



Original Article

Comparison of factors affecting orthodontic treatment motivation of Taiwanese and Thai patients in two hospitals



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Abstract *Background/purpose:* Many factors, including economic, psychosocial statuses and ethnicity, affect patients' decision to seek orthodontic treatment. The present study compared orthodontic patients' motivation, attitude and the factors affecting this motivation in Taiwanese and Thai patients. We investigated the association between the aforementioned variables and patient characteristics.

Materials and methods: We enrolled 250 Thai and 250 Taiwanese patients (age ≥ 20 years) from Sunprasitthiprasong and Taipei Medical University Hospitals, respectively, by using self-administered questionnaires. Demographic characteristics were analyzed using Pearson's chi-square test, patients' motivation, attitude and the factors affecting this motivation were analyzed using the sample *t*-test. The association among the variables was investigated by multiple regression analysis.

Results: In both hospitals, the main motivation for seeking orthodontic treatment was esthetic concerns; the patients believed that treatment could make them more beautiful. Taiwanese and Thai patients rejected treatment because of high treatment costs and long treatment periods, respectively. A significant association was observed between household income and Thai patients' motivation ($p < 0.05$). Sex was significantly associated with Thai patients' attitude ($p < 0.05$). Age, sex, active treatment duration, and marital status were associated with Taiwanese attitude toward treatment ($p < 0.05$). In addition, age, household income, and information resources were significantly associated with the factors affecting Taiwanese patients' motivation ($p < 0.05$).

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Conclusion: Ethnicity influenced patients' motivation. Economic status was the main factor affecting Thai patients, whereas many factors affected Taiwanese patients' decision to seek orthodontic treatment. However, esthetic concerns were a crucial motivation for both groups. © 2017 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Recently, the need for the physical and psychological aspects of evaluation in orthodontic treatment has been widely discussed because psychological factors are conducive to treatment success and failure.¹ Psychological factors include patients' motivation and ability to cope with pain and discomfort during treatment.^{2,3} Patients can be motivated by their peers or by their own desire.¹

Daniels et al. investigated patients' motivation and reported esthetic concerns as the key motivational factor to undergo orthodontic treatment.⁴ Other studies have reported the desire to have straightened teeth and improved smile appearance as the main factors. Furthermore, teasing, dentists' advice, and speech problems encourage patients to seek treatment.^{5,6} In addition, health is not a motivational factor for seeking treatment.⁷

With respect to patients' attitude toward orthodontic treatment, a study reported that patients believed that orthodontic treatment can improve their quality of life, ensure a more successful career, and offer higher chances of finding a romantic partner.⁸ Similarly, another study stated that the orthodontic treatment can improve their social life, offer more opportunities at work, and improve their dental health.⁹

Treatment cost is a factor associated with the treatment desire in Brazilian adolescents.⁸ In addition, pain and discomfort, appearance on placement of braces, and treatment duration are the reasons for treatment rejection.¹⁰ Studies have reported that women are more concerned about esthetics and are less satisfied with their dental appearance than men.^{11–13} Studies have found no significant association between the treatment desire and age or sex.^{4,8} Many studies have analyzed the association between patients' motivation and successful orthodontic treatment.^{6,14} Each study revealed varying results and conducted analyses by using different variables, such as site, ethnicity, and age. However, no study has directly compared orthodontic patients' motivation and their ethnicity. We hypothesize that patients' motivation and the associated factors vary with ethnicity. Therefore, our study determined and compared patients' motivation, attitude toward orthodontic treatment, and the factors affecting this motivation in patients of different ethnicities. Furthermore, we explored the associations among the factors affecting patients' motivation. We tried to enable orthodontists to formulate an appropriate treatment plan and reinforce patients' motivation during treatment on the basis of biological, psychosocial, and economic aspects.

Material and methods

The study was approved by the Joint Institutional Review Board of Taipei Medical University and the Ethics Committee in Human Research of Sunpraditthiprasong Hospital. Two hundred and fifty orthodontic patients were collected from each hospital with a total of 500 orthodontic patients. They included patients aged ≥ 20 years, those undergoing orthodontic treatment with upper and lower fixed orthodontic appliances but not in the retention stage, those with no craniofacial anomalies, and those willing to participate. A visual analog scale was used in the questionnaire, wherein the patients responded on a 10-cm line between dis strongly agree anchor and a patient's mark providing a scale from 0 – 10. The test–retest method was used to assess the reliability of the questionnaire; the reliability coefficient of the questionnaire was 0.93. The questionnaires were distributed at the first regular appointment during the data collection period from May to August 2016.

The differences between Taiwanese and Thai patients' motivation, attitude toward treatment, and the factors affecting this motivation were evaluated using a sample *t*-test and Pearson's chi-square test. Multiple regression analysis was performed to evaluate the association of each variable with demographic characteristics. Data from Thai and Taiwanese patients were analyzed separately. All analyses were conducted using STATA Version 13.1 (MP-Parallel Edition, 2013; Texas, USA). Statistical significance was set at $p < 0.05$.

Results

A total of 500 patients participated in this study; all demographic characteristics except the age and sex had significant differences between Thai and Taiwanese patients (Table 1).

The patients were asked about their motivation to seek orthodontic treatment (Fig. 1). An improved smile was the crucial motivational factor for Taiwanese patients (6.76 ± 2.58), and this was not significantly different from Thai patients ($p > 0.05$). The main motivational factor for Thai patients was the desire to have straightened teeth, which differed significantly from Taiwanese patients' motivation (6.18 ± 2.41 , $p < 0.01$).

Considering patients' attitude toward orthodontic treatment (Fig. 2), both Thai (6.76 ± 2.26) and Taiwanese (8.19 ± 1.69) patients believed that orthodontic treatment could make them more beautiful; the results differed significantly between the two groups of patients ($p < 0.01$).

Table 1 Demographic characteristics.

Variables	Thai patients		Taiwanese patients		p Value
	Frequency	Percentage	Frequency	Percentage	
Sex					0.650
Male	119	47.6	114	45.6	
Female	131	52.4	136	54.4	
Age (means \pm SD)	26.4 \pm 6.75		25.23 \pm 5.33		0.360
Marital status					0.003**
Single	201	80.4	226	90.4	
Married	41	16.4	4	1.6	
Divorced	3	1.2	0	0	
Separated	5	2	0	0	
Religion					0.000***
Buddhism	246	98.4	87	34.8	
Christianity	4	1.6	19	7.6	
Islam	0	0	0	0	
Others	0	0	144	57.6	
Educational level					0.000***
Elementary	0	0	0	0	
High school	28	11.2	14	5.6	
Vocational/college	49	19.6	21	8.4	
Bachelor's degree	162	64.8	186	74.4	
Master's degree or higher	11	4.4	29	11.6	
Occupation					0.000***
Student	93	37.2	118	47.2	
Government officer	41	16.4	2	0.8	
Agriculturist	0	0	0	0	
Self-employed	32	12.8	9	3.6	
Employee	36	14.4	62	24.8	
Unidentified	48	19.2	59	23.6	
Responsibility of medical expenses					0.000***
Themselves	162	64.8	116	46.4	
Parents	87	34.8	130	52	
Other	1	0.4	4	1.6	
Household income					<0.001***
<10,000	31	12.4	9	3.6	
10,000–20,000	107	42.8	72	28.8	
>20,000–30,000	39	15.6	74	29.6	
>30,000–40,000	27	10.8	53	21.2	
>40,000–50,000	20	8	21	8.4	
>50,000	26	10.4	21	8.4	
Information resources					<0.001***
Family members	48	19.2	86	34.4	
Friends	143	57.2	84	33.6	
General dentist	30	12	43	17.2	
Media (television)	27	10.8	23	9.2	
Other	2	0.8	14	5.6	
Active treatment duration					<0.001**
<6 months	22	8.8	30	12	
6 months–1 year	31	12.4	93	37.2	
>1 year–1.5 years	39	15.6	53	21.2	
More than 1.5 years	158	63.2	74	29.6	

Active treatment duration = Treatment period from the beginning until the survey date.

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

A long treatment period and high treatment costs were the noteworthy factors affecting Thai (6.20 ± 2.52 , $p > 0.5$) and Taiwanese (6.25 ± 2.60 , $p < 0.01$) patients' motivation, respectively (Fig. 3).

The association between patients' characteristics and their motivation was determined through multiple regression analysis (Table 2). Only household income was significantly associated with the motivation of Thai patients to

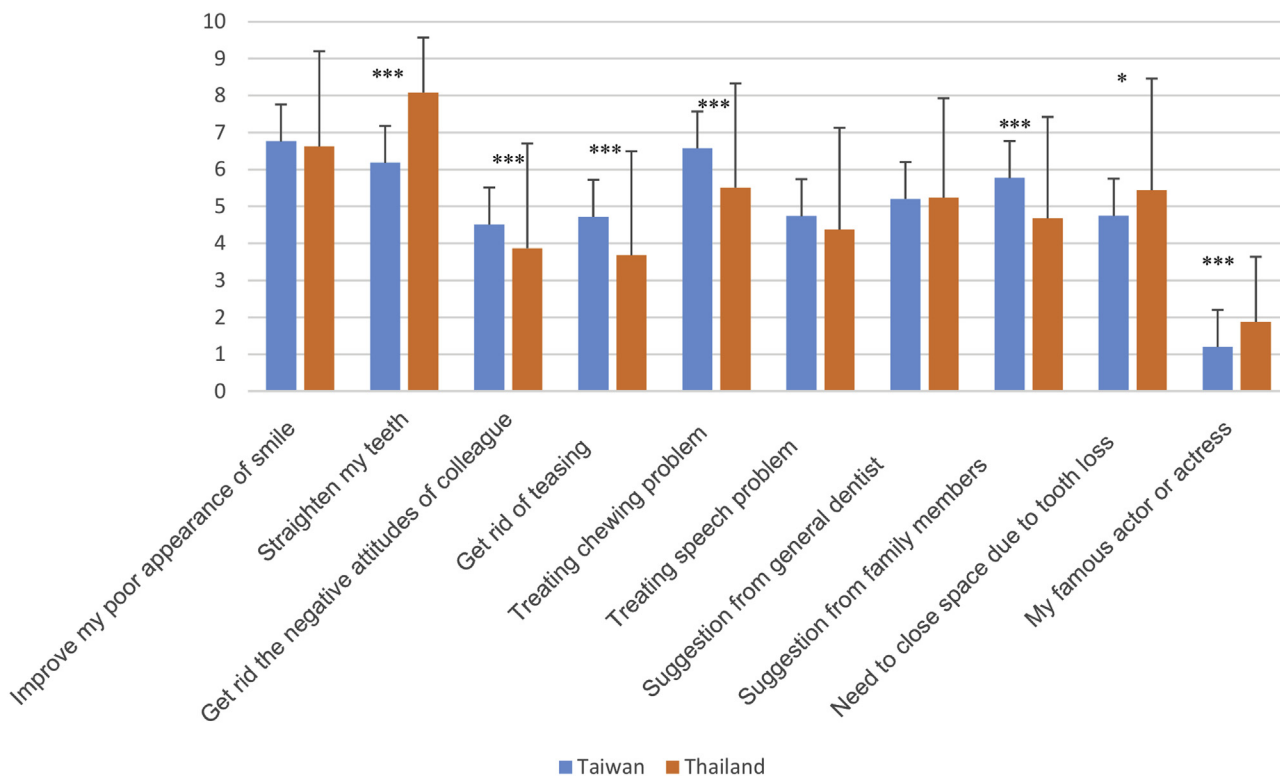


Figure 1 Patient's motivation for seeking orthodontic treatment.

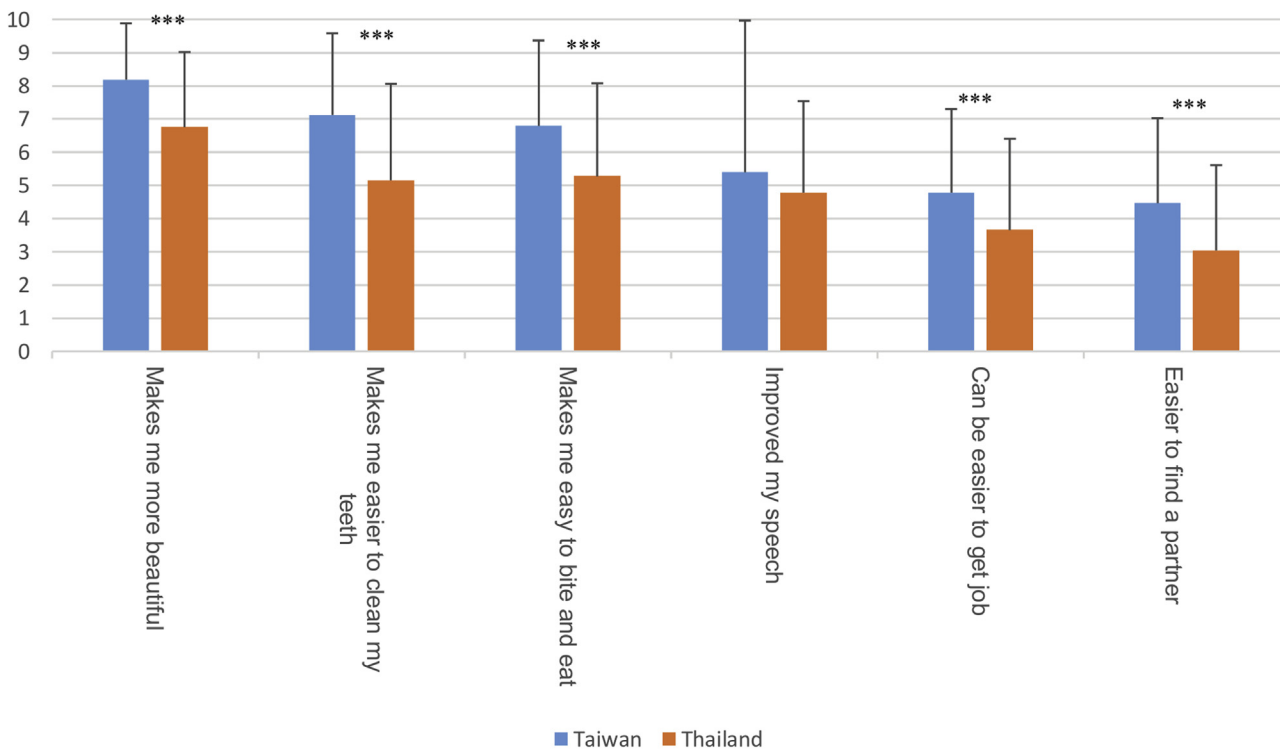


Figure 2 Patient's attitude toward orthodontic treatment.

get straightened teeth ($p < 0.05$), overcome teasing ($p < 0.05$), and close the space caused by tooth loss ($p < 0.05$). By contrast, several factors, except the household income, were significantly associated with Taiwanese patients' motivation.

A significant association was observed between sex and the attitude of Thai patients who believed that the treatment could make them more beautiful ($p < 0.05$; Table 3). By contrast, various factors were significantly associated in Taiwanese patients. In both Thai and Taiwanese patients,

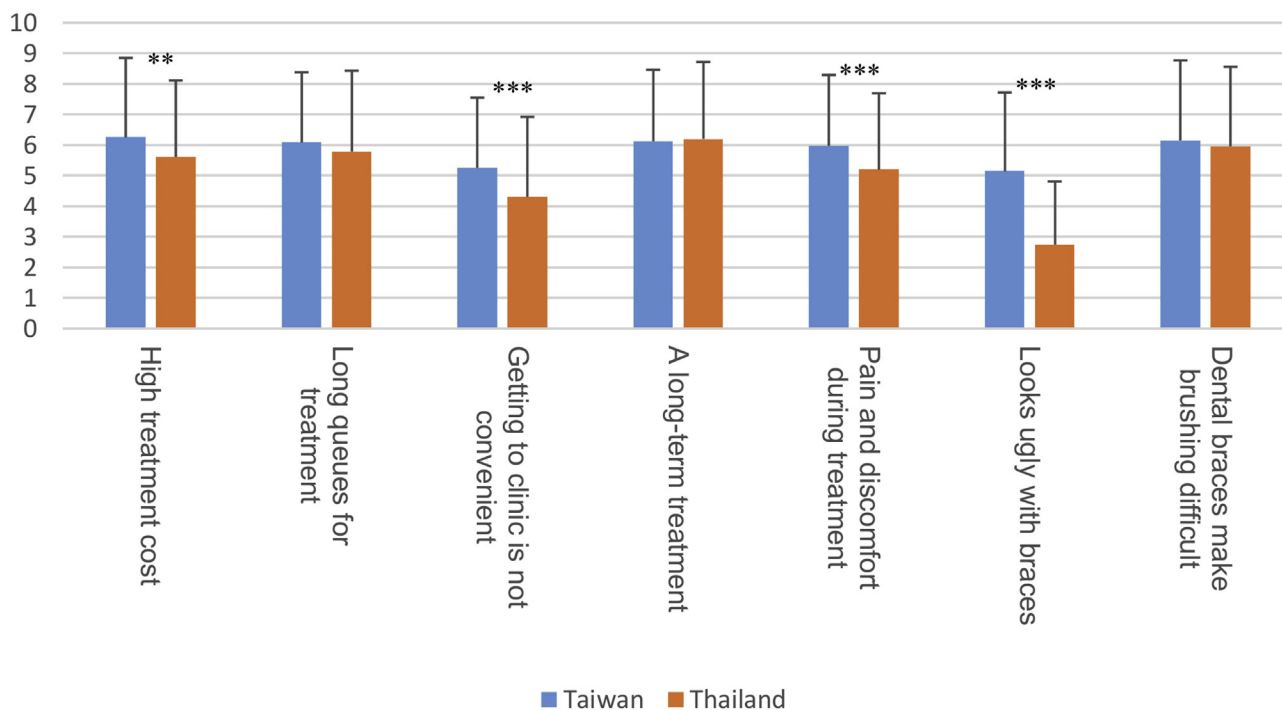


Figure 3 The factors affecting patient motivation.

no association was observed between the factors and attitude of patients who believed that the treatment could make cleaning teeth easier.

With respect to the correlation between demographic characteristics and the factors affecting motivation, a significant correlation was observed between household income and Thai patients who felt ugly with braces ($p < 0.01$). By contrast, numerous factors were significantly associated in Taiwanese patients (Table 4).

Discussion

The present study analyzed the economic, psychosocial, and racial influences on orthodontic patients' motivation. Various variables showed high significant differences between Thai and Taiwanese patients. In our study, most patients were women, and most Thai patients followed Buddhism. The National Statistical Office of Thailand reported in 2011 that 96.4% of Thailand's population followed Buddhism.¹⁵ By contrast, more than a half of Taiwan's population did not have any religion, even when the questionnaire allowed this identification. This may be because of a diverse range of religions in Taiwan and the freedom to follow any religion. In addition, more than half of the Thai population pay by themselves for their medical expenses, which is consistent with the results that more than two-thirds of Thailand's population are in the working age group.

Question one in our questionnaire assessed patients' motivation to receive orthodontic treatment; The responses revealed that for Thai and Taiwanese patients, the desire to obtain straightened teeth and an improved smile were the motivational factors, respectively. Differences were found in the results, but both groups had esthetic

concerns. This result was consistent with that reported by Pabari et al.⁶

Both Thai and Taiwanese patients selected "made them more beautiful" as the main attitude toward treatment. This is probably because facial and smile esthetics are traditionally considered to improve the attractiveness of an individual, a perception by others of higher cognitive ability, intelligence, and social skills.^{4,16} Furthermore, attractive individuals were considered to be more successful in achieving higher socioeconomic status and greater marital happiness than those whose faces were judged as unattractive.

The present findings revealed the factors affecting patients' treatment motivation or reasons for treatment rejection. A long treatment period and high costs were the factors affecting Thai and Taiwanese patients' motivation, respectively. A long treatment period was one of the reasons for treatment rejection in a previous study.¹⁰ Moreover, an explanation may be that long-term treatment duration requires a high number of visits, leading to increased travelling expenses and frequent leaves from work or study. High treatment costs were one of the main reasons for treatment rejection, which was consistent with that reported by Marques et al.⁸ This is probably related to patients' income or unclear value of the treatment investment.

We analyzed the association between patients' characteristics and their motivation. Household income, which was often considered an economic indicator, showed a negative association in Thai patients earning less than 40,000 baht. Thai patients had esthetic concerns, which included obtaining straightened teeth and overcoming teasing. Studies have supported teasing as a common reaction to malocclusion and dental appearance.^{10,17} Based on these data, patients desired treating crooked teeth or

Table 2 Correlation between patient characteristics and motivation, as assessed using multiple regression analysis.

	Sex		Age		Marital status		Religion		Educational level		Occupation		Responsibility of medical expenses		Household income		Information resources		Active treatment duration		
	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	
Straightened teeth	#	#	#	(-) ^{***}	#	#	#	#	#	#	NS	(-) ^{**}	#	(-) [*]	(-) [*]	#	#	#	#	NS	*
Overcome the negative attitude of colleagues	#	#	NS	NS	#	#	#	#	#	#	#	*	#	*	#	#	#	#	NS	NS	*
Overcome teasing	#	#	#	#	#	*	#	#	#	#	#	(-) [*]	#	#	*	NS	#	#	#	#	*
Treat chewing problem	#	#	#	#	NS	NS	#	#	#	#	NS	NS	#	#	#	#	#	#	NS	NS	NS
Suggestion from family members	#	#	#	#	#	#	#	#	#	*	#	#	#	#	#	#	NS	(-) ^{**}	#	#	#
Desire to close the space caused by tooth loss	#	*	NS	*	NS	NS	#	#	#	#	NS	NS	#	#	(-) [*]	#	#	#	#	#	NS
My favorite actor or actress	#	#	NS	NS	NS	***	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#

= Variable not included in the final model; NS = Statistically nonsignificant; (-) = Negative correlation; **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

Table 3 Correlation between patient characteristics and attitude toward treatment, as assessed using multiple regression analysis.

	Sex		Age		Marital status		Religion		Educational level		Occupation		Responsibility of medical expenses		Household income		Information resources		Active treatment duration		
	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	
Makes me more beautiful	*	#	NS	(-) ^{***}	#	#	#	#	#	#	#	NS	#	#	NS	NS	NS	NS	#	#	#
Makes it easier to clean my teeth	#	#	NS	NS	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
Makes it easier to bite and eat	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	NS	*	#
Makes it easier to get job	#	#	NS	(-) ^{***}	#	#	#	#	#	#	#	#	#	#	#	#	#	#	NS	***	#
Makes it easier to find a partner	#	(-) ^{***}	NS	(-) ^{***}	NS	(-) ^{***}	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#

= Variable not included in the final model; NS = Statistically nonsignificant; (-) = Negative correlation; **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

Table 4 Correlation between patient characteristics and factors affecting the treatment motivation, as assessed using multiple regression analysis.

	Sex		Age		Marital status		Religion		Educational level		Occupation		Responsibility of medical expenses		Household income		Information resources		Active treatment duration		
	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	TH	TW	
	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
High treatment costs	#	#	#	#	#	#	#	#	#	#	#	#	#	NS	NS	NS	NS	*	#	#	#
Inconvenience in visiting the clinic	#	#	NS	NS	#	#	#	#	#	#	#	#	#	#	NS	(-)**	#	#	#	#	#
Pain and discomfort during treatment	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	(-)*	NS	*	#	#	#
Looks ugly with braces	#	#	NS	*	#	#	#	#	#	#	NS	NS	#	#	(-)**	NS	NS	*	#	#	#

= Variable not included in the final model; NS = Statistically nonsignificant; (-) = Negative correlation; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

malocclusion, but these treatments may not be affordable. In concordance with these data, the National Statistical Officer of Thailand reported that in 2015, the average monthly household income was 26,915 baht per household, whereas the average monthly expenditure was 21,157 baht per household.¹⁸ Compared with the data from Taiwan, we observed that this result may be related to Thailand's gross domestic product (GDP) per capita being 3.8 times less than that of Taiwan's GDP per capita.^{18,19} Typically, a higher GDP is associated with higher health care expenditure per capita. In 2009, Thailand's and Taiwan's health care expenditure accounted for 4.112% and 6.9% of their GDP, respectively. These results indicate that the ability of Thailand's population to pay for their living and health care is lower than that of Taiwan's population.²⁰ In addition, income showed a negative association in Thai patients desiring to improve their function by closing the space caused by tooth loss. The explanation can be similar to that previously stated.

Age, occupation, responsibility of medical expenses, and active treatment duration showed significant associations in Taiwanese patients having esthetic concerns. It might be because our patients were aged ≥ 20 years and could distinguish between regular beautiful and contemplate improving their attractiveness or becoming more successful. These were nonpaying patients, but even their parents were concerned about the esthetics and affordability of their treatment. Active treatment duration was probably related to patients' adaptability to fixed appliances, which made them feel acceptable to have braces. These results verify that esthetics influence the patients, irrespective of their occupation. In our study, Taiwanese patients desired to close their space, indicating that they were concerned about their dental function increasing with age; this result is in concordance with previous studies that reported increased tooth loss with age.^{21,22}

Taiwanese patients who were influenced by their peers had a significant negative association with educational level and information resources. A possible explanation is that patients who have higher educational level having the ability to think and make a decision by themselves. In addition, married Taiwanese patients were less likely to be motivated by actors.

Both male and female Thai patients believed that the treatment made them more beautiful. According to Roth's philosophy, orthodontic treatment can influence esthetics. Studies have reported that people who have a beautiful smile are considered more intelligent and successful.^{16,23} In addition, women have been reported to be more concerned with appearance and facial attractiveness than are men.²⁴ Taiwanese patients showed a negative correlation with the "made them beautiful" attitude. This result contradicts with that by Pabari et al. who found that an improved smile, which is related to esthetics, was the main motivation of adult patients for seeking treatment.⁶

Increasing active treatment duration had a significant correlation in Taiwanese patients who believed that the treatment could treat their biting and chewing problems. Moreover, active treatment duration was significantly associated in Taiwanese patients who believed that the treatment could facilitate securing a job. Based on these data, improved facial esthetics was found to contribute to

high self-esteem and more success. Taiwanese patients' attitude had a significant negative correlation with their age. This can be explained by the fact that adults having work experiences and increased work ability because of the number of years worked can use those experiences to compensate for their appearance.

The female sex had a significant negative correlation in Taiwanese patients who believed that the treatment could make finding a partner easier. One explanation is women were more likely to have esthetic concerns and possibly felt that braces placed during treatment affect their smile esthetics and might reduce their opportunity to find a romantic partner. We suggest that orthodontists introduce tooth-colored or invisible braces to their patients. Marital status had a significant negative correlation in Taiwanese patients who thought that the treatment could help them find a partner. It might be related to their experiences of never undergoing orthodontic treatment before marriage. Another possible reason is that married couples satisfied with their married life are more likely satisfied with their appearance. Age showed a significant negative correlation with this attitude, probably because the patients believed that irrespective of their age, they can date or find a romantic partner throughout their lives.

High household income showed a significant negative correlation in Thai patients who felt they look ugly with braces. An explanation is that presently in Thailand, orthodontic treatment not only provides improved esthetics and health but has also become a fashion trend and sign of being wealthy. Taiwanese patients who felt that visiting a clinic is inconvenient had a significant negative correlation with household income. In addition, household income had a negative significant correlation with patients who stated pain and discomfort as the reason for rejecting treatment.

Friends and family members showed a significant positive correlation with patients who felt pain and discomfort during treatment and hence denied treatment. Intimate relationships were found to be capable of influencing the patients because influencers may have experienced the same situation, and word-of-mouth communication is effective. In accordance with Oliveira et al.,²⁵ Taiwanese patients in our study who felt braces made them look ugly showed a significant correlation with age; friends and family members had a significant correlation with such patients. Information resources were significantly correlated in Taiwanese patients who reported high treatment costs as the reason for treatment rejection. In such cases, the patients and parents may still have doubts about the treatment benefits and treatment investment value. We suggest that orthodontists should explain the treatment procedures and benefits to patients.

It was concluded that the ethnicity of patients had varying effects on their motivation to seek orthodontic treatment. Economic status was the predominant factor affecting Thai patients' motivation. However, many factors were correlated with Taiwanese patients' motivation. For both Thai and Taiwanese patients, esthetic concerns were the crucial motivational factors for seeking orthodontic treatment. Accordingly, patients' attitude was also related to esthetic improvement.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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