

## Factors Related to Obtaining Fake Braces among Thai Adolescents Living in Municipal Areas

### ปัจจัยที่เกี่ยวข้องในการเลือกใช้บริการจัดฟันแฟชั่นของเด็กวัยรุ่นไทยในเขตเทศบาล

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#### ABSTRACT

This study aimed to identify the associations between the underlying determinants and obtaining fake braces by Thai adolescents. Data were collected by questionnaires from Thai students 12-19 years old who used professional or fake braces. The study was a case-control design with cases as the fake braces group and the controls as the professional braces group. Thirty-six subjects per group were matched by age group, sex, and education level. The variables were compared using the Chi-square and Mann-Whitney U tests. We found associations between obtaining braces and parent education level, subjective norms (friends), braces price, braces cost support, information support (family, provider, and friend), socioeconomic group, and health behavior ( $P < .05$ ). Interventions to decrease obtaining fake braces should focus on peer influence and changing clustering behaviors (intake of sweet diets or snacks) to yield the greatest impact.

#### บทคัดย่อ

การศึกษานี้มีจุดประสงค์เพื่ออธิบายความสัมพันธ์ของปัจจัยที่มีผลต่อการจัดฟันแฟชั่นของเด็กวัยรุ่นไทย ข้อมูลรวบรวมจากแบบสอบถามในเด็กนักเรียนไทยอายุ 12-19 ปี ที่เคยมีประสบการณ์จัดฟันแฟชั่นหรือจัดฟันปกติ โดยใช้การศึกษารูปแบบกลุ่มที่เป็นโรคและไม่เป็นโรค กลุ่มที่เป็นโรคคือ คนที่จัดฟันแฟชั่น และกลุ่มที่ไม่เป็นโรคคือ คนที่จัดฟันปกติ กลุ่มละ 36 คน นำมาจับคู่ระหว่างกลุ่มด้วยปัจจัยช่วงอายุ เพศ และระดับการศึกษา วิเคราะห์ข้อมูลโดยใช้การทดสอบไคสแควร์และการทดสอบแมน-วิทนียู พบว่า ปัจจัยเรื่องการศึกษาของผู้ปกครอง การคล้อยตามเพื่อน ค่าจัดฟัน บุคคลที่จ่ายค่าจัดฟัน ข้อมูลสนับสนุนจากครอบครัว ผู้ให้บริการ และเพื่อน สถานะทางสังคมและเศรษฐกิจ และพฤติกรรม สุขภาพ มีความสัมพันธ์กับประเภทของการจัดฟันที่ระดับนัยสำคัญ .05 ดังนั้น การลดปัญหาจัดฟันแฟชั่นควรเน้นเรื่องอิทธิพลของเพื่อน และทำควบคู่กับการเปลี่ยนพฤติกรรมทานอาหารหวานหรือขนมขบเคี้ยวเพื่อลดผลกระทบที่เพิ่มขึ้น

**Keywords:** Fake braces, Orthodontic appliances, Adolescent

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## Introduction

The perceived need for orthodontic treatment in adolescents has considerably increased in Thailand (Palanuparph, Sirichompun, 2002). When an individual decides to obtain orthodontic treatment, a number of determinants are involved. Andersen's health care utilization model explained the contextual characteristics and individual characteristics as predisposing factors and enabling factors (Andersen, 2013). These factors influence health behaviors including health care access by adolescents. In addition, social determinants of oral health framework revealed the broader concept, the causes of the causes, of oral disease, which were structural determinants (World Health Organization [WHO], 2010). Therefore, structural determinants pattern the more proximal factors on health, such as health behaviors and health care utilization through intermediary determinants.

For Thai adolescents, evidence revealed that in addition to malocclusion causing them to seek orthodontic treatment, wanting braces like others had and fashion reasons also were factors (Atisook, Chuacharoen, 2014). In contrast, they found that other factors, such as high cost and long treatment time, might impede orthodontic care utilization.

As a result of these influences, there are unmet perceived needs for orthodontic treatment among adolescents, resulting in obtaining fake braces. Fake braces are braces that imitate orthodontics appliances, but do not treat malocclusion. There is evidence that the use of fake braces began in Thailand in 2004. These fake appliances have become closer in appearance to real fixed appliances and easier to use. Fake braces in Thailand were categorized into three generations with different designs; 1) beads engaged with wire, 2) fixed or removable fake appliances bonded by a non-dentist provider or the individual, and 3) more complicated appliances than the former appliances that are available for sale online (Vachirarojpisan, 2009).

Anecdotal evidence supports that fake braces were used as fashion and high socioeconomic status statements (Chitpittayaporn, 2017). Fake braces also were obtained to make adolescents more self-confident and good-looking. Furthermore, the lower price and easier access of fake braces combined with low health literacy about the drawbacks were contributing factors for adolescents in obtaining fake braces.

In contrast to other countries, fake braces are now an important problem among Thai adolescents because they can contain contaminated materials, and the reported health risks, e.g., malocclusion, dental caries, gingival inflammation, soft tissue ulceration, and life-threatening infection when using them (Vachirarojpisan, 2009). Although Thailand's Consumer Protection Board has prohibited the sale of fake braces, and their providers can be arrested, fake braces still can be found in big cities such as Bangkok, as well as through social networks. Thus, restricting the importation, production, and sale of fake braces are not adequate to resolve the problem. Determining the factors that are related to obtaining fake braces is indispensable. However, there is currently limited empirical evidence to show these relationships. Hence, it is essential to identify these relationships to determine the type of intervention to employ to reduce their use.

### Objective of the study

This aim of this study was to determine the association of the underlying determinants (predisposing factors, enabling factors, and social determinants of health) on obtaining fake braces among Thai adolescents.

### Material and methods

Data were obtained from Thai adolescents aged 12–19 years old with perceived needs for braces. The subjects were students from secondary schools in Bangkok, located in well-known areas of fake braces providers to facilitate recruitment of cases, i.e. Bang Kapi (Tawanna flea market), Taling Chan (Southern Bus Terminal flea market), Don Mueang, and Huai Khwang (Vachirarojpisan, 2009). Only adolescents who were wearing orthodontic appliances/fake braces or had removed the appliances not more than 12 months were included in this study. The study protocol was approved by the Human Research Ethics Committee of the Faculty of Dentistry, Chulalongkorn University (HREC-DCU 2018-003).

This study was a case-control study design. The cases were subjects who had obtained fake braces (FB), whereas the controls were those using professional braces (PB). The subjects were classified into case or control based on their appliances and data from questionnaires. The cases and controls were matched 1:1 by age group, sex, and education level to avoid confounding effects. The sample size calculation was based on formula testing difference in proportions for a case-control study. Thirty cases and thirty controls were required for the study.

To achieve the purposes of the study, predisposing and enabling factors, as well as social determinants were assessed. The predisposing factors were age, sex, education level of the adolescents, education level of the parents, living with father/mother, and subjective norms. Subjective norms were included to evaluate who is important in the adolescents' opinion about what they believe they should do. Enabling factors were residency area, price of braces, braces cost support, and information support. The price of braces was the payment for orthodontic treatment per month or fake braces each time they were applied. Information supports were the sources of information that facilitated the adolescents to obtain braces.

In addition, to determine the socioeconomic status (SES) of each household, the household questionnaires considered selected household assets (floors, roofs, or walls; flush or pour-flush toilets, transportation, including bicycles, motorcycles, cars, or trucks; and electrical equipment, including radios, televisions, line or mobile telephones, refrigerators, and computers) were combined using principal component analysis to form an asset index (Limwattananon, 2010). The SES results were divided into higher and lower groups by ranking according to asset index. Health behaviors were also investigated to determine whether clustering of behaviors was associated with obtaining fake braces. Data on the underlying determinants were collected using self-administrated online questionnaires that were completed by each student after providing informed consent. A researcher was available for queries from the students concerning completing the questionnaires.

Data analyses were performed using statistical software (SPSS Statistic version 22). Descriptive analysis was performed to determine the characteristics of the subjects in both groups. The associations between the underlying

determinants and braces utilization were analyzed using the Chi-square test and Mann-Whitney U test. A P-value of  $<.05$  was deemed statistically significant.

## Results

Forty-five subjects who had obtained FB and 351 subjects who had obtained PB were recruited to participate in this study. Nine subjects in the FB group and 315 subjects in the PB group were excluded in the matching procedure. As a result, thirty-six adolescents per group were closely matched.

The mean age of the adolescents in the FB and PB group were  $14.0 \pm 1.0$  years old and  $14.1 \pm 0.7$  years old, respectively. The adolescents in both groups were mostly in early adolescence (69.4 %) and female (86.1%). Almost all of the adolescents were in lower secondary school (97.2%). The percentage of adolescents living with their father or mother were 80.6% in the FB group and 88.9% in the PB group, which were not related to the type of braces obtained ( $P = .326$ ). However, the factors influencing the type of braces obtained were the education level of the parents and subjective norms from friends. The percentage of parents of the adolescents that attained an education level higher than secondary/vocational degree was 38.9% in the PB group compared with 11.1% in the FB group ( $P <.05$ ). A friend was the only person in this study that influenced adolescents to obtain braces in 75% of the FB group and 41.7% of the PB group ( $P <.05$ ) (Table 1).

The average monthly payment for PB was  $1750.0 \pm 855.9$  baht which was significantly higher compared with the price of FB,  $993.8 \pm 1422.5$  baht ( $P <.001$ ). The support of braces cost in the PB group was mainly from a parent or relatives (94.4%), however, in the FB group, 44.4 % of the adolescents earned the cost by themselves ( $P <.001$ ). Information support from family members, provider, and friends were related to the type of braces obtained. Information from family members was involved in 47.2% of those obtaining PB compared with 16.7% of those obtaining FB ( $P <.05$ ). Similarly, providers were more often the person that adolescents obtaining PB asked for information (36.1%) compared with those obtaining FB (2.8%) ( $P <.001$ ). In contrast, friends were the main information source for obtaining FB (77.8%) relative to obtaining PB (16.7%) ( $P <.001$ ). However, information from advertisements and social media had less influence on the type of braces obtained (13.9%) ( $P = 1.000$ ) (Table 2).

The SES groups were associated with the braces type groups. More adolescents obtained PB in the higher SES group compared with the FB group, 63.9% and 36.1% respectively ( $P <.05$ ). Health behavior also had a relationship with the type of braces obtained. Snacks or sweet diets consumption was found in 72.2% of the adolescents in the PB group, which was lower than the 97.2 % of those in the FB group ( $P <.05$ ), whereas exercising was not related to either braces type group ( $P = .102$ ) (Table 3).

**Table 1** Predisposing factors for adolescents who obtained fake braces or professional braces.

Predisposing factors	Fake braces (N = 36)	Professional braces (N = 36)	P-value
<b>Living with father/mother (%)</b>			.326
No	19.4	11.1	
Yes	80.6	88.9	
<b>Education level of the parent(s) (%)</b>			<.05
Up to secondary/vocational degree	88.9	61.1	
Higher than secondary/vocational degree	11.1	38.9	
<b>Subjective norms</b>			
Friend			<.05
No	25.0	58.3	
Yes	75.0	41.7	
Partner			1.000
No	83.3	83.3	
Yes	16.7	16.7	
Famous person			.224
No	55.6	69.4	
Yes	44.4	30.6	

**Table 2** Enabling factors for adolescents who obtained fake braces or professional braces.

Enabling factors	Fake braces (N = 36)	Professional braces (N = 36)	P-value
<b>Price of braces (baht; mean ± SD)</b>	993.8 ± 1422.5	1750.0 ± 855.9	<.001
<b>Braces cost support</b>			<.001
Parent or relatives	55.6	94.4	
Part-time job	44.4	5.6	
<b>Information support (%)</b>			
Family members or relatives			<.05
No	83.3	52.8	
Yes	16.7	47.2	
Advertisement and social media			1.000
No	86.1	86.1	
Yes	13.9	13.9	
Provider			<.001
No	97.2	63.9	
Yes	2.8	36.1	
Friend			<.001
No	22.2	83.3	
Yes	77.8	16.7	

**Table 3** Socioeconomic group and health behaviors for adolescents who obtained fake braces or professional braces.

Social determinants of health	Fake braces (N = 36)	Professional braces (N = 36)	P-value
<b>Socioeconomic group (%)</b>			<.05
Higher group	36.1	63.9	
Lower group	63.9	36.1	
<b>Health behaviors (%)</b>			
Sweet diet/Snack (> 2 times/day)			<.05
No	2.8	27.8	
Yes	97.2	72.2	
Exercising (> 3 times/week)			.102
No	83.3	66.7	
Yes	16.7	33.3	

## Discussion

The subjects in this study were recruited from secondary schools located in well-known areas of FB providers to facilitate case recruitment. If the cases could not be matched with the controls in the same school, they were matched with controls from another school in the same area so that the cases and controls were closely paired geographically.

This is the first study to report the relationships of the underlying factors and obtaining fake braces compared with a professional braces control group. We found that most adolescents who obtained FB were female in the early adolescence group (10-14 yrs.). Although no study on the age groups of fake braces wearers has been conducted, a previous study on orthodontic treatment needs proposed that there was a higher treatment need in those of adolescent age (Palanuparph, Sirichompun, 2002). Due to increased perceived needs, FB were an option for those with unmet needs. Sex was a significant factor affecting orthodontic treatment utilization. Females have more orthodontic perceived needs compared with male adolescents because of their esthetic concerns (Hosanguan et al., 2005; Atisook, Chuacharoen, 2014). However, currently, that a larger proportion of females obtained FB compared with males has only been shown in a thesis study (Chaiyawech, 2011). A previous study has demonstrated the importance of living arrangement, families with parents influenced the adoption of health behaviors in adolescents (Rossow, Rise, 1993). In contrast, the present study found that whether adolescents lived with their father or mother was not related to the utilization of FB or PB. This result is likely because adolescents in the FB group, despite having a father or mother in the family, did not rely on information or support from their parents in their decision to use FB. Moreover, the significant determinants for obtaining fake braces were the education level of the parents and subjective norms from friends. The education level of the parents is often used as an indicator of SES in survey-based research (Aarø et al., 2009). Our results demonstrated that the higher parent's education in the PB group correlated with the higher proportion of adolescents classified as having a higher SES. However, these results did not agree with a study of orthodontic treatment experience that showed no association between treatment experience and education level of the father (Hosanguan et al., 2005). Subjective norms from friends were related with obtaining FB in a previous study and report (Chaiyawech, 2011; Chitpittayaporn 2017). The present study also confirmed the influence of friends on obtaining FB by 75% of adolescents.

In Thailand, the cost of orthodontic treatment is relatively high. Orthodontic treatment in a government hospital costs 32,000–36,000 baht (Atisook, Chuacharoen, 2014). In contrast to PB, the average price of FB application, which was a one-time cost, was much lower ( $993.8 \pm 1422.5$  baht) or approximately half compared with the payment per month for PB ( $1750.0 \pm 855.9$  baht). Thus, the support of braces cost might reflect how adolescents utilized each braces type because adolescents earning the expense by themselves were likely to obtain FB, which were lower-priced. Another significant factor related to the type of braces utilized was the source of information support. Approximately half of the adolescents obtaining PB were given information before starting treatment from family members and relatives. This result might be because the support of the PB expenses was from a parent or relatives. Similarly, approximately one-third of the adolescents found the information concerning PB from health personnel (providers) who might be a dentist or staff in a dental clinic. In contrast, friends were the critical persons who provided information for FB, which was consistent with the subjective norms results, thus, friends might be an important target in reducing

the use of FB. An unexpected result was the finding of the low influence of social media information support in both groups, despite the rise of internet based information and advertisements about FB and PB. These findings are supported by those of a study of Australian social media users in which most subjects were adolescents. Rather than accepting information from social media, patients tended to find orthodontic treatment information directly from an orthodontist (Henzell et al., 2013).

It has been shown that socioeconomic status, through social determinants of health, can shape health behaviors and consequently result in health inequality (WHO, 2010). The adolescents in the higher SES group can afford the high cost of orthodontic treatment, whereas those in the lower SES group may be vulnerable to health-compromising conditions that might lead to obtaining FB. Health behaviors tended to cluster in a variety of patterns that have a cumulative effect on health (Tsakos, Alzahrani, 2014). The interventions on multiple behaviors had an increased effect on public health compared with single behavior interventions. In the present study, obtaining FB coincided with the intake of sweet diets or snacks in almost all adolescents in the FB group. Therefore, both behaviors are likely associated in some manner, and interventions to simultaneously change them would be an effective measure.

### **Conclusion**

Subjective norms from friends, lower price of braces, information support from friends, and lower socioeconomic status were found to be associated with obtaining fake braces among Thai adolescents. Interventions to reduce the prevalence of obtaining fake braces situation should focus on peer influence and collaborate with altering health behavior patterns, such as the intake of sweet diets or snacks, to yield the greatest impact.

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