SELF-PERCEIVED ORTHODONTIC NEED, INFORMATION-SEEKING BEHAVIOUR AND KNOWLEDGE ON ORTHODONTIC TREATMENT AMONG YOUNG MALAYSIAN ADULTS

Kamarozaman DMS[1,2], Kamarudin Y[3], Tengku Hamzah TNN[3], Mohd Nor NA[2].
[1] Oral Health Programme, Ministry of Health, 62590, Putrajaya, Malaysia
[2] Department of Community Oral Health & Clinical Prevention, Faculty of Dentistry, University of Malaya, 50603 Kuala Lumpur, Malaysia
[3] Department of Paediatric Dentistry and Orthodontics, Faculty of Dentistry, University of Malaya, 50603 Kuala Lumpur, Malaysia

Correspondence:
Dr Nor Azlida Mohd Nor
Department of Community Oral Health & Clinical Prevention,
Faculty of Dentistry, University of Malaya,
50603 Kuala Lumpur, Malaysia.
Email: azlida@um.edu.my

Abstract

Objective: This study aimed to assess self-perceived aesthetics and orthodontic need, information-seeking behaviours and knowledge on orthodontic treatment among young adults in Malaysia.

Methods: A cross-sectional study was conducted among 933 polytechnic students in Malaysia using a self-administered questionnaire. The Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) was used to assess self-perceived orthodontic need. Respondents were also asked about their intention to seek orthodontic treatment. Those showing intention were further asked about their reason(s) for seeking treatment, their information-seeking behaviours, and knowledge on orthodontic treatment. Data was analysed using SPSS.

Results: The overall response rate was 93.2% with the mean age of 20.43 (SD±1.07). Although most of the respondents rated themselves under the no treatment need category of the AC-IOTN scale, 61.9% reported intention to seek orthodontic treatment. The main reason for seeking treatment was to improve dental function (45.3%) and aesthetics (40.1%). Most claimed to look for information prior to orthodontic treatment, either using online or offline platforms. Many relied on friends (83.3%) as a source of information and more than half used online sources including social media and websites. A minority demonstrated lack of knowledge in terms of appropriate places to receive treatment (2.2%) and qualification of orthodontic practitioners (37.7%).

Conclusions: The majority of young Malaysian adults have high intention to seek orthodontic treatment regardless of their perceived need. A minority had lack of knowledge about qualified orthodontic providers and places to receive treatment. Most of them reported positive attitudes towards information-seeking behaviour prior to seeking orthodontic treatment.

Keywords: *Aesthetic Component, Index of Orthodontic Treatment Need (IOTN), Information-seeking Behaviour, Young Adults*

Introduction

Many studies have reported that the perception of dental aesthetics is one of the main reasons for patients to seek orthodontic treatment (1, 2). This perception is influenced by many factors such as age, gender, ethnicity, education level, severity of malocclusion, and the societal norms of dental aesthetics (3). It is important to note that the public may not perceive the need for treatment to the same extent as a dentist or orthodontist. However, an individual's concern for his own dental appearance and

subjective need cannot be underestimated as it reflects on a decisive factor in the demand for orthodontic treatment (1, 4). For example, individuals who deem themselves as having poor dental aesthetics would perceive themselves as having a higher need for orthodontic treatment (5). This is particularly true among young adult populations because they are more critical about their appearance (6). To a certain extent, greater demand on aesthetics among the current young generation comes with unrealistic expectations to achieve the perfect smile as portrayed by media (7).

Typically, individuals interested in orthodontic treatment will attempt to gather as much information as possible regarding the service to facilitate their decision-making process (8). The use of the internet has become increasingly popular as a means to gather such information. For some individuals, it has even become the initial source of information, before consulting any healthcare professionals. A systematic review reported that the quality and amount of information gained can positively influence the patient's treatment expectations and cooperation (2). However, poor information-seeking behaviour can be detrimental as it may cause the patient to make poor decisions when it comes to choosing the best treatment. The Malaysian Internet Survey reported that 77.2% of internet users rely on the internet to search for health-related information and 82.7% trusted the information found regardless of the source (9). This is alarming as it is difficult to guarantee the reliability and credibility of such online information (10). With reference to orthodontics in particular, patients are vulnerable to misinformation with the emergence of 'fake braces' that are offered via online platforms in Southeast Asian countries, including Malaysia. 'Fake braces' refers to fixed orthodontic treatment provided by unqualified individuals in homes or hotel rooms using substandard appliances (8).

Based on media reports, the uptake of fake braces services is often linked to young adults with poor knowledge about orthodontic treatment (11). Another possible contributing factor leading patients to seek alternative treatment options is the high cost of orthodontic treatment. In some countries, including Malaysia, government clinics offer free or subsidised orthodontic treatment to patients below 18 years old and prioritise patients based on their treatment needs (8, 12). The Index of Orthodontic Treatment Need (IOTN) is commonly used as it measures both the normative and subjective need for treatment. It comprises of two components; a dental health component (DHC) and an aesthetic component (AC) (13). DHC objectively looks at specific intraoral features of the malocclusion based on a 5-level severity scale. The AC records aesthetic needs based on a series of photographs on a decreasing level of attractiveness. The AC scale is important to measure perceptions of dental aesthetics and orthodontic treatment need based on the patient's point of view. To date, several local studies have measured orthodontic need based on professional assessment (6, 12), however there is a lack of studies measuring the perceptions of dental aesthetics from the patients' perspective, in particular among young adults.

In view of the high demand for orthodontic treatment and the recent trend of fake braces uptake among young adults, this study aimed to assess self-perceived orthodontic need, information-seeking behaviours and knowledge on orthodontic treatment among young adults in Malaysia. A better understanding of participants' knowledge and information-seeking behaviours will assist oral health service providers to supply relevant information and appropriate methods of information dissemination to the public in relation to orthodontic services. Information about self-perceived dental aesthetics may be useful to predict future orthodontic treatment demand.

Materials and Methods

Ethical approval for this study was granted by the Medical Ethics Committee, Dental Faculty, University of Malaya [(DF C01711/0076 (P)]. Permission to conduct the study was obtained from the Polytechnic Research and Development Centre, Ministry of Higher Education, Malaysia.

This study was a cross-sectional study using a self-administered questionnaire conducted in four polytechnics in the state of Pahang and Melaka. Polytechnic is a tertiary education institution that provides skilled semi-professionals in the field of engineering, commerce and hospitality at diploma and advanced diploma level. The polytechnic students were chosen to represent a population of young adults in a college setting. Pahang and Melaka were selected due to recent reports on the growing number of unqualified individuals providing illegal orthodontic treatment ('fake braces') in these states (10, 13).

A total number of 1000 subjects were invited to participate in this study from four polytechnics. The sample size was calculated based on prevalence of orthodontic treatment need reported by a previous local study, which was at 37% (15) with 80% power of study, 5% precision (α=0.05); resulted in a minimum sample size of 384. This minimal sample size was multiplied by a design effect of two and inflated by 20% to account for non-response rate [N=384 x (2) + 20% =922]. This number was rounded to 1000 participants. The calculation of participants required from each polytechnic was based on proportionate sampling from the number of second year students enrolled in each programme offered by each polytechnic. In total, 300 students were invited from Polytechnic Merlimau, 110 students from Polytechnic Melaka, 370 from Polytechnic Sultan Ahmad Shah and 220 students from Polytechnic Muadzam Shah. Students were then randomly selected from each programme based on proportionate number of students in each programme. Students with a history of orthodontic treatment were excluded as their past experiences could potentially affect the study outcome.

A self-administered questionnaire was distributed to the participants manually. The questionnaire consisted of four

sections, which included socio-demographic questions, self-perceived orthodontic treatment need, reasons for treatment and information-seeking behaviour prior to orthodontic treatment. The Aesthetic Component of the Index of Orthodontic Treatment Need (AC-IOTN) was used to assess the self-perceived aesthetic and treatment need (13). The AC-IOTN consists of a series of 10 coloured photographs arranged on a continuum of attractiveness with grade 1 being the most attractive and grade 10 the least attractive. The other questions were formulated based on literature review (4) and expert group discussion. The questionnaire was prepared in English and Malay languages. The questionnaire was face validated by two senior academicians in the field of Dental Public Health and Orthodontics in University of Malaya, and one orthodontist from the Ministry of Health, Malaysia. Following feedback from the expert panel, both Malay and English versions required minor modifications. Following the face validation, a pilot study was carried out to pre-test the questionnaire among students in Polytechnic Metro, Kuala Lumpur and no further modifications were found to be deemed necessary.

The questionnaires were administered in a classroom setting, which lasted approximately ten minutes. Prior to questionnaire distribution, the participants were given an information sheet and consent form. The information sheet provided clear explanations of the nature and purpose of the study. Participation was voluntary and the questionnaires were only distributed to consenting participants. Completed questionnaires were anonymous. The data were collected from 1st March 2018 until 30th April 2018.

Data were analysed using Statistical Package for Social Sciences (SPSS) software version 24 software (24.0, IBM Corp, Armonk, NY, SA). The AC-IOTN grades were recorded into three categories; Grade 1-4 as 'no treatment need', Grade 5-7 as 'moderate treatment need' and Grade 8-10 as 'definite treatment need' (15). Descriptive analysis was used to examine frequency data. Association between self-perceived treatment need and intention for orthodontic treatment and demographic characteristics were analysed using Chi-square and Fisher's exact tests. Significance level was set at $\alpha < 0.05$.

Results

A total of 935 questionnaires were returned to the author, giving an overall response rate of 93.5%. Table 1 shows the demographic characteristics of the respondents. Majority were Malay, aged 19 to 28 years old (mean 20.43, SD±1.07). They were equally distributed by gender. In terms of parental education level, most parents were formally educated, with household income less than RM4000 per month. The highest level of education reported was secondary school level among mothers and college or university level among fathers.

Table 1: Socio-demographic characteristic of participants

Characteristics	n (%)
Gender	
Male	460 (49.5)
Female	469 (50.5)
Ethnicity	
Malay	841 (90.7)
Chinese	20 (2.2)
Indian	62 (6.7)
Others	4 (0.4)
Father's Education	
No formal education	16 (1.7)
Primary education	38 (4.1)
Secondary education	417 (45)
College/University	456 (49.2)
Mother's Education	
No formal education	30 (3.3)
Primary education	61 (6.7)
Secondary education	545 (59.4)
College/University	281 (30.6)
Total Household Income	
RM4000 and below	685 (75)
RM4000 to RM6000	98 (10.7)
RM6000 to RM8000	76 (8.3)
More than RM8000	54 (5.9)
Study Funding	
Scholarship	40 (4.4)
Study loan	552 (60.4)
Self-funded	322 (35.2)

Sums may not total (n=932) due to missing response variables.

In terms of self-perceived treatment need (AC-IOTN), majority of the respondents rated themselves at AC Grade 1 to 4 ('no treatment need') followed by Grade 5 to 7 ('moderate treatment need') and Grade 8 to 10 ('definite treatment need') (Figure 1).

Although majority rated themselves as having no treatment need, more than half (61.9%) indicated intention to seek orthodontic treatment. The difference between those with intention and no intention to seek orthodontic treatment was statistically significant $\chi^2(9, N=916) = 54.125$, $p<0.001$ (Table 2). No significant association was found between demographic characteristics of the respondents and AC-IOTN (Table 3).

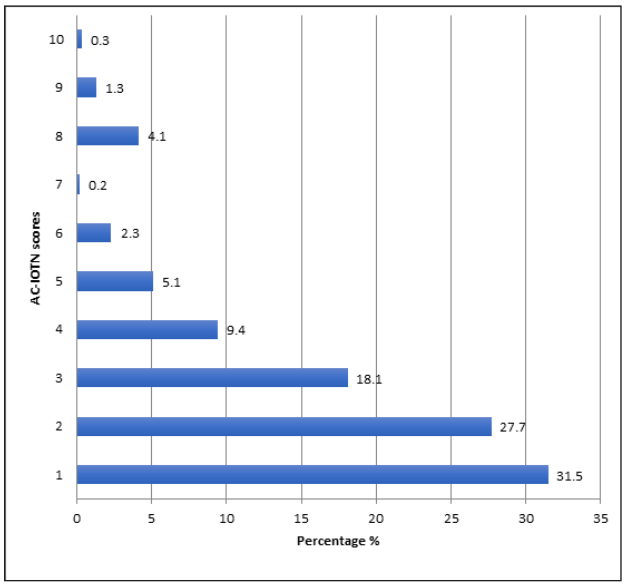

Figure 1: Self-perceived aesthetic component score (AC-IOTN)

Table 2: Association between self-perceived treatment need (AC-IOTN) and intention to seek orthodontic treatment

Self-perceived treatment need	Yes n (%)	No n (%)	df	*p* value[a]
No need (Grade 1-4)	454 (57.3)	339 (42.7)	9	<0.001
Moderate need (Grade 5-7)	64 (91.4)	6 (8.6)		
Definite need (Grade 8-10)	49 (92.5)	4 (7.5)		
TOTAL	567 (61.9)	349 (38.1)		

[a]Chi-square test, df= degrees of freedom.

Table 3: Association between demographic characteristics of the participants and AC-IOTN

Variables	AC Grades (1-4) n (%)	AC Grades (5-7) n (%)	AC Grades (8-10) n (%)	df	*p* value[a]
Gender					
Male	378 (84.0)	42 (9.3)	30 (6.7)	2	0.050
Female	416 (89.5)	28 (6.0)	21 (4.5)		
Ethnicity					
Malay	717 (68.5)	66 (8.0)	46 (5.5)	6	0.500
Chinese	19 (95.0)	1 (5.0)	0 (0.0)		
Indian	53 (88.3)	3 (5.0)	4 (6.7)		
Others	3 (75.0)	0 (0.0)	1 (25)		
Father's Education					
No formal education	13 (81.3)	2 (12.5)	1 (6.3)	6	0.420
Primary school	31 (81.6)	2 (5.3)	5 (13.2)		
Secondary school	360 (87.6)	23 (5.6)	28 (6.8)		
College/ University	388 (86.6)	43 (9.6)	28 (6.8)		
Mother's Education					
No formal education	29 (96.7)	1 (3.3)	0 (0.0)	6	0.257
Primary school	48 (81.4)	4 (6.8)	7 (11.9)		
Secondary school	464 (86.4)	43 (8.0)	30 (5.6)		
College/ University	243 (87.4)	22 (7.9)	13 (4.7)		
Total Household Income					
≤RM4000	579 (85.9)	50 (7.4)	45 (6.7)	6	0.182
RM4000-RM6000	85 (87.6)	10 (10.3)	2 (2.1)		
RM6000-RM8000	65 (87.8)	7 (9.5)	2 (2.7)		
>RM8000	51 (94.4)	2 (3.7)	1 (1.9)		
Study Funding					
Scholarship	33 (84.6)	2 (5.1)	4 (10.3)	4	0.714
Study loan	473 (86.5)	44 (8.0)	30 (5.5)		
Self-funded	274 (87.3)	24 (7.6)	16 (5.1)		

[a]Chi-square test and Fisher's Exact test (for a cell contained an expected count less than 5).
df=degrees of freedom.

Data from those who had intention to seek orthodontic treatment (n=573) were further analysed to explore their reason for seeking treatment, their knowledge and information-seeking behaviour on orthodontic treatment. The main reasons for orthodontic treatment were for 'dental function' (45.2%) and 'attractiveness' (40.1%)

(Table 4). Having orthodontic treatment as a symbol of trend/fashion (3.7%) was the least common reason reported by respondents. Most of the respondents were aware that dentists (92.5%) and orthodontists (72.6%) can legally provide orthodontic treatment. However, a small proportion reported lack of knowledge on this question by answering beauticians (37%) and dental nurses (7.1%) as qualified practitioners for orthodontic treatment.

Table 4: Participants' self-reported reasons for treatment and knowledge about orthodontic treatment

Variables	n (%)
Reasons for orthodontic treatment	
Attractiveness	230 (40.1)
Dental function	259 (45.2)
Fashion/trend	21 (3.7)
Others	63 (11.0)
Knowledge on qualified practitioner to provide orthodontic service[§]	
Orthodontist	384 (72.6)
Dentist	509 (92.5)
Dental Nurse	183 (37.0)
Beautician	33 (7.1)
Knowledge on facility that provide orthodontic treatment	
Government dental clinic/hospital	392 (68.2)
Private dental clinic/hospital	170 (29.6)
Hotel/Homestay	4 (0.7)
Home	4 (0.7)
Beauty salon	3(0.5)
Others	2 (0.3)

Analysis was conducted for respondents who had intention to seek orthodontic treatment and sums may not total (n= 573) due to missing response variables.
[§]Multiple answers are allowed for this question.

Knowledge on available facilities providing orthodontic treatment was also asked (Table 4). Although majority knew about appropriate facilities to get orthodontic treatment, a small proportion (2.2%) reported that orthodontic treatment outside dental facilities (hotel/homestay, home, beauty salon) was acceptable, which indicate lack of knowledge or understanding of appropriate facilities for such treatment.

Table 5 shows data on information-seeking behaviour among respondents who reported intention to seek orthodontic treatment. Almost all (97%) reported that they would search orthodontic related information prior to treatment. However, only 52.3% reported that they would search for the qualification of the practitioners. They were further asked on sources of their information. The sources of information were from both online and conventional offline mediums. For conventional mediums, most respondents relied on information from friends (83.3%), instead of healthcare professional (56.6%) or mass media (40.8%). In relation to online sources, apart from using web (www) based platforms, more than half of respondents reported searching information through social media such as Instagram (57.8%), Facebook (56.6%) and Twitter (32.4%).

Table 5: Information-seeking behaviour among those who have intention for orthodontic treatment

Statements	Yes n (%)
Search information prior to orthodontic treatment	570 (97.0)
Check practitioner's qualification	299 (52.3)
Seeking information via online platform[§]	
World Wide Web (www)	342 (65.4)
Facebook	289 (56.6)
Instagram	298 (57.8)
Twittter	159 (32.4)
YouTube	258 (51.1)
Seeking information via conventional platform[§]	
Family	336 (63.2)
Friends	460 (83.3)
Leaflet	205 (41.3)
Health Professional	295 (56.6)
Newspaper	168 (33.9)
Radio	85 (17.6)
Television	205 (40.8)

Analysis was conducted for respondents who had intention to seek orthodontic treatment and sums may not total (n= 573) due to missing
response variables.
[§]Multiple answers are allowed for this question.

Discussion

Findings from the present study show that more than half of the respondents rated themselves as having no treatment need (86.7%). The self-perceived treatment need was significantly associated with intention for treatment, with almost 100% of those who perceived themselves as having an IOTN aesthetic grade between 5 to 10, showing intention for orthodontic treatment. This is a common finding in previous literature as the psychosocial impact of aesthetics has been shown to play a crucial role in the decision-making process (17, 18). It is interesting to note that more than half of the respondents who rated themselves as having no treatment need, also

showed intention to seek treatment. The findings suggest that subjective perceptions of AC-IOTN are not reliable indicators to measure the objective treatment need (19). However, it reflects on potential demand of orthodontic services in the future.

The results from this study contradict with a local study conducted among private university students (6). In the earlier study, although majority of the students rated themselves as having no treatment need (98.2%) (Grades 1 to 4), the demand for orthodontic treatment was low (14.18%) (6). A potential explanation for these contradictory findings, is due to different dental aesthetic satisfaction among private university students and polytechnic students. It could be that those studying in private universities have less self-insecurity coming from higher income families and tend to have better acceptance of their teeth alignment. In the present study most of the respondents had parents with low to moderate income. Additionally, it could also reflect a difference in knowledge and expectations of orthodontic treatment, but these differences warrant further study to fully explore.

Approximately 40% of respondents who had intention to seek treatment cited aesthetic motivations and 45.2% cited functional purposes. These findings are supported by existing evidence that poor dental aesthetics have psychosocial impact on an individual such as interpersonal sensitivity, depression and lowered quality of life (20, 22). Hence the desire to improve one's smile aesthetic is strongly justifiable. However, the present study also showed that individuals who already considered themselves to fall in the 'most attractive' category, were still not satisfied with their current dental appearance. This may reflect the unrealistic beauty standards that are placed on the current generation through mass media portrayal of smile aesthetics. Engeln-Maddox and Miller (2008) found that although the public may be aware of fake and unrealistic beauty images used in the media, they still suffered from appearance-related dissatisfaction or internalisation (23). In other words, people still desire to emulate the beauty standards that they deem to be unrealistic. In such cases, patient satisfaction is unlikely to be achieved. Furthermore, patients are put at risk of developing iatrogenic side effects of orthodontic treatment such as pain, white spot lesions, gingivitis and root resorption, with minimal patient gain (24-26).

Almost all participants showed positive information-seeking behaviour by reporting desire to embark on information-seeking activities before choosing treatment, using both offline and online mediums. The main sources of information cited were friends and online platforms. This highlights the strong influence of peers in the decision making of young adults. It has been reported that individuals who want orthodontic treatment are more likely to have someone in their peer group who is already receiving orthodontic care (27). Respondents in this present study reported a variety of online platforms such as websites (54.4%), Instagram (57.8%), Facebook (56.6%), Youtube (51.1%) and Twitter (32.4%) to search for information prior to getting orthodontic treatment. These findings are in line with the high internet usage (76.9%) reported by a national internet survey in Malaysia (9). Although internet use among Malaysian patients is high, e-health literacy is poor, as many still struggle to critically appraise online health information (28). This leaves patients vulnerable to receiving misleading information as unqualified individuals often use social media platforms such as Instagram and Facebook to share information about illegal orthodontic treatment (8). The advertisements use the sentiment of cheaper prices and testimonials from satisfied consumers to elicit followers. Furthermore, it is not uncommon for these social media handlers to purchase followers to further establish their presence on social media (29). As an attempt to address this issue, health care providers should also turn to the power of social media to distribute oral health information including to warn the public about fake braces and its complications (24-26).

A large majority of the respondents demonstrated sufficient knowledge in terms of qualification of dental practitioners although most did not actively search for such qualifications from potential providers. A proportion of participants cited dental nurses (37%) and beauticians (7.1%) as qualified orthodontic providers, which is similar to what has been reported by Wahab *et al* (8). Most respondents also scored well in terms of knowledge on appropriate places to receive treatment. However, a small proportion of participants thought that beauty parlours, hotels and personal homes were suitable places to receive orthodontic treatment. This suggests lack of knowledge about orthodontic treatment and that these participants may have potential to look for such services. This is worrisome as the subjects for this study were specifically chosen from states which had recent reports of fake braces activity (11, 14).

Findings from this study can be used to educate the community in particular to highlight key information relating to orthodontic services. This can be done using existing peer-led programmes such as the Young Doctors Programme for school children, Transformation with 1 smile (TW1ST) for young adults attending community college and Dental Icons for the general public (30, 31). Based on the findings from this study, such programmes can be extended by having social media influencers to relay important oral health issues including orthodontic treatment. In addition, more effort should be made to increase visibility of official social media pages and websites of relevant authorities and service providers for wider public access of trustworthy information. Efforts should also be made to highlight the benefit and risks of orthodontic treatment.

Conclusion

The majority of the respondents perceived themselves as having no treatment need but with high intention to seek orthodontic treatment either for functional or aesthetic

reasons. Of those who had intention to seek orthodontic treatment, a small proportion reported lack of knowledge on who can provide the treatment and places to receive treatment. In terms of information-seeking behaviour, most of them reported positive attitudes towards information-seeking behaviour prior to seeking orthodontic treatment. Findings from this study can be used to educate the community about orthodontic treatment and services. Efforts should also be made to highlight about the benefit and risks of orthodontic treatment in particular to those in low treatment need.

Acknowledgement

We would like to thank all respondents who participated in this study and representative in each polytechnic who assisted us in questionnaire distribution.

Competing interest

Authors declare no conflict of interest in this study.

References

1. Mandall NA, McCord JF, Blinkhorn AS, Worthington HV, O'Brien KD. Perceived aesthetic impact of malocclusion and oral self-perceptions in 14-15-year-old Asian and Caucasian children in greater Manchester. Eur J Orthod. 2000;22:175-183.
2. Yao J, Li DD, Yang YQ, McGrath CP, Mattheos N. What are the patients' expectations of orthodontic treatment: a systematic review. BMC Oral Health. 2016;16:19.
3. Flores-Mir C, Major PW, Salazar F.R. Self-perceived orthodontic treatment need evaluated through 3 scales in a university population. J Orthod. 2004;31:329–334.
4. Livas C, Delli K. Subjective and objective perception of orthodontic treatment need: a systematic review. Eur J Orthod. 2013;35:347-353.
5. Abdullah M.S, Rock WP. Assessment of orthodontic treatment need in 5,112 Malaysian children using the IOTN and DAI indices. Community Dent Health. 2001;18:242-248.
6. Siti F, Tan BS, Mathew T. Dental esthetic impact of malocclusion and orthodontic treatment need based on self-perception among university students. IJDSR. 2015;2:49-54.
7. MacCallum F, Widdows H. Altered images: understanding the influence of unrealistic images and beauty aspirations. Health Care Anal. 2018;26:235-245.
8. Wahab RMA, Hasan SK, Yamin NEM, Ibrahim Z. Awareness of fake braces usage among Y-generations. J Int Med Res. 2018;12:663-666.
9. Malaysia Communication and Multimedia Commission. Internet user survey 2017:2017. Report No: 21.
10. Beck F, Richard JB, Nguyen TV, Montagni I, Parizot I, Renahy E. Use of the internet as a health information resource among French young adults: results from a nationally representative survey. J Med Internet Res. 2014;16:e128.
11. Jalil NAA . 'Doktor gigi palsu dipenjara 2 tahun, denda 100 000'. *Berita Harian Online*, 2018 Feb 22.
12. Zamzuri SZ, Razak IA, Esa R. Normative and perceived need for treatment of malocclusion among Malaysian adolescents. Sains Malays. 2014;43:1037-1043.
13. Richmond S, Shaw WC, Stephens CD, Webb WG, Roberts CT, Andrews M. Orthodontics in the general dental service of England and Wales: a critical assessment of standards. Br Dent J. 1993;174:315–329.
14. Radhi NAM. 'MAO alarmed by fundraising campaign for bogus Melaka dentist who took tips from YouTube', *New Straits Times*, 2018 Feb 24.
15. Esa R, Razak IA, Allister JH. Epidemiology of malocclusion and orthodontic treatment need of 12-13 years old Malaysian school children. Community Dent Health. 2001;18:31-36.
16. Lunn H, Richmond S, Mitropoulos C. The use of the index of orthodontic treatment need (IOTN) as a public health tool: a pilot study. Community Dent Health. 1993;10:111-121.
17. Lin F, Ren M, Yaoc L, Hed Y, Guoe J, Ye Q. Psychosocial impact of dental esthetics regulates motivation to seek orthodontic treatment. Am J Orthod Dentofacial Orthop. 2016;150:476-482.
18. Salih FN, Lindsten, Bågesund M. Perception of orthodontic treatment need among Swedish children, adolescents and young adults. Acta Odontol Scand. 2017;75:407–412.
19. Hamdan AM, Singh V, & Rock WP. Assessment of the relationship between perceptions of dental aesthetics and demand for orthodontic treatment in 10-11 year old school children in Birmingham, UK. Community Dent Health. 2012;29:124-128.
20. Ashari A, Mohamed AM. Relationship of the Dental Aesthetic Index to the oral health-related quality of life. Angle Orthod. 2015;86:337-342.
21. Ekuni D, Furuta M, Irie K, Azuma T, Tomofuji T, Murakami T, Morita M. Relationship between impacts attributed to malocclusion and psychological stress in young Japanese adults. Eur J Orthod. 2011;33:558-563.
22. Kang JM, Kang KH. Effect of malocclusion or orthodontic treatment on oral health-related quality of life in adults. Korean J Orthod. 2014;44:304-311.
23. Engeln-Maddox R, Miller S. Talking back to the media ideal: the development and validation of the critical processing of beauty images scale. Psychol Women Q. 2008;32:159-171.
24. Krishnan V. Orthodontic pain: from causes to management-a review. Eur J Orthod. 2007;29:170-179.
25. Tufekci E, Dixon JS, Gunsolley JC, Lindauer SJ. Prevalence of white spot lesions during orthodontic treatment with fixed appliances. Angle Orthod. 2011;81:206-210.

26. Brezniak N, Wasserstein A. Orthodontically induced inflammatory root resorption. Part I: the basic science aspects. Angle Orthod. 2002;72:175-179.
27. Burden DJ. The influence of social class, gender, and peers on the uptake of orthodontic treatment. Eur J Orthod. 1995;17:199-203.
28. Abdullah A, Mohd P. Internet use and e-Health literacy levels among patients attending a hospital based primary care clinic In Malaysia. In: The 4th International Health Literacy Conference 2016, 07 - 09 November 2016, Haiphong City, Vietnam.
29. Theobald AH, Wong BK, Quick AM, Thomson W. The impact of the popular media on cosmetic dentistry. NZ Dent J. 2006;102:58.
30. Yusof ZYM, Jaafar N. Health promoting schools and children's oral health related quality of life. Health Qual Life Outcomes. 2013;11:1-9.
31. Bernama. '21 orang asli dipilih sebagai ikon gigi orang asli',*Sinar Harian*, 2019 July 12.