceive more oral health impacts in social dimensions of OHRQoL, which may be related to their low self-worth and desire for validation from others [13]. Negative affectivity (i.e. general disposition to experience negative emotional states), which has previously been linked with attachment insecurity [58], has also been

Table 4 Regression coefficients from multivariate regression models of attachment anxiety and attachment avoidance predicting OHIP-14, m-DNS, and self-rated oral health, when controlling for demographic characteristics and oral health behaviours

	Attachment anxiety		Attachment avoidance	
	β	Model R^2 (adj)	β	Model R^2 (adj)
OHIP-14[a]				
Overall score (OHIP-14S)	0.17**	0.21***	0.15**	0.21***
Functional Limitation	0.13*	0.09***	0.24***	0.13***
Physical Pain	0.06	0.14***	0.09	0.14***
Psychological Discomfort	0.22***	0.14***	0.17**	0.12***
Physical Disability	0.01	0.15***	0.02	0.15***
Psychological Disability	0.18**	0.18***	0.11*	0.16***
Social Disability	0.16**	0.15***	0.08	0.13***
Handicap	0.19**	0.16***	0.15**	0.14***
Modified Dental Neglect Scale				
Dental Self-Care[b]	−0.15*	0.06***	−0.12*	0.05**
Dental Visiting[c]	−0.05	0.07***	−0.06	0.07***
Self-rated oral health[a]	−0.06	0.19***	−0.25***	0.25***

* $p < 0.05$; ** $p < 0.01$, *** $p < 0.001$

[a] Covariates included gender, tooth brushing frequency, flossing frequency, and reason for dental visit

[b] Covariates included gender, tooth brushing frequency, and flossing frequency

[c] Covariates included gender and reason for dental visit

strongly associated with adverse oral health impacts on functional and psychosocial aspects of OHRQoL [59, 60]. Unlike other research [7, 61], attachment insecurity was not associated with the physical aspects (e.g. Physical Pain and Physical Disability) of OHRQoL. However, this sample had a favourable oral health status, decreasing the likelihood of oral health diseases [62]. In sum, findings from the present study suggest that attachment insecurity is associated with the perceived adverse impact of oral health conditions on overall well-being and, specifically, the functional and psychosocial aspects of OHRQoL.

Oral health behaviours

With respect to oral health behaviours, results of the present study suggested that those who were insecurely attached were more likely to report having less adaptive dental visiting behaviours, corresponding to problem-oriented, irregular, and delayed dental appointments [41, 42]. Congruent with such findings, non-optimal participation in protective health behaviours is proposed to be a potential mechanism through which attachment insecurity is a risk factor for the development of health problems [23]. As attachment theory suggests, avoidantly attached individuals may be reluctant to schedule regular preventive dental appointments as they have higher levels of self-reliance, distrust of others, and avoidance of support-seeking behaviours [8, 63]. Studies in the medical literature have similarly revealed links between attachment avoidance and decreased health care utilisation [3, 64].

The literature examining links between attachment anxiety and health behaviours has been inconsistent, depending on the sample investigated. For individuals with a chronic health condition (e.g. periodontitis [24], chronic pain [65], medically unexplained symptoms [66]), attachment anxiety has been associated with increased health care utilisation. In contrast, when examining preventative health care behaviours in relatively healthy young people, attachment anxiety was linked to decreased participation in cervical screening [22]. Such inconsistencies suggest that there may be differences in health care utilisation for asymptomatic, preventative health care visits compared to disease-oriented health care visits. Another plausible explanation is that as both cervical screening and dental visiting may be considered as distressing health care visits, individuals who are anxiously attached and relatively healthy may tend to avoid potentially distressing health care visits if there is no immediate need (e.g. to alleviate pain from an oral health problem) [22]. While the findings suggest that for a relatively healthy population, those who are insecurely attached are more likely to participate in less adaptive dental visiting behaviours, further research is required to increase confidence in these findings.

Self-rated oral health

When examining the third oral health parameter of self-rated oral health, the results revealed that increased attachment avoidance was associated with poorer self-ratings of oral health. Similar associations have been found in other studies between higher attachment avoidance and

increased symptom reporting [4, 18, 32, 33]. Individuals with higher levels of attachment avoidance may be prone to focusing on health factors as a substitute for focusing on emotional factors [3]. The finding of the present study, linking attachment avoidance and lowered self-rated oral health, adds to the body of the literature suggestive of associations between psychosocial characteristics and self-rated oral health [67–69].

Covariates

When examining the associations for the sociodemographic covariate, females were more likely to report higher oral health impacts related to their pronunciation and sense of taste (i.e. Functional Limitation) compared to males. For the behavioural covariates, individuals who engaged in unfavourable oral health behaviours (e.g. less frequent tooth brushing, weekly flossing, and problem-oriented dental visiting) were more likely to have more oral health impacts for both overall and specific dimensions of OHRQoL, as well as lowered self-rated oral health.

Considerations

Although largely consistent with expectations, results of the present study should be considered as preliminary. Because the sample was recruited through convenience sampling, selection bias may have occurred. Indeed, analyses suggested that the present sample was different in some respects from a nationally representative sample, limiting capacity to generalise findings. To address this in future studies, random sampling may be used and large samples recruited. There were also some demographic differences (i.e. age, gender) in those who completed the online and printed questionnaires.

Several factors related to the measures used should also be considered. While the self-report data used in the present study accurately describe participants' subjective perceptions, reliance on such data may result in common method variance. To address this limitation, future research may include oral examinations by a dentist to provide an objective measure of oral health status; as well as interview approaches to assess OHRQoL and adult attachment pattern. The method of conceptualising and measuring adult attachment in this study was rigorous and well accepted; however, use of a categorical measure of adult attachment in future studies will support comparisons with earlier literature in the attachment/health field. In addition, the presence of comorbidities such as chronic oral diseases was not evaluated in this study, and future research should consider the influence of such variables on the relationships found.

As a result of the cross-sectional nature of this study, causal relationships cannot be inferred, and future longitudinal studies should be conducted. Finally, the potential of a Type II error occurring may have increased as a large number of variables (i.e. 3–5 variables) were included in the multiple linear regression models.

To extend the scope of the present study, the effect of other factors (e.g. social support, coping strategies, depression, relationship between dental provider and patient, history of child abuse/neglect) on the link between adult attachment and oral health parameters warrants investigation.

Conclusion

The results of the present study suggest that attachment insecurity was significantly related to diminished overall quality of life and, more specifically, to the more psychosocial and functional aspects of OHRQoL. Attachment insecurity was also associated with less adaptive dental visiting behaviours, and lower self-rated oral health. These findings underscore the potential value of adopting adult attachment as a theoretical framework for understanding a range of oral health-related parameters. Assessing for attachment styles may also assist in identification of people who are at risk of more negative outcomes for OHRQoL, oral health behaviours, and self-rated oral health. While the findings point to the potential value of attachment-informed approaches being considered when undertaking oral health-related interventions, more research in this field is required.

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Compliance with ethical standards

Conflict of interest The authors declare no conflicts of interest.

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