

ORIGINAL ARTICLE

Association Between Dental Anxiety, Utilisation and Oral Health-related Quality of Life Among Young Adults in Malaysia

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ABSTRACT

Introduction: Dental anxiety (DA) is a potential barrier to dental care among young adults in Malaysia, yet its influence on dental utilisation (DU) and oral health-related quality of life (OHRQoL) remains unclear. This study aims to investigate the relationship between DA and DU, as well as their impact on OHRQoL for Malaysian young adults. **Methods:** A cross-sectional study was conducted among 601 young adults in Selangor using convenience sampling. Participants completed a self-administered questionnaire assessing DA, DU and OHRQoL. **Results:** The mean age of participants was 20.67 ± 2.71 years. While 94.8% perceived dental visits as important, only 72.5% reported intent to attend preventive check-ups. The most common barriers to DU were time (67.2%), cost (17%), and fear (6.8%). The mean MDAS score was 11.87 ± 4.42 . Higher DA was significantly associated with sex and unknown fear items ($p < 0.05$). However, DA was not significantly related to actual DU behaviour. Multiple linear regression identified key predictors of poorer OHRQoL, including older age ($p = 0.016$), Malay ethnicity ($p < 0.001$), proximity to a dental clinic (≤ 5 km: $p = 0.014$), and high DA (MDAS ≥ 13 : $p < 0.001$). The model demonstrated moderate explanatory power (Adjusted $R^2 = 0.143$, $F = 8.153$, $p < 0.001$). **Conclusions:** Although DA did not significantly influence DU, it was associated with OHRQoL, along with age, ethnicity, and proximity to dental clinics. These findings highlight the need to address DA to enhance oral health-related quality of life among young Malaysian adults.

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INTRODUCTION

Dental anxiety (DA) is well-documented as a significant barrier to dental treatment, leading to avoidance behaviour and poor oral health outcomes(1). The prevalence of DA varies by age, with higher rates among preschoolers (36.5%) and schoolchildren (25.8%) compared to teenagers (13.3%) (2). With a prevalence higher in young adults and women, DA affects 13.8% of the population overall (3). In Malaysia, 3.5%, primarily women, reported severe DA and anxiety dropped with age (4).

On a related note, the rates of dental utilisation (DU) and the frequency with which people sought dental treatment were low in Malaysia. This is supported by a nationwide survey conducted by Tan et al., which revealed that only 13.2% of the respondents had utilised oral health care services in the past 12 months (5). This low percentage was maintained despite several efforts by the Ministry of Health Malaysia to increase access and encourage regular dental attendance. Globally, DU shows significant disparities, notably lower among males, ethnic minorities, rural inhabitants and individuals from lower socioeconomic backgrounds (6). A 2020 study found that 86.4% of Indonesians had never visited a dentist, while women, older individuals and those in higher socioeconomic brackets tended to seek dental care more frequently (7).

Meanwhile, in Malaysia, DU was influenced by demographic and socioeconomic factors, including age, sex, marital status, income and education (5). As such, DU was lower globally among younger children, individuals with poor health and those lacking support or health literacy (8). Inadequate dental care has led to persistent oral problems, including bad breath and cavities and is associated with broader health issues like heart diseases and adverse pregnancy outcomes (9). This situation has also intensified health inequalities across different socioeconomic and demographic populations (10). Additionally, DA often causes individuals to avoid seeking dental care, further compromising their oral health and increasing the risk of tooth decay (11).

The World Health Organisation (WHO) recognises oral health-related quality of life (OHRQoL) as vital to overall health. Factors such as age, socioeconomic status, and oral diseases significantly impact OHRQoL, with untreated conditions adversely affecting oral function, causing pain, and impacting appearance on a global scale (12,13). While DA lowers OHRQoL, factors such as mobility, dental needs, age, race and obesity significantly influence OHRQoL in Malaysia (14). The DA cycle helped explain the theory that DA influences adult patients' impressions of dental appointments, thereby affecting their OHRQoL (15). The vicious cycle theory of Berggren and Meynert (1984) emphasised the relationship between DA, dental use, and OHRQoL, thus exposing a noteworthy negative correlation whereby increased DA negatively affects both DU and OHRQoL (16).

With only 28% of the adult population using dental care, young adults in Malaysia exhibit a low rate of dental service consumption (NOHSA, 2010). After secondary school, young adults continue to face limited access to oral healthcare, prompting them to seek treatment independently at primary dental clinics (NOHSA, 2010). This decline in oral healthcare usage highlights the need for a more comprehensive investigation into the underlying causes and consequences. The low rates of utilisation among Malaysian young adults may be attributed to DA, a psychological obstacle that discourages individuals from seeking the essential care they require (17,18). However, its exact position within this population remains unknown. Globally, studies have shown that DA is associated with avoidance of dental visits and adverse oral health outcomes across various populations, including young adults in Australia (19), the United Kingdom (15), Brazil (20) and Sweden (21). Although international studies have linked DA to reduced DU and poorer OHRQoL, there is a lack of empirical evidence examining this relationship specifically among Malaysian young adults. This study aims to explore the impact of DA and DU on oral OHRQoL among young adults in Selangor, Malaysia.

MATERIALS AND METHODS

Ethical considerations

This study received approval from the Research Ethics Committee (REC) at UiTM [Ref. No. 600-TNCPI (5/1/6)] and was registered with the National Medical Research Register (NMRR ID-23-02344-S6D). All participants provided written informed consent prior to their inclusion in the study.

Study population

This quantitative cross-sectional study was carried out among young adults in shopping malls located in Selangor, Malaysia. These sites were selected based on their accessibility and applicability to the intended age range in this study. Participants included in this study were Malaysian citizens aged between 15 and 24 years who provided informed consent and demonstrated a clear understanding of the questionnaire. Individuals were excluded if they had acute medical or psychiatric illnesses or if they had difficulty providing informed consent or understanding the survey content. The age range of 15 to 24 years was selected based on the definition of "young adults" provided by the Department of Statistics Malaysia (DOSM 2021).

The Raosoft Sample Size Calculator, an online tool for prevalence studies, was utilised to determine the required sample size. Its methodological framework enables researchers to customise the sample size based on specific characteristics of the study population, thereby enhancing the reliability of the gathered data (22). With a young adult population of 9,887,000, a 4% margin of error, and a 95% confidence interval (CI), the suggested sample size was 601.

Data collection

Data were collected using convenience sampling from September 2023 to February 2024. To mitigate the limitations of convenience sampling, the authors deliberately ensured a broad geographic coverage by including one shopping mall from each of the nine administrative districts in Selangor, Malaysia: Sabak Bernam, Hulu Selangor, Kuala Langat, Hulu Langat, Klang, Sepang, Petaling, Gombak, and Kuala Selangor. Within each district, one accessible mall was selected based on logistical feasibility. Although this approach does not provide statistical representativeness, it allowed for the inclusion of young adults from diverse urban and semi-urban areas across the state, enhancing the breadth of data captured.

Targeting a total of 601 participants, with a goal of approximately 67 volunteers from each district, the authors aimed to increase the statistical power of this study. According to Golzar and Noor (23), increasing the sample size in convenience sampling greatly

minimises its restrictions, thus improving the validity and dependability of study findings. Potential subjects were approached and given a thorough overview of the study. Those interested were invited to complete a self-administered questionnaire in hard copy, which took an average of 10 to 15 minutes to complete.

Data collection was carried out by a team of nine personnel, comprising the principal researcher and eight trained non-technical assistants. As the study utilised self-administered questionnaires, all team members underwent structured training to standardise procedures for participant approach, eligibility screening, informed consent, and survey distribution across nine shopping malls in Selangor. No calibration was required, as no clinical examinations or subjective scoring were performed by the data collection team.

Research tools

The questionnaire included 14 items to collect participants' demographic information, such as age, sex, ethnicity, marital status, education, employment status, and household income. Participants who were full-time students without personal income were grouped under the 'unclassified' category for household income to reflect their financial status and preserve the integrity of the sample. Educational attainment was categorised using the NOHSA 2010 classification: Level I (primary education), Level II (secondary education), and Level III (post-secondary or tertiary education, including STPM, Diploma, and university degree). It also incorporated two items adapted from NOHSA (2010) and Goettems et al., which examined reasons for not visiting the dentist and concerns when entering a dental clinic (24). These items were previously used in peer-reviewed studies and remained unchanged to preserve conceptual integrity. In addition to sociodemographic items, the questionnaire comprised three main sections: DA, DU, and OHRQoL. Each section was assessed using validated instruments, eliminating the need for further content validation. The English and Malay questionnaires were selected based on existing literature and included items that had been previously validated in earlier studies. Additional validation was not required, as the scales were utilised as they were (25). The reliability and validity remain intact when the adopted instrument is applied in comparable contexts (25).

The Modified Dental Anxiety Scale (MDAS) was used to assess DA in both English and Malay. The validated English version of the MDAS, as developed by Humphris et al., (26) was obtained from the University of St Andrews DA Research website [accessed August 18, 2023; <http://www.st-andrews.ac.uk/dentalanxiety/>]. The validated Malay version was adapted from Sitheeque et al. (4). The MDAS consists of five items, each rated on a 5-point Likert scale, with total scores ranging from 5 to 25. The response options included 'not anxious', 'slightly anxious', 'fairly anxious', 'very anxious', and 'extremely

anxious'. To determine the subjects' anxiety levels, all answers were summed, resulting in total participant scores that ranged from 5 to 25; a higher score indicated greater levels of DA.

The OHRQoL was evaluated in both English and Malay using a short version of the Malaysian Oral Health Impact Profile [S-OHIP(M)] (27). The questionnaire comprised two items for each of the seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The assessment included 14 items, each using a five-point Likert rating scale to evaluate the frequency of oral impacts experienced in the last 12 months, ranging from "never" (score 0) to "very often" (score 4). The total possible score ranged from 0 to 56 (14×4), with higher scores indicating more severe oral impacts and poorer OHRQoL. This scoring approach is consistent with the validated format of the S-OHIP(M) and the original OHIP-14.

The questionnaire for DU patterns was developed from the 2010 National Oral Health Survey of Adults (NOHSA) and the 2019 National Health and Morbidity Survey (NHMS) (28). It comprised structured and validated items that measured: (i) time since last dental visit (6–12 months, 1–2 years, more than 2 years, never); (ii) reason for last dental visit (routine check-up, pain or problem, treatment, others); (iii) main concerns when entering dental clinic (the sight and smell, the price of dental treatment, unknown fear, others); (iv) a visit to a dentist is important (Yes/No); and (v) plan to visit a dentist (Yes/No). These items enabled a multidimensional evaluation of DU in relation to DA and OHRQoL. Before collecting data, a pilot study was conducted at the Urban Transformation Centre (UTC) in Selangor in September 2023, involving 29 young adults to evaluate the clarity, comprehension, item relevance, and internal consistency of the questionnaire. This process ensured that the survey items were appropriate, understandable and reliable before full-scale data collection began. Although both the MDAS and S-OHIP(M) were used in their previously validated forms, internal consistency was assessed in this study population using Cronbach's alpha. The reliability scores were 0.847 for the MDAS and 0.889 for the S-OHIP(M), indicating good internal consistency for both instruments.

Statistical analysis

The data analysis was performed using Version 28 of the Statistical Package for the Social Sciences (SPSS) software. Although the Kolmogorov-Smirnov and Shapiro-Wilk tests indicated significant deviations from normality ($p < 0.001$), the skewness and kurtosis values were within acceptable ranges ($|Z| < 7$). Therefore, in accordance with the Central Limit Theorem and given the large sample size ($n = 601$), parametric tests were considered appropriate for further analyses.

The descriptive characteristics of the participants were reported, including means and standard deviations (SD), frequencies and percentages, based on their distribution. To analyse the mean differences in DA scores across categories of DU, independent t-tests and one-way analysis of variance (ANOVA) were conducted. The Pearson Chi-Square test was utilised to examine associations between categorical levels of DA and categories of DU, as well as participants' sociodemographic characteristics.

Multiple linear regression (MLR) analysis was performed to identify predictors of OHRQoL, measured using the total S-OHIP(M) score as the dependent variable. Independent variables included sociodemographic characteristics (age, race, education level, income classification, and distance to dental clinic), DA (MDAS score), and DU indicators (e.g., time since last dental visit). All variables were included in the model using the 'enter' method based on theoretical relevance and alignment with the study objectives. Model assumptions, including linearity, independence of errors, homoscedasticity and normality of residuals, were tested and met. Categorical variables were dummy coded, with 'reference' categories determined by theoretical importance or the largest subgroup. These included: Male (Sex), Young (Age), Non-Malay (Race), Single (Marital status), Basic Education (Education), Unemployed (Employment), Unclassified (Income), >6 km (Access), >1 year or Never (Last dental visit), No (Negative Past Dental Experience), No (Family/Friend's Negative Experience) and MDAS ≤ 12 (Low DA). Educational level categorised into "Basic Education" (none, primary, secondary) and "Higher Education" (tertiary) to meet model assumptions and ensure adequate group sizes. Model fit was evaluated using R² and F-statistics. No interaction terms were tested, as the focus was on estimating the independent effects of predictors on OHRQoL. The mean was calculated using a 95% confidence interval, with significance set at $P < 0.05$. The overall study process, including sampling strategy, inclusion and exclusion criteria, and analytical framework, is illustrated in Figure 1.

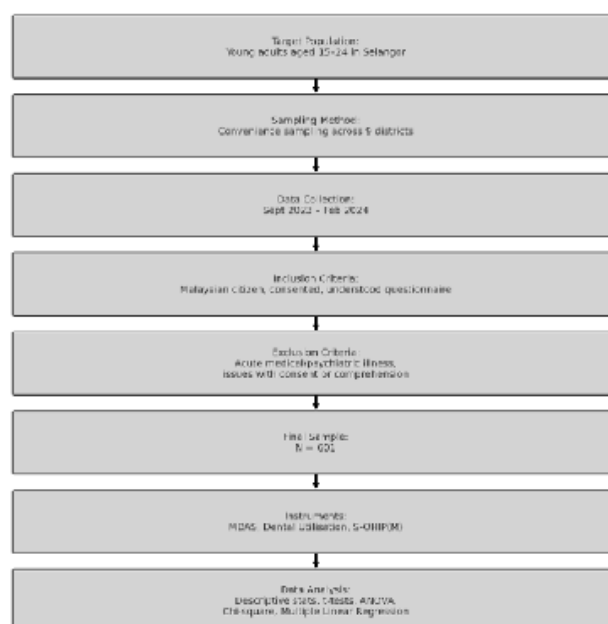


Figure 1: Analytical framework

RESULTS

A total of 601 young adults filled out a questionnaire, with a mean age of 20.67 years (SD = 2.71). Most participants were over 21 years old (48.3%). Table 1 outlines the characteristics of the study participants. The sex distribution was relatively even, with men making up 46.8% and women 53.2%. The majority of the sample identified as single (94.7%), in contrast to those who were married. Nearly all participants (94.8%) considered dental visits essential, and 72.5% intended to schedule a preventive check-up in the near future. A common barrier to attending was a lack of time, reported by 67.2%, while cost (17%) and fear (6.8%) also occasionally hindered this behaviour. Additionally, a small percentage (13.3%) mentioned knowing someone who had a negative experience at a dental visit, and 12.6% shared interesting stories from their most recent appointment.

Table I: Characteristics of study participants (n=601)

Variables	Frequency	(%)
Age (year): Mean (SD) 20.67 (2.71)		
< 19	139	(23.1)
19-21	172	(28.6)
>21	290	(48.3)
Sex		
Female	320	(53.2)
Male	281	(46.8)
Marital Status		
Single	569	(94.7)
Married	32	(5.3)
Education Level		
None	9	(1.5)
Primary	3	(0.5)
Secondary	250	(41.6)
Tertiary	339	(56.4)
Current Employment Status		
Full-time	168	(28)
Part-time	48	(8.0)
Self-employed	14	(2.3)
Student	335	(55.7)
Unemployed	36	(6.0)
Ethnicity		
Malay	492	(81.9)
Chinese	35	(5.8)
Indian	55	(9.2)
Others	19	(3.2)
Household Income		
RM2, 000 & above	142	(23.6)
RM1,000-RM1,999	101	(16.8)
RM500 & RM999	12	(2.0)
RM499-Below	5	(0.8)
Unclassified	341	(56.7)
Distance to Dental Clinic		
0-5km	265	(44.1)
6-10km	239	(39.8)
11-15km	57	(9.5)
16-20km	23	(3.8)
>21km	17	(2.8)
Visiting the dentist is important		
Yes	570	(94.8)
No	31	(5.2)
Plans to visit a dentist for a dental checkup soon		
Yes	436	(72.5)
No	165	(27.5)
Main reason for not visiting the dentist regularly		
Lack of time		
Yes	404	(67.2)
No	197	(32.8)

CONTINUE

Table I: Characteristics of study participants (n=601) (CONT.)

Variables	Frequency	(%)
Main reason for not visiting the dentist regularly		
Treatment not needed		
Yes	156	(26.0)
No	445	(74.0)
Fear from the dentist		
Yes	41	(6.8)
No	560	(93.2)
Cost		
Yes	102	(17.0)
No	499	(83.0)
Had an unpleasant experience during last dental treatment		
Yes	76	(12.6)
No	525	(87.4)
Family members or friends have had unwanted experiences with dental treatment		
Yes	80	(13.3)
No	521	(86.7)

Dental Anxiety

As shown in Table II, 44.3% of participants reported no anxiety about visiting a dentist tomorrow, while 2% reported extreme anxiety. 59.4% reported moderate to severe anxiety from tooth drilling. 21.6% had mild anxiety about dental scaling and polishing, while 35.9% did not. Local anaesthetic injections caused the most anxiety, 25.5% moderate and 17% severe (mean = 2.97, SD = 1.35). These statistics guide patient comfort by identifying anxiety-causing procedures. The mean MDAS score in this study was 11.87 (SD = 4.42), which is higher than that reported in a Malaysian study conducted in 2015, where the mean (SD) was 10.73 (4.03) (4). This suggests a comparatively greater level of DA among the current sample, although still below the commonly accepted clinical threshold of 19 for high DA.

Table III presents the mean MDAS scores and the percentages of individuals with high and low DA based on factors such as age, sex, frequency of dental visits, and primary reasons for visiting the clinic. For descriptive and comparative analysis, MDAS scores were categorised as ≤ 12 (low to moderate anxiety) and ≥ 13 (elevated anxiety), based on the midpoint of the MDAS total score range (5–25). This operational threshold is not diagnostic but was used to facilitate meaningful group comparisons.

The overall prevalence of DA was found to be 7.8% (MDAS ≥ 19). For individuals under 19 years, the mean MDAS score was 12.25 (SD = 4.33). Those aged 19–21 and over 21 had average scores of 12.20 (SD = 4.32) and 11.49 (SD = 4.50), respectively. A chi-square analysis was performed to assess whether age influenced the

Table II: Distribution of Dental Anxiety Levels Based on MDAS Among Study Participants (n=601)

Modified Dental Anxiety Scale (MDAS)		Not Anxious		Slightly Anxious		Fairly Anxious		Very Anxious		Extremely Anxious		Mean (SD)
		n	%	n	%	n	%	n	%	n	%	
B1.	If you went to your dentist for treatment tomorrow, how would you feel?	266	44.3	213	35.4	95	15.8	15	2.5	12	2.0	1.83 (0.92)
B2.	If you were sitting in the waiting room (waiting for treatment), how would you feel?	229	38.1	221	36.8	100	16.6	35	5.8	16	2.7	1.98 (1.01)
B3.	If you were about to have a tooth drilled, how would you feel?	95	15.8	149	24.8	164	27.3	104	17.3	89	14.8	2.91 (1.28)
B4.	If you were about to have your teeth scaled and polished, how would you feel?	216	35.9	171	28.5	130	21.6	51	8.5	33	5.5	2.19 (1.17)
B5.	If you were about to have a local anaesthetic injection in your gum above an upper back tooth, how would you feel?	111	18.5	119	19.8	153	25.5	116	19.3	102	17.0	2.97 (1.35)

Table III: Mean and standard deviation of MDAS, the proportion of participants with MDAS ≤ 12 and MDAS ≥ 13 according to age group, sex and dental utilisation.

	n (%)	Mean MDAS (SD)	p-value	MDAS ≤ 12 n (%)	MDAS ≥ 13 n (%)	p-value
Age (year)						
<19 years old	139 (23.1)	12.25 (4.33)	0.122 ^b	79 (13.1)	60 (10.0)	0.197 ^c
19-21 years old	172 (28.6)	12.20 (4.32)		96 (16.0)	76 (12.7)	
> 21 years old	290 (48.3)	11.49 (4.50)		184 (30.6)	106 (17.6)	
Sex						
Male	281 (46.8)	11.30 (4.52)	*0.003 ^a	177 (29.5)	104 (17.3)	0.127 ^c
Female	320 (53.2)	12.37 (4.27)		182 (30.3)	138 (23.0)	
The last time visited a dentist						
Less than 1 year ago	294 (48.9)	11.83 (4.26)	0.903 ^b	175 (29.1)	119 (19.8)	0.915 ^c
Between 1-2 years ago	109 (18.1)	11.77 (3.80)		68 (11.3)	41 (6.8)	
More than 2 years ago	166 (27.6)	12.06 (4.86)		98 (16.3)	68 (11.3)	
Had never gone for dental visits	32 (5.3)	11.53 (5.49)		18 (3.0)	14 (2.3)	
Plan to visit the dentist anytime soon for a preventive checkup						
Yes	436 (72.5)	11.84 (4.43)	0.793 ^a	258 (42.9)	178 (29.6)	0.709 ^c
No	165 (27.5)	11.95 (4.41)		101 (16.8)	64 (10.6)	
A visit to the dentist is important						
Yes	570 (94.8)	11.89 (4.39)	0.534 ^a	342 (56.9)	228 (37.9)	0.578 ^c
No	31 (5.2)	11.39 (4.95)		17 (2.8)	14 (2.3)	
Main concern when entering the dental clinic						
The sight of a dental clinic	207 (34.4)	12.12 (4.21)	0.320 ^a	124 (20.6)	83 (13.8)	0.951 ^c
The sound in the dental clinic	31 (5.2)	12.10 (5.04)	0.768 ^a	17 (28.0)	14 (2.3)	0.578 ^c

Table III: Mean and standard deviation of MDAS, the proportion of participants with MDAS ≤ 12 and MDAS ≥ 13 according to age group, sex and dental utilisation.

	n (%)	Mean MDAS (SD)	p-value	MDAS ≤ 12 n (%)	MDAS ≥ 13 n (%)	p-value
The smell of the dental clinic	155 (25.8)	12.31 (4.74)	0.149 ^a	84 (14.0)	71 (11.8)	0.103 ^c
The dental clinic staff	41 (6.8)	11.83 (4.84)	0.953 ^a	24 (4.0)	17 (2.8)	0.871 ^c
The price of treatment provided by the dental clinic	151 (25.1)	11.25 (4.28)	*0.045 ^a	98 (16.3)	53 (8.8)	0.135 ^c
Fear unknown	90 (15.0)	13.37 (4.81)	*0.000 ^a	43 (7.2)	47 (7.8)	*0.012 ^c

Note: Percentages under MDAS ≤ 12 and MDAS ≥ 13 are column-based, representing the proportion of each subgroup within the total number of participants classified under each anxiety category.

^aIndependent t-test, ^bOne-way ANOVA test, ^cPearson Chi-Square test

*Significant at P<0.05

chances of achieving a low anxiety score (MDAS ≤ 12) compared to a high anxiety score (MDAS ≥ 13). Among the 139 participants under 19, 56.8% received MDAS scores of ≤ 12, whereas 43.2% scored ≥ 13. In the 19-21 age group, 55.8% obtained scores of ≤ 12 and 44.2% scored ≥ 13. Of 290 participants over 21, 184 (63.4%) scored ≤ 12 and 106 (36.6%) scored ≥ 13. The chi-square test revealed that younger people have more DA; however, the p-value of 0.197 indicated that this relationship was non-significant.

In another aspect, women had a mean MDAS score of 12.37 (SD = 4.27), indicating higher DA than men, who averaged 11.30 (SD = 4.52) (p = 0.003). Although the chi-square test did not yield statistically significant findings, some interesting data points reveal differences in DA by sex. Among men, 37.0% (104) reported MDAS scores of 13 or more, whereas 63.0% (177) had scores below 12. In contrast, 138 women (43.1%) had MDAS scores ≥ 13 and 182 (56.7%) had scores ≤ 12. The study found no correlation between MDAS scores and dental check-ups from the preceding period (p = 0.903). Since the last visit, the proportions of individuals with lower and higher MDAS scores remained unchanged

($p = 0.915$). Although the study found no significant statistical relationship between the average MDAS scores of participants and the timing of their last dental appointment ($p = 0.903$), several emerging trends could shed light on DA. Dental appointments within the last year reported a mean MDAS score of 11.83 ($SD = 4.26$). For appointments that occurred 1 to 2 years ago, the mean score was 11.77 ($SD = 3.80$), and for those over 2 years ago, it was 12.06 ($SD = 4.86$). Although these differences are not statistically significant, the slight trend implies that more recent dental visits may help alleviate anxiety.

An independent t-test revealed differences in average MDAS scores among participants based on their main concerns: the sight of the dental clinic received a score of 12.12 ($SD=4.21$) with a p-value of 0.320; sound scored 12.10 ($SD=5.04$) ($p = 0.768$); smell received a score of 12.31 ($SD=4.74$) ($p = 0.149$); and worries regarding dental clinic staff yielded a score of 11.83 ($SD=4.84$) ($p = 0.953$). In contrast, "fear of the unknown" displayed a significant average MDAS score of 13.37 ($SD=4.81$) with a p-value of 0.000, indicating increased anxiety. The average score of 11.25 ($SD = 4.28$) for "price of treatment" suggested lower anxiety, with a p-value of 0.045. These findings imply that specific concerns, particularly "fear of the unknown," may heighten DA. Furthermore, a Pearson chi-square analysis revealed a significant association between the "fear of the unknown" ($p = 0.012$) and increased DA (52.2%) in participants with an MDAS score of 13 or higher. Hence, the fear of the unknown of dental visits may increase anxiety.

Dental Utilisation Patterns and OHRQoL

Among the participants, 48.9% had visited the dentist within the past year, 18.1% between 1 and 2 years ago, 27.6% more than 2 years ago, and 5.3% had never visited a dentist. The most common reasons for not visiting a dentist regularly were a lack of time (67.2%), followed by the perception that treatment was not needed (26.0%) and fear of the dentist (6.8%). Additionally, 94.8% of respondents acknowledged that visiting the dentist is important, yet only 72.5% reported planning to see a dentist soon. These findings suggest gaps between attitudes and actual utilisation of services. Among the seven S-OHIP(M) domains, the "Psychological Discomfort" domain recorded the highest mean score, indicating a greater negative impact on emotional well-being. In contrast, the "Social Disability" domain showed the lowest mean score.

Dental Anxiety, DU and OHRQoL.

Table IV illustrates 14.3% of S-OHIP (M) score variance with an R² Square value of 0.143. According to this, 14% of OHRQoL variability may be attributed to the model's predictors, while 86% may be attributed to factors not included in the study. The model demonstrated statistical significance, with an F-statistic of 8.153 and a significance level of $P < 0.001$, highlighting

its importance. Consequently, even though some predictors were not statistically significant individually, their collective impact on OHRQoL was notable.

Factors such as age, race, distance to dental clinics, and DA significantly influenced OHRQoL. Younger individuals recorded lower S-OHIP(M) scores compared to older adults ($B = -1.956$, $p = 0.016$), indicating a 1.956 unit decrease in S-OHIP(M) scores when other variables were held constant. Age had a small effect, with a Beta of -0.107 as a standard coefficient. The positive coefficient for race indicated that Malay participants had higher S-OHIP(M) scores than their non-Malay counterparts ($B = 3.726$, $p = 0.000$) with a modest effect size of $B = 0.159$ as the standardised coefficient. Additionally, residents living within five kilometres of a dental clinic experienced a 1.726-unit enhancement in OHRQoL ($B = 1.726$, $p = 0.014$). Distance to dental clinics has a marginal yet beneficial impact on OHRQoL (Beta = 0.095). Higher levels of DA are associated with elevated S-OHIP(M) scores ($MDAS \geq 13$), showing a rise of 4.172 units ($B = 4.172$, $P < 0.001$). Dental anxiety plays a crucial role in the model (Beta = 0.227). Additionally, there are no concerns regarding multicollinearity in this model, as all tolerance values are above 0.1 and variance inflation factor (VIF) values remain below 10. This indicates that the model's predictors are not strongly correlated, meaning each predictor provides a unique contribution.

Table IV: Multiple Linear Regression Analysis Predicting OHRQoL

Predictor Variables	B	SE	Beta	t	p-value	Tolerance	VIF
Sex							
Male	-1.412	0.714	0.078	-1.978	0.068	0.934	1.071
Female							
Age							
Young	-1.926	0.797	-0.107	-2.418	0.016*	0.748	1.338
Older							
Race							
Malay	3.726	0.900	0.159	4.139	0.000*	0.985	1.015
Non-Malay							
Marital status							
Married	-0.790	1.611	-0.020	-0.490	0.624	0.906	1.104
Single							
Education							
Basic Education							
Higher Education	1.383	0.827	0.076	1.671	0.095	0.704	1.420
Education							
Employment							
Employed	-1.098	1.212	-0.059	-0.906	0.366	0.341	2.930
Unemployed							

CONTINUE

Table IV: Multiple Linear Regression Analysis Predicting OHRQoL (cont.)

Predictor Variables	B	SE	Beta	t	p-value	Tolerance	VIF
Income							
Classified	0.919	1.211	0.050	0.759	0.448	0.329	3.037
Unclassified							
Distance to Dental Clinic							
≤5km	1.726	0.701	0.095	2.462	0.014*	0.978	1.022
≥6km							
Last Visit to a Dentist							
≤1 year	0.464	0.701	0.026	0.662	0.508	0.965	1.037
>1 year or never							
Bad/Unpleasant Experiences							
Yes	3.369	1.058	0.124	3.183	0.080	0.958	1.044
No							
Family and Friends' Unpleasant Experience							
Yes	-0.957	1.022	-0.036	-0.937	0.349	0.983	1.017
No							
Dental Anxiety							
MDAS ≥13	4.172	0.722	0.227	5.776	0.000*	0.944	1.059
MDAS ≤12							

Reference categories used in the model:

Gender: Male
 Age: Young
 Race: Non-Malay
 Marital Status: Single
 Education: Basic Education
 Employment: Unemployed
 Income: Unclassified
 Access to Dental Clinic: >6 km
 Last Dental Visit: >1 year or never
 Bad/Unpleasant Experience: No
 Family/Friends' Unpleasant Experience: No
 Dental Anxiety: MDAS <13

Abbreviations: B, unstandardised coefficient; SE, standard error; β, standardised coefficient; VIF, variance inflation factor.

*Significant at $P < 0.05$ **Summary of the MLR model**

R Square: 0.143
 Adjusted R Square: 0.125
 Durbin-Watson: 1.746
 F-statistic: 8.153, $P < 0.001$

DISCUSSION

This study found that DA, age, ethnicity, and distance to dental clinics were significant predictors of OHRQoL among Malaysian young adults. Participants with higher DA reported poorer OHRQoL, whereas more favourable outcomes were observed among Malay individuals and those residing closer to dental clinics. These findings provide critical insight into the psychosocial and structural factors shaping oral health outcomes in this population.

Merely 28% of Malaysian young adults utilised dental care services (NOHSA 2010). This may result from discontinuing services for the cohort of individuals entering adulthood, specifically those who have just completed their secondary school education (NOHSA, 2010). Dental anxiety, a psychological impediment,

may influence this decline; however, its effect on DU and OHRQoL remains ambiguous (17,18). To the authors' knowledge, this study represents the first study in Malaysia to statistically examine these characteristics and their associations, offering valuable insights for formulating strategies to improve OHRQoL in this community. The study participants had a mean age of 20.67 ± 2.71 years, with 48.3% above 21 years old, indicating they were no longer in secondary school. Most (55.7%) were college or university students and no longer received incremental dental care through School Dental Services (NOHSA 2010).

Dental Anxiety and OHRQoL

Anxiety rises during potentially painful procedures such as tooth drilling and local anaesthetic injections. This finding is consistent with prior studies that have shown elevated anxiety levels during invasive dental procedures. For example, Astramskaitė et al. (2016) (29) reported that patients experienced significant anxiety during extractions and oral surgeries, highlighting that procedures perceived as painful or invasive are common triggers of DA. This study revealed that the prevalence of high DA (MDAS ≥ 19) among Malaysian young adults aged 15–24 was 7.8%. This is higher than the 3.5% reported by Sitheeque et al., whose study involved a broader age range of Malaysian adults aged 16 to 69 years (4).

Additionally, age was not a significant predictor of DA, consistent with previous research indicating that among younger populations, DA tends to be more closely related to dental experiences and psychological factors rather than age differences (30). However, when predicting OHRQoL, age was found to be a significant factor. This suggests that while age may not influence DA levels within this young adult cohort, it may affect how individuals perceive the impact of their oral health on daily life. Some earlier studies have reported mixed findings on the association between age and DA, with lower anxiety levels often observed in older adults (31). However, these findings may not be directly applicable to our younger sample aged 15–24.

In particular, this study found that women experienced DA more frequently than men. Similar to a previous study conducted in 1999, 3% of Swedish middle-aged and elderly women reported DA, with a higher prevalence in younger women (32). Next, the fear of the unknown was found to be associated with increased DA. This suggests unfamiliar dental procedures may increase DA (33) as anxiety increases when patients expect to feel more pain than they do (34). Participants who were concerned about treatment costs exhibited lower DA than others. This finding is consistent with a previous study, which reported that although financial issues were a significant barrier to dental care, they did not increase DA levels. (35). The "Psychological Discomfort" domain recorded the highest mean score, indicating emotional impacts

such as tension or self-consciousness related to oral health. In contrast, the "Social Disability" domain had the lowest score, suggesting minimal disruption to social activities. This aligns with findings that social aspects are less affected by oral health problems, possibly due to strong social support and community ties that help buffer these impacts (36).

Dental Anxiety, DU and OHRQoL.

This study examined the impact of demographic, socioeconomic, and dental factors on OHRQoL using MLR analysis, which explained 14.3% of the OHRQoL variability. Although the model had a negligible impact on OHRQoL, it indicated that elements the model neglected accounted for 87% of the variability in OHRQoL. An overall significant model ($F = 8.153$, $P < 0.001$) suggested that the predictors collectively help explain variations in OHRQoL, although some individual predictors may not be substantial. Younger participants were found to have poorer OHRQoL compared to older individuals. This is consistent with a previous study on adolescents seeking orthodontic treatment, which reported that those aged 15 to 18 with malocclusion and psychological distress experienced a greater negative impact on OHRQoL (37). Consistent with these findings, Baniyadi et al. (38) stated that being older than 75 was negatively correlated with poor OHRQoL, suggesting that older individuals may have better OHRQoL than younger individuals.

Better OHRQoL was observed among Malay participants. However, this contrasts with findings from a 2020 Malaysian study, which reported that Malays had poorer OHRQoL compared to other ethnic groups (39). On a related note, this study revealed that dental clinics within 5 km improved OHRQoL. Multiple studies have highlighted that easy access to oral healthcare promotes consistent dental visits and timely preventive care, which in turn reduces the risk of oral diseases and improves overall oral health (12,40).

Dental anxiety emerged as a significant predictor of OHRQoL, with elevated anxiety levels associated with poorer quality of life. This aligns with various studies indicating that DA can lead to avoidance of dental treatment, exacerbation of oral health problems and a reduced overall quality of life (41). Hence, these psychological factors can significantly impact OHRQoL, suggesting that DA interventions may improve outcomes (41). Income, marital status, education, and occupation were not identified as significant predictors of OHRQoL. Additionally, previous negative dental experiences, the time since the last dental visit, and negative experiences shared by family or friends showed a minimal predictive impact on OHRQoL. These DU factors may reflect behavioural frequency rather than the perceived burden or quality of oral health. The relatively uniform DU patterns in this cohort may also have reduced variability, limiting their influence in the model. This supports

findings from other studies, which have found that DU was not independently associated with OHRQoL (41). In contrast, context-specific factors such as DA and accessibility were stronger predictors. The absence of multicollinearity, as indicated by suitable tolerance and VIF values, further validates the model's reliability and confirms that each variable contributed uniquely.

Strengths and Limitations

This study presents several limitations. Its cross-sectional design limits the ability to draw causal inferences between DA, DU, and OHRQoL. The study employed convenience sampling across shopping malls in Selangor, which may have introduced selection bias. Participants were selected based on their availability and willingness to participate. As a result, the findings may not be generalisable to the broader Malaysian young adult population. Additionally, the sample predominantly consisted of Malay participants, limiting the applicability of the results to other ethnic groups. Participant recall bias is also a concern, particularly regarding previous dental experiences and utilisation patterns. However, efforts were made to mitigate this by allowing participants sufficient time to reflect and complete the questionnaire at their convenience. Furthermore, while the results offer valuable insights into factors associated with OHRQoL, future studies employing random or stratified sampling across more diverse settings are recommended to enhance representativeness and generalisability.

Additionally, the study did not include clinical oral health parameters, such as dental caries, periodontal status, or other diagnosed oral conditions, which are known to influence OHRQoL. As a result, potential confounding effects related to oral disease burden may not have been adequately accounted for, which limits the validity of causal interpretations. Future research should incorporate clinical oral health assessments alongside self-reported data to better capture the complex relationship between DA, utilisation and OHRQoL.

Despite its limitations, the study has several strengths. The large sample of 601 Malaysian young adults offers valuable insights into DA, DU, and OHRQoL. Advanced statistical methods, including MLR, strengthened the results and clarified important correlations. The findings demonstrate how psychological and demographic factors dynamically shape OHRQoL. Dental anxiety should be prioritised, clinic accessibility should be improved and demographic diversity should be considered in OHRQoL interventions.

CONCLUSION

Age, ethnicity, proximity to dental clinics and DA were significantly associated with OHRQoL among young adults in Selangor, Malaysia. These findings highlight the

importance of addressing DA, particularly dimensions such as fear of the unknown, which emerged as a notable factor. The study emphasises the importance of targeted, context-specific strategies, particularly those that enhance psychological support and access to care, in mitigating the impact of DA on the oral health and quality of life of young adults.

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