A structural equation model to assess the influence of neuroticism on oral health-related quality of life in complete denture wearers

Hitomi Soeda | Yusuke Sato | Eijiro Yamaga | Shunsuke Minakuchi

Objective: To investigate the influence of patient neuroticism on oral health-related quality of life (OHRQoL) in complete denture wearers.

Background: There are some indicators of complete denture prognosis. The relationship between personality traits, mainly neuroticism and OHRQoL in complete denture wearers remains unclear.

Materials and methods: A total of 199 edentulous patients participated in this study. Neuroticism was investigated using the Japanese version of the modified short form of the Eysenck Personality Questionnaire (MS-EPQ). OHRQoL was measured according to the Japanese version of the Oral Health Impact Profile for edentulous subjects (OHIP-EDENT-J). Structural equation modelling was used to evaluate the relationship between neuroticism and subscales of the OHIP-EDENT-J.

Results: The High and Low neuroticism groups fit the same model for the 5 subscales of the OHIP-EDENT-J—functional limitation, pain, disability, discomfort and handicap—with different path coefficients. The path from functional limitation to handicap via pain, disability and discomfort was the same as previously reported. However, path coefficients for pain to disability differed significantly between the 2 neuroticism groups. The High neuroticism group had higher estimated path coefficients for Pain compared with those for other subscales than did the Low neuroticism group. This finding indicates that the participants who are high in neuroticism felt pain more strongly, and their disability increased.

Conclusions: Neuroticism may influence OHRQoL in complete denture wearers because of patients’ perception of pain.

Keywords: complete dentures, neuroticism, oral health-related quality of life, personality, predictive factor

1 | INTRODUCTION

The number of edentulous patients has decreased over the past decades in developed countries. Moreover, the McGill Consensus Statement described that two-implant overdentures are the first treatment choice for edentulous patients. However, not all such patients can or want to receive implant overdenture treatment, for economic reasons or because of the patients’ general condition, bone status or fear of surgery. Therefore, understanding the predictors of satisfaction with complete dentures remains important. Thus far, many studies have focused on predictors of denture satisfaction. However, Critchlow and Ellis have argued that the evidence base in this area suffers from a lack of well-conducted studies.
Four factors—mandibular ridge form, accuracy of jaw relations, denture quality, and adaptability—have been suggested as predictors of complete denture satisfaction.\(^4\) Fenlon and Sherriff showed that mandibular residual alveolar ridge condition, or the reproduction quality of the maxillomandibular relationship, is associated with patient satisfaction.\(^4\) Yamaga et al\(^5\) also demonstrated that mandibular denture stability and retention and mandibular ridge form are associated with satisfaction through jaw relations. Moreover, mandibular ridge form is considered to be directly related to patient satisfaction.\(^5\) Marchini also suggested factors that may influence patients’ satisfaction with their complete dentures.\(^6\) There is reasonable empirical evidence for 5 broad influences on satisfaction: type of therapy chosen, personality and psychological factors, oral conditions, patient perception of the dentist and dental care, and communication issues.\(^6\)

Much research has focused on personality of patients as a predictor of complete denture satisfaction. Patients who have problems using dentures share characteristics, such as complaining about dentures or pain.\(^7\) Moreover, a significant association between personality traits and emotional reactions to new dentures has been observed.\(^8\) Some studies have shown a significant relationship between high neuroticism and patient dissatisfaction\(^7,10\) and concur that patients who are high in neuroticism are more likely to complain.\(^11\) Guckes found a significantly negative association between neuroticism and denture satisfaction in complete denture wearers.\(^12\) Conversely, others studies have found no relationship between personality and denture satisfaction.\(^13\) Eysenck showed that individuals high in neuroticism tend to have a highly reactive autonomic nervous system. Conversely, the autonomic nervous systems of individuals who are low in neuroticism are not very reactive.\(^14\)

Many studies have examined oral health-related quality of life (OHRQoL). There is a strong causal relationship between the Oral Health Impact Profile (OHIP) and denture satisfaction.\(^5\) The OHIP is used to measure OHRQoL. Takeshita et al\(^15\) discovered that personality traits are associated with OHQoL in elderly people. They found that neuroticism was negatively associated with OHQoL, and extraversion was positively associated with OHQoL in community-dwelling Japanese elderly people.\(^15\) Mahmoud et al\(^16\) showed the possibility of influence of neuroticism on OHRQoL. Torres et al\(^17\) also found an influence of personality traits, mainly neuroticism, on OHRQoL. However, these studies did not focus on complete denture wearers. Therefore, the relationship between neuroticism and complete denture satisfaction remains unclear.

To enable the prediction of denture prognosis, research that evaluates the impact of each potential factor is needed. Investigation of the patient’s personality as a predictor of complete denture satisfaction and OHRQoL is needed. Therefore, the aim of this study was to investigate the influence of patients’ neuroticism on OHRQoL in complete denture wearers and to explicate that relationship using a structural equation model based on Baker’s model.\(^18\) Baker’s model is one of the empirical models in the dental field that shows the connection between disease and social circumstances. Baker provided an empirical test of Locker’s conceptual model.\(^19\) Locker’s model brought the patient-centred perspective to dentistry and describes a progression in which impairment (anatomical loss, structural abnormality or disturbance) leads to functional limitations (restrictions in functions of the body), which in turn lead to pain and discomfort (self-reports of physical and psychological symptoms), which lead to disability (limitations in performing activities of daily living), which results in social disadvantage.\(^18,19\) In Baker’s model regarding the edentulous population, functional limitations lead directly to pain, discomfort and disability. Pain directly leads to discomfort and disability. Discomfort directly leads to disability, and disability directly leads to handicap.\(^18\)

Structural equation modelling is a powerful multivariate analytical method. This method can reveal direct and indirect effects and express complex relationships visually by path diagram. This method has been applied to oral health by Baker\(^20\) and to other fields of dentistry recently.\(^21\) There are 3 structural equation modelling analysis strategies in model specification and evaluation: a strictly confirmatory strategy, a model generation strategy and an alternative model strategy.\(^22\) The strictly confirmatory strategy is to study one a priori model. In the model generation strategy, an initial model is fit to data and then modified as necessary to improve fit. In the alternative model strategy, multiple a priori models are specified and evaluated. In this study, a strictly confirmatory strategy was employed and the a priori model is Baker’s model of edentulous patients.

The following hypotheses were tested: (i) neuroticism negatively influences OHRQoL in complete denture wearers; (ii) Baker’s model of edentulous patients is valid for patients with both low and high neuroticism scores; and (iii) patients with high neuroticism scores require a different model to describe the relationships between OHIP subscales (Functional limitation, Pain, Discomfort, Disability and Handicap) from those with low neuroticism scores.

## MATERIALS AND METHODS

### 2.1 | Subjects

The participant population consisted of maxillary and mandibular complete denture wearers who visited our institution from 2009 to 2012. Exclusion criteria were systemic illness and inability to understand the materials of this study. Two hundred and forty-eight complete denture wearers (mean age, 75.1 ± 9.2 years; 105 men) participated. Baseline data (participant’s age, gender, mandibular denture stability, mandibular denture retention, diagnostic classification number, mandibular edentulous period) and questionnaire results about OHRQoL and neuroticism were collected for all 248 participants. Forty-nine participants were excluded because of missing data. In the end, 199 participants (80.2%; mean age, 75.3 ± 9.2 years; 83 men) were included in the analysis. All participants provided their written informed consent to participate, and the university’s ethics committee approved the study design; approval number: 232.

### 2.2 | Baseline characteristics

Crichlow showed denture stability and retention and mandibular ridge form as factors that influence complete denture outcome.\(^2\) These factors were investigated in this study by one prosthetic specialist. Mandibular
denture stability and retention were estimated using Kapur’s method. Stability was assessed with a 3-point scale, and retention with a 4-point scale. The method classifies mandibular complete denture stability into 3 scores: 0, no stability; 1, some stability; 2, sufficient stability. The method classifies mandibular retention into 4 scores: 0, no retention; 1, minimum retention; 2, moderate retention; 3, good retention. Mandibular ridge form was assessed using Cawood and Howell’s method, which classifies edentulous ridges into 5 categories: Class II, immediately post-extraction; Class III, high well-rounded ridge form; Class IV, knife-edge ridge form; Class V, flat ridge form; Class VI, depressed ridge form.

2.3 | OHRQoL

OHRQoL was measured with the Japanese version of the Oral Health Impact Profile for edentulous subjects (OHIP-EDENT-J). The OHIP-EDENT-J has 19 questions derived from the English-language OHIP-EDENT. The OHIP-EDENT-J measures the impact of a condition on everyday physical, psychological and social functioning. Participants were asked to rate the frequency of each impact on a 5-point scale from 0 (never) to 4 (very often), with higher scores indicating a worse OHRQoL. These questions are classified into the following 7 sub-scales: Functional limitation, Physical pain, Psychological discomfort, Physical disability, Psychological disability, Social disability and Handicap. The summed scores for each of the 5 subscales (Functional limitation, Pain, Discomfort, Disability and Handicap) were used in this analysis in accordance with Baker’s research.

2.4 | Neuroticism

Neuroticism was measured using the Japanese version of the modified short form Eysenck Personality Questionnaire (MS-EPQ). The MS-EPQ has 12 items, 6 each relating to extraversion and to neuroticism. Participants were asked to rate their usual behaviours or thoughts regarding each item on a 4-point scale from 1 (never) to 4 (markedly), with higher scores indicating both strong extraversion and neuroticism. In this study, only the responses related to neuroticism were used. The median score was 14 (range 6-24). To investigate the difference between participants who were low or high on neuroticism, the sample was divided into 2 groups according to their neuroticism scores (low [n = 104]: participants with neuroticism scores <14; and high [n = 95]: participants with neuroticism scores ≥15).

2.5 | Confounding factors

Pearson’s correlation coefficients between each OHIP subscale and the neuroticism score were checked to see whether confounding factors were present. In general, coefficients over 0.85 indicate multicollinearity.

2.6 | Difference in subscale scores between groups

The Mann-Whitney U test was carried out to investigate group differences in the 7 subscale scores (Functional limitation, Physical pain, Psychological discomfort, Physical disability, Psychological disability, Social disability and Handicap). The criterion for significance was a $P < .05$.

2.7 | Statistical analysis

A structural equation model was constructed to examine the relationships among the 5 subscales of the OHIP-EDENT-J, using AMOS 17.0 (SPSS Japan Inc., Tokyo, Japan). Parameter estimates of direct, indirect and total effects were determined using the bootstrap method based on 1000 samples. Effect sizes of the direct, indirect and total effects were interpreted by a widely used and recommended method in social science. Standardised direct, indirect and total effects with an absolute value less than 0.1 were interpreted as small; values around 0.3 were considered medium; and values greater than 0.5 were considered large. Verification and rounding of the model were conducted based on Baker’s model. The main hypotheses from Baker’s edentulous model were that: Functional limitation would predict Pain, Discomfort and Disability; Pain would predict Discomfort and Disability; Discomfort would predict Disability; and Disability would predict Handicap.

2.8 | Multigroup analysis

To check whether the 2 groups represented the same population, multigroup analysis was carried out. This analysis includes (i) evaluation of the model fit for each group; (ii) confirmation of the configural invariance model, that the path coefficients for each path may differ between groups; (iii) confirming the fit indices on the limitation model, in which all path parameters were hypothesised as the same in the 2 groups; and (iv) comparison of the fit indices in the limitation model with those of the no-limitation model.

2.9 | Sample size estimation

As a general guide, 20 per free parameter was the desirable sample size; however, 10 was recommended as the actual minimal size by Kline. Baker’s model has 7 free parameters; therefore, 70 was the minimum sample size for each group in this study.

2.10 | Model fit evaluation

To investigate model fit to the data, indices used widely in structural equation modelling, that is $P$-value, standardised root-mean-square residual (SRMR), goodness-of-fit index (GFI) and root-mean-square error of approximation (RMSEA), were employed. For good model fit, the following index values should be met: $P$-value >.05, SRMR < 0.08, GFI > 0.95 and RMSEA < 0.05.

3 | RESULTS

3.1 | Baseline characteristics

Group baseline characteristics are shown in Table 1. The median neuroticism (MS-EPQ) score was 14. The 104 participants whose
Neuroticism scores fell below 14 were defined as the Low neuroticism group; the other 95 were the High neuroticism group. No significant differences were observed between the 2 neuroticism groups. The medians and ranges of each subscale score by group are shown in Table 2.

### 3.2 Confounding factors

Pearson’s correlation coefficients between each subscale and the neuroticism score were determined as follows: Functional limitation and neuroticism, $r = .032, P = .65$; Pain and neuroticism, $r = .14, P = .040$; Discomfort and neuroticism, $r = .091, P = .20$; Disability and neuroticism, $r = .25, P < .001$; Handicap and neuroticism, $r = .21, P < .001$; and total OHIP score and neuroticism, $r = -.055, P = .44$. There were no confounding factors between neuroticism and OHIP subscales.

### 3.3 Difference in subscale score between groups

The subscales were not normally distributed; therefore, the Mann-Whitney $U$ test was adopted to compare the 2 groups. Social disability and Handicap exhibited significant group differences ($P < .05$).

<table>
<thead>
<tr>
<th></th>
<th>Low neuroticism</th>
<th>High neuroticism</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, y</strong></td>
<td>75.7</td>
<td>74.9</td>
<td>.56</td>
</tr>
<tr>
<td>Female gender, n (%)</td>
<td>67 (64.4%)</td>
<td>49 (51.6%)</td>
<td>.07</td>
</tr>
<tr>
<td><strong>Mandibular denture stability, n (%)</strong></td>
<td></td>
<td></td>
<td>.10</td>
</tr>
<tr>
<td>0</td>
<td>42 (40.4%)</td>
<td>25 (26.3%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>36 (34.6%)</td>
<td>38 (40.0%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>26 (25.0%)</td>
<td>32 (33.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Mandibular denture retention, n (%)</strong></td>
<td></td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>0</td>
<td>36 (34.7%)</td>
<td>20 (21.1%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>20 (19.2%)</td>
<td>17 (17.9%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>20 (19.2%)</td>
<td>25 (26.3%)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>28 (26.9%)</td>
<td>33 (34.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Mandibular ridge form, n (%)</strong></td>
<td></td>
<td></td>
<td>.58</td>
</tr>
<tr>
<td>II</td>
<td>5 (4.8%)</td>
<td>6 (6.3%)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>29 (27.9%)</td>
<td>27 (28.4%)</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>28 (26.9%)</td>
<td>18 (18.9%)</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>35 (33.7%)</td>
<td>33 (34.7%)</td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>7 (6.7%)</td>
<td>11 (11.6%)</td>
<td></td>
</tr>
<tr>
<td><strong>Mandibular edentulous period, n(%)</strong></td>
<td></td>
<td></td>
<td>.68</td>
</tr>
<tr>
<td>&lt;1 y</td>
<td>20 (19.2%)</td>
<td>20 (21.1%)</td>
<td></td>
</tr>
<tr>
<td>1≤y≤3 y</td>
<td>6 (5.8%)</td>
<td>8 (8.4%)</td>
<td></td>
</tr>
<tr>
<td>3≤y≤5 y</td>
<td>6 (5.8%)</td>
<td>5 (5.3%)</td>
<td></td>
</tr>
<tr>
<td>5≤y≤10 y</td>
<td>10 (9.6%)</td>
<td>15 (15.8%)</td>
<td></td>
</tr>
<tr>
<td>10 y≤</td>
<td>60 (57.7%)</td>
<td>46 (48.4%)</td>
<td></td>
</tr>
</tbody>
</table>

$t$ test.

$^b$Chi-square test.

$^c$Score 0: no stability, denture base demonstrates extreme rocking on its supporting structures under pressure; Score 1: some stability, denture base demonstrates moderate rocking on its supporting structures under pressure; Score 2: sufficient stability, denture base demonstrates slight or no rocking on its supporting structures under pressure.

$^d$Score 0: no retention, when a denture is seated in its place, it displaces itself; Score 1: minimum retention, the denture offers slight resistance to vertical pull, and little or no resistance to lateral force; Score 2: moderate retention, the denture offers moderate resistance to vertical pull, and little or no resistance to lateral force; Score 3: good retention, the denture offers maximum resistance to vertical pull, and sufficient resistance to lateral force.

$^e$Class II: immediately post-extraction; Class III: well-rounded ridge form, adequate in height and width; Class IV: knife-edge ridge form, adequate in height and inadequate in width; Class V: flat ridge form, inadequate in height and width; Class VI: depressed ridge form, with some basilar loss evident.

### TABLE 1 Comparison of group baseline characteristics
However, no significant differences were observed in the other subscales (Table 2).

### 3.4 | Model fit evaluation

In the Low neuroticism group, Baker’s model fit was reasonable \((P = .27, GFI = 0.99, RMSEA = 0.054 [90\%CI = 0.00-0.18] \text{ and } SRMR = 0.025)\), while the High neuroticism group showed a negative path coefficient with poor fit \((P = .12, GFI = 0.98, RMSEA = 0.100 [90\%CI = 0.00-0.22] \text{ and } SRMR = 0.023)\). When the path of Functional limitation to Disability was omitted, this model had better fit in both the Low neuroticism group \((P = .40, GFI = 0.99, CFI = 1.00, RMSEA = 0.0080 [90\%CI = 0.00-0.15] \text{ and } SRMR = 0.026)\) and the High neuroticism group \((P = .18, GFI = 0.98, CFI = 0.99, RMSEA = 0.078 [90\%CI = 0.00-0.19] \text{ and } SRMR = 0.029)\).

### 3.5 | Multigroup analysis

To investigate whether the 2 groups are from the same population, multigroup analysis was performed. Placement invariance was confirmed. Heterogeneous paths were Pain to Disability, and measurement error to Pain. Therefore, the limitation model was instituted, as heterogeneous direct parameters were the same between the 2 groups under simultaneous analysis. The no-limitation model had a close fit \((P = .24, GFI = 0.98, CFI = 1.000, RMSEA = 0.038 [90\%CI = 0.00-0.097] \text{ and } SRMR = 0.026)\), while the limitation model had a reasonable fit \((P = .0060, GFI = 0.95, CFI = 0.98, RMSEA = 0.087 [90\%CI = 0.044-0.074] \text{ and } SRMR = 0.028)\).

### 3.6 | Standardised parameter and adopted model

Standardised parameter estimates of direct, total indirect and total effects are shown in Tables 3 and 4. The path diagrams are shown in Figures 1 and 2.

### 4 | DISCUSSION

The aim of this study was to investigate the influence of patient neuroticism on OHRQoL in complete denture wearers and to explicate the relationship. In our study, the Low and High neuroticism groups fit the same model. In this model, Functional limitation, which describes restrictions in body functions such as difficulty chewing, leads to Pain (self-reports of physical symptoms) and Discomfort (self-reports of psychological symptoms). Pain also leads to Discomfort and Disability (limitations in performing daily activities, such as maintaining a satisfactory diet). Discomfort leads to Handicap, which means social disadvantages such as social isolation. Multigroup analysis showed that the no-limitation model had a close fit, while the limitation model had a reasonable fit. The resulting adoption of the configural invariance model indicates that the 2 groups should be addressed as different populations. Parameter estimates were high between Disability and Handicap in both the Low and High neuroticism groups \((0.75 \text{ and } 0.80, \text{ respectively})\). In the Low neuroticism group, the parameter estimate between Functional limitation and Discomfort was high, while the High neuroticism group had higher estimates of Pain compared with other subscales (excluding Functional limitation) than did the Low neuroticism group.

This study, which conducted OHIP subscale structural modelling using SEM, focused on patient personality based on Baker’s conceptual model. However, some limitations must be noted. All participants were visitors to our clinic; the study is cross-sectional in design and did not have enough analysis of the relationship of clinical findings.

The essential paths are not contradictory to previous studies by Baker18 and Locker.19 The study hypotheses were confirmed. Moreover, the significant group differences in Social disability and Handicap support Baker’s and Locker’s empirical models and this common model. Disability and Handicap are downstream in the model, and the finding that the difference was more significant in the downstream portion supports the model stream. The configural invariance model was confirmed, however, in that the limitation model that all path coefficients were the same was not confirmed. The finding that the configural invariance model was confirmed is likely the result of personality-related differences in perceptions between the 2 groups and suggests a relationship between neuroticism and OHRQoL.

In this study, the High neuroticism group had higher estimates of Pain compared with other subscales than did the Low neuroticism group. This finding shows an effect of Pain on other subscales in the

### TABLE 2 Medians and ranges of Oral Health Impact Profile subscales in each group

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Low neuroticism (Median/Max/min)</th>
<th>High neuroticism (Median/Max/min)</th>
<th>Difference between low and high neuroticism group (P)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional limitation</td>
<td>8/12</td>
<td>7/12</td>
<td>.85</td>
</tr>
<tr>
<td>Pain</td>
<td>6/16</td>
<td>6/16</td>
<td>.10</td>
</tr>
<tr>
<td>Discomfort</td>
<td>3/8</td>
<td>3/8</td>
<td>.62</td>
</tr>
<tr>
<td>Disability</td>
<td>7/26</td>
<td>8/32</td>
<td>.06</td>
</tr>
<tr>
<td>Physical</td>
<td>-/-</td>
<td>-/-</td>
<td>.21</td>
</tr>
<tr>
<td>Psychological</td>
<td>-/-</td>
<td>-/-</td>
<td>.14</td>
</tr>
<tr>
<td>Social</td>
<td>-/-</td>
<td>-/-</td>
<td>.02*</td>
</tr>
<tr>
<td>Handicap</td>
<td>1/8</td>
<td>2/8</td>
<td>.02*</td>
</tr>
</tbody>
</table>

*Chi-square test. *\(P < .05\).
High neuroticism group. The source of the relationship between patient personality and satisfaction experienced in clinical situations may arise from a heterogeneous path; that is, from pain to disability. Pain has been demonstrated to readily affect disability.34 In general, people who are high in neuroticism have strong reactivity.35 It is conceivable that this personality trait caused differences between the 2 groups in subscales related to affectivity, such as Social disability and Handicap. People who are high in neuroticism have negative self-perceptions and tend to be influenced by negative life events. Additionally, neuroticism is a predictor of depression.36 In this study, Functional limitation and Pain related to oral health could be considered negative life events. Therefore, patients who are high in neuroticism likely feel more depressed than do who are low in neuroticism when experiencing the same functional limitation or pain. In the fear-avoidance model,37 whether patients recover from pain is determined by the way they comprehend the pain. If patients catastrophise their pain, they follow the route to pain-related fear and avoidance, subsequently falling into a chronic pain loop.37 Moreover, Goubert et al38 argued that neuroticism is related to pain severity after pain catastrophising. These studies suggest a relationship between neuroticism and chronic pain through pain catastrophising. Vlaeyen and Linton37 also described pain catastrophising as a trigger of chronic pain, which subsequently influences disability. Education to promote response shifts in patients who are high in neuroticism to reduce pain catastrophising may reduce chronic

<table>
<thead>
<tr>
<th></th>
<th>Functional limitation</th>
<th>Pain</th>
<th>Discomfort</th>
<th>Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct effect</td>
<td>0.69 (0.05)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>95%CI</td>
<td>0.59-0.077**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total indirect effect</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>95%CI</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total effect</td>
<td>0.69 (0.05)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>95%CI</td>
<td>0.59-0.77**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**TABLE 3** Standardised parameter estimates of direct, total indirect and total effects in the Low neuroticism group

**Standardised estimates are on the first line (with Bootstrap standard errors). 95% confidence intervals by percentile method (95%CI) are on the second line.**

*P < .05.

**P < .01.
pain and increase denture satisfaction and OHRQoL. Moreover, patient-specific education might be effective. Cognitive-behavioural therapy may also be helpful to disrupt destructive patterns, thereby reducing pain. Managing anxiety for patients who are high in neuroticism, for example by implementing changes in the environment or oral condition, could be one method of promoting oral health-related quality of life in complete denture wearers. Further study with multivariate analysis is necessary to confirm our findings. Such studies should include neuroticism and other parameters as factors in denture satisfaction and OHRQoL. Furthermore, we will conduct studies in which we make complete dentures and investigate OHRQoL and other changes before and after the intervention. In further studies, we also wish to examine participants with the Pain Catastrophising Scale (PCS) to confirm whether they actually are catastrophising. If patients score high on the catastrophising scale and the neuroticism scale, we would intervene to reduce catastrophising. The results of this study will be planned to incorporate into the Yamaga model, which has demonstrated relationships between oral condition, denture quality, chewing ability, satisfaction and OHRQoL in complete denture wearers. This body of evidence may be helpful for increasing the accuracy of prognosis predictions.

The flow of the existing Baker model has been supported in patients with both high and low neuroticism scores. However, as groups with high neuroticism scores are more affected by pain, neuroticism appears to be related to OHRQoL. In the future, the inclusion of other factors will definitely enable a more accurate and complete set of denture prognostic factors.
CONFLICT OF INTERESTS
None.

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