

Part II. What drives Korean adults to seek orthodontic treatment: Factors contributing to orthodontic treatment decisions

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Objective: This study aimed to identify the perceptions of orthodontic treatment among Korean adults and determine the factors that drive them to seek orthodontic treatment. **Methods:** A total of 2,321 adults aged 19–64 years were surveyed using an internet research system from a specialized research company. The participants were divided into the following groups based on their experience of and willingness to undergo orthodontic treatment: experience, acceptance, and non-acceptance groups. The characteristics of the participants were compared using analysis of variance with post-hoc analysis. Multinomial logistic regression analysis was performed in all three models with the non-acceptance group as a reference. **Results:** In terms of demographic characteristics, age, gender, marital status, and education had significant influences on orthodontic treatment decisions in adults in the experience and acceptance groups ($p < 0.001$). When all the factors were analyzed, age, marital status, past dental treatment experience, regular oral examinations, demand for orthodontic treatment, optimal treatment period, health insurance coverage, information on orthodontic treatments, perceptions regarding orthodontic treatment, and psychosocial impact of dental esthetics significantly influenced orthodontic treatment decisions in adults in the experience and acceptance groups ($p < 0.001$). **Conclusions:** These findings suggest that various factors influence orthodontic treatment decisions in adults. Individuals who seek orthodontic treatment were found to undergo more regular dental treatment and oral examination than those who did not. They also had a better perception of orthodontic treatment and more negative values for the psychosocial impact of dental esthetics.

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INTRODUCTION

Adolescents have been the primary target of orthodontic treatment in the past. However, in recent times, the number of adults seeking orthodontic treatment to improve esthetics, appearance, and function has increased significantly because of economic development and the increasing availability of information regarding orthodontic treatment.^{1,2} Unlike adolescents, adult orthodontic patients have different physical characteristics and a greater capacity to make decisions for themselves; they also have very specific psychological perspectives for treatment motivation and needs. Therefore, these differences need to be considered for adult orthodontic patients. In a study by Lee,³ adults had a stronger tendency to decide for themselves whether they will have a treatment than adolescents, and their will and judgment often influenced their treatment decisions. In another study by Wedrychowska-Szulc and Syryńska,⁴ orthodontic treatment-related decisions among adolescents were strongly influenced by their dentist or parents; however, this tendency decreased with age in adulthood.

Socioeconomic and psychological aspects, such as improvement in appearance and interpersonal relationships, have a greater impact than functional abnormalities on the choice or decision to seek orthodontic treatment. In a study by Hassan and Amin Hel-S,⁵ malocclusion requiring orthodontic treatment in young adults had negative effects such as oral pain, dissatisfaction with self, nervousness, and dissatisfaction with life. Further, in a study by Pabari et al.,⁶ self-satisfaction and facial body image scores were higher after orthodontic treatment and orthodontic treatment had a positive effect on self-esteem.

In adults, it is essential to identify the state of and differences in perception since treatment decisions are usually based on an individual's perception regarding orthodontic treatment rather than the expert's view. However, limited studies have been conducted on this

subject. Therefore, the present study aimed to understand the perceptions regarding orthodontic treatment among adults and investigate the factors that drive adult orthodontic treatment in Korea. We hypothesized that there is no difference between adults who seek orthodontic treatment and those who do not.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board of Chonnam National University Dental Hospital (1041223-202003-HR-01).

Study participants

Participant selection was performed in accordance with the distribution of age groups in the population. Thus, among a total of 34,612,768 adults aged 19–64 years (estimated population in 2016)⁷ in Korea, the estimated sample size required was approximately 2,100. A total of 2,321 participants were enrolled considering a dropout rate of approximately 10%. Quota sampling was conducted in four major areas and grouped according to the age (Table 1). The data were collected using an online survey internet research system from a specialized research organization that is reputed for conducting national surveys or enquete (Macromill Embrain, Seoul, Korea).

Study instrument

A questionnaire developed by Oh et al.⁸ was used, which assesses the general characteristics, oral hygiene-related characteristics, demand for orthodontic treatment, psychosocial impact of dental esthetics, perception regarding orthodontic treatment, and other orthodontic treatment-related parameters. The psychosocial impact of dental esthetics was evaluated using the Psychosocial Impact of Dental Esthetics Questionnaire (PIDAQ) developed by Klages et al.⁹ and revised by Kang and Kang.¹⁰ The dental self-confidence items in the PIDAQ were

Table 1. Sampling of four major areas by age based on 2,016 estimated population

Age (yr)	Population	Four major areas (population)				Participants
		Capital (17,904,988)	Central (4,436,470)	Southeast (8,693,200)	Southwest (3,578,110)	
19–29	7,499,899 (21.7)	235	58	114	47	455 (21.7)
30–39	7,534,072 (21.8)	236	59	115	47	457 (21.8)
40–49	8,399,979 (24.3)	264	65	128	53	510 (24.3)
50–59	8,223,311 (23.8)	258	64	125	52	499 (23.8)
60–64	2,955,507 (8.5)	93	23	45	19	179 (8.5)
Total	34,612,768 (100.0)	1,086 (52.0)	269 (13.0)	527 (25.0)	218 (10.0)	2,100 (100.0)

Values are presented as number (%) or number only.

Table 2. Comparison of general characteristics among the three groups (n = 2,321)

Characteristic	Orthodontic treatment			F or χ^2	p-value
	Experience (n = 327)	Acceptance (n = 585)	Non-acceptance (n = 1,409)		
Age (yr)	33.82 ± 11.71 ^a	39.42 ± 12.60 ^a	44.06 ± 11.88 ^b	111.07	< 0.001
19–29	151 (46.2)	163 (27.8)	199 (14.1)	226.99	< 0.001
30–39	90 (27.5)	130 (22.2)	280 (19.9)		
40–49	35 (10.7)	139 (23.8)	381 (27.0)		
50–59	34 (10.4)	114 (19.5)	399 (28.4)		
60–64	17 (5.2)	39 (6.7)	150 (10.6)		
Gender					
Men	91 (27.8)	279 (47.7)	711 (50.5)	55.03	< 0.001
Women	236 (72.2)	306 (52.3)	698 (49.5)		
Residence					
Capital area	187 (57.2)	281 (48.0)	714 (50.7)	9.77	0.135
Central area	32 (9.8)	89 (15.2)	188 (13.3)		
Southeast area	77 (23.5)	146 (25.0)	360 (25.6)		
Southwest area	31 (9.5)	69 (11.8)	147 (10.4)		
Spouse					
Yes	126 (38.5)	319 (54.5)	982 (69.7)	124.80	< 0.001
No	201 (61.5)	266 (45.5)	427 (30.3)		
Education level					
High school	33 (10.1)	109 (18.6)	298 (21.1)	69.14	< 0.001
Attending university	56 (17.1)	71 (12.1)	84 (6.0)		
Bachelor's	218 (66.7)	359 (61.4)	881 (62.5)		
≥ Master's	20 (6.1)	46 (7.9)	146 (10.4)		
Occupation					
Employed	192 (58.7)	388 (66.3)	985 (69.9)	15.57	< 0.001
Unemployed	135 (41.3)	197 (33.7)	424 (30.1)		
Monthly income (10,000 KRW)					
≤ 100	37 (11.3)	53 (9.1)	86 (6.1)	29.64	< 0.001
101–200	83 (25.4)	138 (23.6)	282 (20.0)		
201–300	75 (22.9)	146 (25.0)	323 (22.9)		
301–400	48 (14.7)	110 (18.8)	297 (21.1)		
≥ 401	84 (25.7)	138 (23.6)	421 (29.9)		
Working time (hr/day)					
< 6	15 (4.6)	23 (3.9)	62 (4.4)	23.28	0.003
6–8	53 (16.2)	118 (20.2)	289 (20.5)		
8–10	103 (31.5)	210 (35.9)	555 (39.4)		
≥ 10	24 (7.3)	54 (9.2)	115 (8.2)		
None	132 (40.4)	180 (30.8)	388 (27.5)		

Values are presented as mean ± standard deviation or number (%).

Analysis of variance and Post-hoc analyses (Scheffe test for continuous variables and Chi-square test for categorical variables) were performed.

KRW, Korean won.

^{a,b}Different letters indicate statistically significant differences (same row).

analyzed by converting item into positive questions.

Data analysis

The actual values and percentages were calculated for categorical variables, and descriptive statistics (mean and standard deviation) were used for continuous variables. The participants were divided into the following groups based on their experience of and willingness to undergo orthodontic treatment: experience, acceptance, and non-acceptance groups. The characteristics of the participants were compared using analysis of variance for general characteristics, oral hygiene-related characteristics, demand for orthodontic treatment, psychosocial impact of dental esthetics, and perceptions regarding orthodontic treatment. Post-hoc analysis was performed using Scheffe and chi-square (χ^2) tests.

To identify the factors that influenced the orthodontic treatment decisions in adults, multinomial logistic regression analysis using forward selection was performed. In the regression analysis, only variables with a *p*-value of < 0.05 were used in the univariate analysis and the fit of the model was verified using the Hosmer–Lemeshow test. A multinomial logistic regression analysis was performed with the non-acceptance group as a reference for three models—the effects of general characteristics in the experience and acceptance groups (Model 1), the effects of general and oral hygiene-related characteristics in the experience and acceptance groups (Model 2), and

the effects of general and oral hygiene-related characteristics, demand for orthodontic treatment, psychosocial impact of dental esthetics, and perceptions regarding orthodontic treatment in the experience and acceptance groups (Model 3). The results are presented as odds ratios (ORs) and 95% confidence intervals. Statistical analyses were performed using IBM SPSS ver. 21.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The data on demographic characteristics, oral hygiene-related characteristics, demand for orthodontic treatment, perceptions regarding orthodontic treatment, and psychosocial impact of dental esthetics are shown in Supplementary Tables 1–4. The questionnaire results were divided into three groups according to the intention to begin orthodontic treatment, and the differences in the aforementioned factors are shown in Tables 2–5. Supplementary data is available at <https://doi.org/10.4041/kjod.2021.51.1.3>

Comparison of participant characteristics according to the intention to seek orthodontic treatment

General characteristics

The distribution analysis of general characteristics showed significant intergroup differences for all items,

Table 3. Comparison of oral hygiene-related characteristics among the three groups (n = 2,321)

Characteristic	Orthodontic treatment			χ^2	p-value
	Experience (n = 327)	Acceptance (n = 585)	Non-acceptance (n = 1,409)		
Oral health status					
Very unhealthy & unhealthy	94 (28.7)	267 (45.6)	484 (34.4)	37.63	< 0.001
Average	137 (41.9)	216 (36.9)	601 (42.7)		
Healthy & very healthy	96 (29.4)	102 (17.4)	324 (23.0)		
Dental treatment experience					
Yes	327 (100)	548 (93.7)	1,300 (92.3)	26.95	< 0.001
No	0 (0.0)	37 (6.3)	109 (7.7)		
Regular oral examinations					
Yes	190 (58.1)	228 (39.0)	541 (38.4)	44.29	< 0.001
No	137 (41.9)	357 (61.0)	868 (61.6)		
Number of brushings (time/day)					
≤ 1	16 (4.9)	49 (8.4)	114 (8.1)	18.61	0.005
2	102 (31.2)	236 (40.3)	553 (39.2)		
3	186 (56.9)	265 (45.3)	676 (48.0)		
≥ 4	23 (7.0)	35 (6.0)	66 (4.7)		

Values are presented as number (%).

Analysis of variance and Post-hoc analyses (Chi-square test) were performed.

except the areas of residence. The proportion of younger adults, unmarried adults, and women was higher among participants who wished to undergo orthodontic treatment than in those who did not. In addition, participants with higher incomes and married status had a low interest in seeking orthodontic treatment (Table 2).

Oral hygiene-related characteristics

The distribution analysis of oral hygiene-related characteristics showed significant intergroup differences for all items. Participants who perceived that their oral health was poor wished to seek orthodontic treatment, while participants who had experienced orthodontic

treatment had good oral health and were interested in orthodontic treatment (Table 3).

Demand for orthodontic treatment

The distribution analysis of the demand for orthodontic treatment showed significant intergroup differences for all items. Participants who had an experience of orthodontic treatment had an understanding of the cost and duration of orthodontic treatment (Table 4).

Perceptions regarding orthodontic treatment and psychosocial impact of dental esthetics

The distribution analysis of perceptions regarding

Table 4. Comparison of demand for orthodontic treatment among the three groups (n = 2,321)

Characteristic	Orthodontic treatment			F or χ^2	p-value
	Experience (n = 327)	Acceptance (n = 585)	Non-acceptance (n = 1,409)		
Need for orthodontic treatment					
Very necessary	37 (11.3)	99 (16.9)	21 (1.5)	883.64	< 0.001
Necessary	136 (41.6)	343 (58.6)	181 (12.8)		
Average	81 (24.8)	143 (24.4)	375 (26.6)		
Not necessary	60 (18.3)	0 (0.0)	635 (45.1)		
Not necessary at all	13 (4.0)	0 (0.0)	197 (14.0)		
Optimal treatment cost (10,000 KRW)					
≤ 100	150.58 ± 8.33 ^a	144.07 ± 5.96 ^b	137.95 ± 3.68 ^b	66.55	< 0.001
101-200	65 (19.9)	276 (47.2)	727 (51.6)	178.71	< 0.001
201-300	75 (22.9)	147 (25.1)	363 (25.8)		
≥ 301	90 (27.5)	94 (16.1)	186 (13.2)		
Optimal treatment period (mo)	19.50 ± 7.98 ^a	14.09 ± 7.41 ^b	13.58 ± 7.97 ^b	77.22	< 0.001
≤ 6	27 (8.3)	139 (23.8)	385 (27.3)	188.30	< 0.001
7-12	55 (16.8)	198 (33.8)	501 (35.6)		
13-18	93 (28.4)	129 (22.1)	273 (19.4)		
19-24	106 (32.4)	86 (14.7)	147 (10.4)		
≥ 25	46 (14.1)	33 (5.6)	103 (7.3)		
Health insurance coverage					
Yes	299 (91.4)	561 (95.9)	1,184 (84.0)	59.50	< 0.001
No	28 (8.6)	24 (4.1)	225 (16.0)		
Information on orthodontic treatment					
Family, friends, neighbors	135 (41.3)	217 (37.1)	585 (41.5)	57.47	< 0.001
Internet search	106 (32.4)	231 (39.5)	349 (24.8)		
Public media	9 (2.8)	36 (6.2)	114 (8.1)		
Dentist	77 (23.5)	101 (17.3)	361 (25.6)		

Values are presented as number (%) or mean ± standard deviation.

Analysis of variance and Post-hoc analyses (Scheffe test for continuous variables and Chi-square test for categorical variables) were performed.

KRW, Korean won.

^{a,b}Different letters indicate statistically significant differences (same row).

orthodontic treatment and the psychosocial impact of dental esthetics showed significant differences among groups. Perception regarding orthodontic treatment was the highest among participants who had an experience of orthodontic treatment, followed by those who wished to undergo orthodontic treatment; it was the least in participants who did not wish to seek orthodontic treatment. Furthermore, negative perception regarding the psychosocial impact of dental esthetics was directly proportional to the demand for orthodontic treatment (Table 5).

Factors influencing the decision to seek orthodontic treatment in adults

Analysis of the model based on general characteristics (Model 1)

The goodness-of-fit test for Model 1 was significant ($\chi^2 = 281.95$, $df = 36$, $p < 0.001$). In the experience group, acceptance of orthodontic treatment was lower in the participants aged 30–39 (OR: 0.55), 40–49 (OR: 0.18), 50–59 (OR: 0.18), and 60–64 (OR: 0.30) years than in participants aged 19–29 years. Participants in their 30s showed the highest acceptance, followed by those in their 60s, 40s, and 50s. Women (OR: 1.97) showed a higher acceptance than men, and married participants (OR: 1.51) showed a higher acceptance than unmarried participants. Participants with Bachelor’s degrees (OR: 1.89) showed a higher acceptance than university students (OR: 1.46) or those with Master’s degrees (OR: 1.33). However, occupation, monthly income,

and working time did not influence the orthodontic treatment decision (Table 6).

In the acceptance group, acceptance was lower in participants aged 30–39 (OR: 0.65), 40–49 (OR: 0.55), 50–59 (OR: 0.44), and 60–64 (OR: 0.40) years than in participants aged 19–29 years; an increase in age was correlated with a decrease in the acceptance. Gender, marital status, occupation, monthly income, and working time (hours of work per day) did not influence the treatment decision (Table 6).

Analysis of the model based on general and oral hygiene-related characteristics (Model 2)

The goodness-of-fit test for Model 2 was also significant ($\chi^2 = 411.07$, $df = 50$, $p < 0.001$). In the experience group, acceptance was lower in participants aged 30–39 (OR: 0.57), 40–49 (OR: 0.18), 50–59 (OR: 0.17), and 60–64 (OR: 0.23) years than in those aged 19–29 years. Acceptance was the highest among the participants in their 30s, followed by those in their 60s, 40s, and 50s. Compared to men, women showed a higher acceptance (OR: 1.61), and married participants showed a lower acceptance than unmarried participants (OR: 0.60). Participants with Bachelor’s degrees (OR: 1.64) showed a higher acceptance. However, occupation, monthly income, and working time did not influence the treatment decision. The results of the analysis of Model 2 showed patterns similar to those in Model 1. However, the experience group showed a difference with respect to the marital status; married participants showed a higher acceptance in Model 1, whereas their acceptance was

Table 5. Perception of orthodontic treatment and psychosocial impact of dental aesthetics according to the three groups (n = 2,321)

Characteristic	Orthodontic treatment			F	p-value	Scheffe
	Experience ^a (n = 327)	Acceptance ^b (n = 585)	Non-acceptance ^c (n = 1,409)			
Perception of orthodontic treatment in adults	3.21 ± 0.39	3.07 ± 0.33	2.95 ± 0.32	78.27	< 0.001	a > b > c
Perception of orthodontic treatment	3.27 ± 0.48	3.18 ± 0.45	3.08 ± 0.46	26.01	< 0.001	a > b > c
Perception of adult orthodontic treatment	3.14 ± 0.44	2.97 ± 0.39	2.81 ± 0.40	90.52	< 0.001	a > b > c
Effect of orthodontic treatment	3.20 ± 0.50	3.12 ± 0.42	3.02 ± 0.41	25.13	< 0.001	a > b > c
Retention of orthodontic treatment	3.27 ± 0.52	3.05 ± 0.44	2.97 ± 0.45	50.91	< 0.001	a > b > c
Psychosocial impact of dental aesthetics	1.70 ± 0.74	2.16 ± 0.70	1.58 ± 0.68	150.35	< 0.001	b > a > c
Dental self-confidence	2.06 ± 0.86	2.66 ± 0.77	2.10 ± 0.81	107.01	< 0.001	b > a, c
Social impact	1.40 ± 0.84	1.76 ± 0.86	1.24 ± 0.76	81.22	< 0.001	b > a > c
Psychological impact	1.81 ± 0.81	2.26 ± 0.73	1.59 ± 0.76	172.43	< 0.001	b > a > c
Aesthetic concern	1.53 ± 1.00	2.06 ± 0.98	1.41 ± 0.91	99.64	< 0.001	b > a, c

Values are presented as mean ± standard deviation.

Analysis of variance and Post-hoc analyses (Scheffe test) were performed.

For the perception of orthodontic treatment in adults and the psychosocial impact of dental aesthetics, each variable was classified into four categories, and the mean and standard deviation for each category were calculated.

Table 6. Factors influencing the orthodontic treatment decision in individual groups

Variable	Categories	Model 1 (Reference: Non-acceptance)			Model 2 (Reference: Non-acceptance)			Model 3 (Reference: Non-acceptance)					
		Experience (n = 327)	Acceptance (n = 585)	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	
Age (yr) (vs. 19-29)	30-39	0.55**	0.37-0.82	0.65*	0.45-0.93	0.57**	0.37-0.85	0.63*	0.44-0.90	0.70	0.43-1.23	0.72	0.45-1.16
	40-49	0.18***	0.11-0.29	0.55**	0.38-0.80	0.18***	0.10-0.30	0.51***	0.35-0.74	0.25***	0.14-0.45	0.57*	0.36-0.96
	50-59	0.18***	0.11-0.30	0.44***	0.30-0.66	0.17***	0.10-0.29	0.41***	0.27-0.61	0.29***	0.16-0.52	0.55*	0.32-0.93
	60-64	0.30***	0.15-0.58	0.40***	0.24-0.67	0.23***	0.12-0.46	0.33***	0.20-0.55	0.44*	0.21-0.96	0.42*	0.22-0.81
Gender (vs. Men)	Female	1.97***	1.46-2.67	0.97	0.78-1.22	1.61**	1.17-2.20	0.96	0.76-1.21	1.11	0.77-1.59	0.76	0.56-1.03
Spouse (vs. No)	Yes	1.51*	1.07-2.14	1.22	0.94-1.59	0.60**	0.42-0.86	0.79	0.61-1.04	0.59**	0.38-0.85	0.76	0.54-1.08
Education level (vs. High school)	University	1.46	0.81-2.63	1.19	0.74-1.93	1.18	0.65-2.17	1.19	0.73-1.93	1.04	0.52-2.10	1.25	0.66-2.38
	Bachelor's	1.89**	1.25-2.87	1.06	0.81-1.39	1.64*	1.07-2.52	1.09	0.83-1.43	1.53	0.96-2.44	1.07	0.75-1.52
Occupation (vs. Unemployed)	≥ Master's	1.33	0.71-2.49	0.92	0.61-1.39	1.06	0.56-2.02	0.97	0.64-1.48	0.75	0.37-1.53	0.73	0.43-1.25
	Employed	0.42	0.12-1.52	1.36	0.71-2.61	2.22	0.61-8.07	0.77	0.40-1.49	2.00	0.50-8.08	0.61	0.26-1.45
Monthly income (10,000 KRW) (vs. ≤ 100)	101-200	0.71	0.42-1.22	0.90	0.58-1.41	0.65	0.37-1.12	0.87	0.55-1.36	0.61	0.32-1.14	0.85	0.47-1.51
	201-300	0.75	0.44-1.27	0.93	0.60-1.44	0.65	0.38-1.10	0.89	0.58-1.39	0.60	0.32-1.12	0.93	0.52-1.65
	301-400	0.74	0.43-1.29	0.85	0.54-1.32	0.62	0.35-1.10	0.81	0.51-1.27	0.62	0.32-1.18	0.86	0.47-1.57
	≥ 401	0.99	0.59-1.66	0.78	0.51-1.21	0.78	0.46-1.33	0.75	0.48-1.17	0.74	0.40-1.36	0.89	0.50-1.61
Working time (hr/day) (vs. < 6)	< 6-8	0.79	0.39-1.60	1.20	0.68-2.12	0.68	0.33-1.40	1.15	0.64-2.04	0.73	0.32-1.66	1.18	0.57-2.44
	< 8-10	0.81	0.41-1.60	1.08	0.62-1.90	0.69	0.34-1.39	1.01	0.57-1.78	0.82	0.37-1.81	1.23	0.60-2.52
	≥ 10	1.06	0.47-2.38	1.38	0.73-2.61	0.90	0.42-2.20	1.28	0.67-2.44	0.99	0.39-2.51	1.39	0.61-3.14
Oral health status (vs. Unhealthy & very unhealthy)	None	1.92	0.53-6.92	0.79	0.39-1.61	1.83	0.50-6.70	0.79	0.38-1.61	2.22	0.54-9.12	0.83	0.32-2.14
	Average	0.88	0.64-1.20	0.58***	0.46-0.73	1.11	0.77-1.59	1.11	0.77-1.59	0.97	0.71-1.31	0.97	0.71-1.31
Dental treatment experience (vs. No)	Healthy & very healthy	0.85	0.59-1.21	0.47***	0.35-0.62	1.33	0.86-2.05	1.33	0.86-2.05	1.41	0.94-2.12	1.41	0.94-2.12
	Yes	-	-	-	1.20	0.80-1.81	-	-	-	1.79*	1.06-3.00	-	-
Regular oral examination (vs. No)	Yes	2.38***	1.80-3.15	1.30*	1.05-1.62	2.14***	1.57-2.94	1.39*	1.05-1.85	1.39*	1.05-1.85	1.39*	1.05-1.85
Number of brushings (time/day) (vs. ≤ 1)	2	0.98	0.53-1.80	1.01	0.69-1.49	0.86	0.44-1.67	0.86	0.44-1.67	1.06	0.64-1.74	1.06	0.64-1.74
	3	1.39	0.76-2.54	0.98	0.66-1.45	1.16	0.60-2.24	1.16	0.60-2.24	0.97	0.59-1.61	0.97	0.59-1.61
	≥ 4	1.86	0.86-4.05	1.38	0.79-2.40	1.30	0.54-3.10	1.30	0.54-3.10	1.58	0.76-3.28	1.58	0.76-3.28

Table 6. Continued

Variable	Categories	Model 1 (Reference: Non-acceptance)			Model 2 (Reference: Non-acceptance)			Model 3 (Reference: Non-acceptance)		
		Experience (n = 327)	Acceptance (n = 585)	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Need for orthodontic treatment	Necessary				0.71	0.36-1.41		0.58	0.33-1.01	
	Average				0.23***	0.11-0.46		0.14***	0.08-0.24	
	Not necessary				0.08***	0.04-0.18		-	-	
	Not necessary at all				0.03***	0.01-0.08		-	-	
Optimal treatment cost (10,000 KRW)				1.00	1.00-1.01		1.00	0.99-1.00		
Optimal treatment period (mo)				1.05***	1.03-1.08		1.00	0.98-1.02		
Health insurance coverage (vs. No)	Yes				1.56	0.94-2.58		2.68***	1.60-4.50	
Information on orthodontic treatment (vs. Family, friends, neighbors)	Internet search				1.74**	1.21-2.50		1.77***	1.30-2.42	
	Public media				0.68	0.30-1.52		1.05	0.61-1.81	
	Dentist				1.16	0.79-1.70		0.78	0.55-1.11	
Perception of orthodontic treatment				4.36***	2.71-7.01		2.02**	1.33-3.06		
Psychological and social impact of dental esthetics					0.89	0.69-1.14		1.62***	1.29-2.03	
Likelihood ratio test	χ^2	281.95			411.07			1,617.39		
	df	36			50			74		
	p	< 0.001			< 0.001			< 0.001		
-2 Log likelihood		1,875.74			3,414.19			2,683.25		

Multinomial logistic regression analysis using forward selection were performed.

OR, odds ratio; CI, confidence interval; KRW, Korean won.

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

low in Model 2 (OR: 1.51 and OR: 0.60, respectively). In terms of oral hygiene-related characteristics, the acceptance was higher among participants who underwent regular oral examinations than in those who did not (OR: 2.38; Table 6).

In the acceptance group, acceptance was lower in participants aged 30–39 (OR: 0.63), 40–49 (OR: 0.51), 50–59 (OR: 0.41), and 60–64 (OR: 0.33) years than in those aged 19–29 years. Acceptance was the highest among participants in their 30s, followed by those in their 40s, 50s, and 60s. Gender, marital status, education level, occupation, monthly income, and working time did not influence the treatment decision. Acceptance was low if participants believed their oral hygiene was average (OR: 0.58) or healthy and very healthy (OR: 0.47). However, participants who underwent regular oral examinations (OR: 1.30) showed a high acceptance. Dental treatment experience and the number of brushings (the number of times per day that the teeth were brushed) did not affect the treatment decisions (Table 6).

Analysis of the model based on general and oral hygiene-related characteristics, demand for orthodontic treatment, psychosocial impact of dental esthetics, and perception regarding orthodontic treatment (Model 3)

The goodness-of-fit test for Model 3 was also significant ($\chi^2 = 1,617.39$, $df = 74$, $p < 0.001$). In the experience group, the acceptance was lower in participants aged 30–39 (OR: 0.70), 40–49 (OR: 0.25), 50–59 (OR: 0.29), and 60–64 (OR: 0.44) years than in those aged 19–29 years. The acceptance was the highest among people in their 30s, followed by those in their 60s, 40s, and 50s. Married participants showed a lower acceptance than unmarried participants (OR: 0.59). Gender, education level, occupation, monthly income, and working time did not affect the treatment decision. Acceptance was higher among participants who underwent regular oral examinations than in those who did not (OR: 2.14). However, oral health status, previous experience of dental treatment, and the number of brushings did not affect the treatment decision. In terms of demand for orthodontic treatment, perceptions regarding orthodontic treatment, and psychosocial impact of dental esthetics, acceptance for orthodontic treatment was low if the participants answered average (OR: 0.23), not necessary (OR: 0.08), or not necessary at all (OR: 0.03) for the need of orthodontic treatment, but the acceptance was high for the optimal treatment period (OR: 1.05). The acceptance was high if the information on orthodontic treatment was obtained through internet searches (OR: 1.74), and it was very high if the perception regarding orthodontic treatment was high (OR: 4.36). Optimal cost of treatment, health insurance coverage, and the psychosocial impact of dental esthetics did not affect the

treatment decision.

In the acceptance group, acceptance was lower in participants aged 30–39 (OR: 0.72), 40–49 (OR: 0.57), 50–59 (OR: 0.55), and 60–64 (OR: 0.42) years than in those aged 19–29 years. Acceptance for orthodontic treatment was the highest among participants in their 30s, followed by those in their 40s, 50s, and 60s. Gender, marital status, education level, occupation, monthly income, and working time did not affect the orthodontic treatment decision. Acceptance was high among participants who had an experience of dental treatment (OR: 1.79) and among those who underwent regular oral examinations (OR: 1.39). Oral health status and the number of brushings did not affect the treatment decision. In terms of the demand for orthodontic treatment, perceptions regarding orthodontic treatment, and psychosocial impact of dental esthetics, acceptance was low if participants felt that their need for orthodontic treatment was average (OR: 0.14). However, it was very high if the participants felt that orthodontic treatment should be covered by insurance (OR: 2.68). Acceptance was high if the information on orthodontic treatment was obtained through internet searches (OR: 1.77), and it was very high among those who had higher perceptions regarding orthodontic treatment (OR: 2.02). It also increased as the psychosocial impact of dental esthetics increased (OR: 1.62). However, the optimal treatment cost and optimal treatment period did not affect the treatment decision.

DISCUSSION

Feu et al.¹¹ reported that orthodontic treatment significantly improved esthetic self-perception, whereas Oh¹² reported that adults intending to undergo orthodontic treatment felt they needed it to improve their oral health-related quality of life. Similar to the results of previous studies,^{11,12} in our study, demand for orthodontic treatment was higher in the experience (41.6%) and acceptance (58.6%) groups than in the non-acceptance group (12.8%).

The optimal treatment cost (the willingness to pay) showed a difference between the experience and acceptance/non-acceptance groups. The experience group cited 3.01 million Korean won (KRW) or above, whereas the acceptance/non-acceptance groups cited 1 million KRW. These results are inconsistent with those of a previous study,¹³ in which an economical cost of treatment was 2.01–3 million KRW. This could be attributable to the fact that the present study included participants from the non-acceptance group, whereas the previous study was conducted among patients undergoing orthodontic treatment or those willing to undergo orthodontic treatment. Unlike the experience group, the acceptance and

non-acceptance groups perceived the value of orthodontic treatment to be lower due to a lack of information about it. Furthermore, higher the monthly income and greater the social stability, less was the willingness to undergo orthodontic treatment. Nevertheless, the choice of the lowest orthodontic cost in the acceptance group explains the actual economic situation. In contrast, in the non-acceptance group, it is possibly due to underestimation of the cost and value of orthodontics. This suggests that to induce appropriate perceptions about the optimal cost of treatment, promotion of the need and value of orthodontic treatment is necessary. Perceptions regarding orthodontic treatment in adults showed differences among three groups. Perceptions regarding orthodontic treatment and adult orthodontic treatment were higher in the experience and acceptance groups than in the non-acceptance group. Lee¹⁴ reported that good attitudes toward orthodontic treatment were associated with a higher level of knowledge or perceptions regarding orthodontic treatment and that this could influence the attitude toward treatment. In a study by Doğan et al.¹⁵ that examined the perceptions regarding the need for orthodontic treatment, the general population felt a lower need than orthodontists. These results suggest that to improve the acceptance for orthodontic treatment in adults, perception regarding orthodontic treatment needs to be improved.

Regarding the psychosocial impact of dental esthetics, the acceptance group showed the highest results for all categories, including dental self-confidence, social impact, psychological impact, and esthetic concern, which reflect that self-esteem regarding the dental condition as well as social, psychological, and esthetic confidence can be achieved through orthodontic treatment. This is consistent with the results of previous studies,^{6,13,16} which showed that the main objective of orthodontic treatment was to improve esthetics and appearance in addition to straightening the teeth. These results suggest that the psychosocial expectations associated with orthodontic treatment affect the acceptance of orthodontic treatment, and the role of orthodontic treatment is more important than ever.

In Model 1, the acceptance for orthodontic treatment was higher in younger people, women, married participants, and university graduates in the experience group, whereas it was not related to gender, marital status, or the education level in the acceptance group. The acceptance was relatively high in people in their 30s, which suggests that positive perception regarding orthodontic treatment increases in the age group in which people are highly concerned about their appearance and are socially active. Bellot-Arcís et al.¹⁷ reported a relatively high acceptance in adults, and this tendency was higher among women and in those with higher education lev-

els. In our study, people in the experience group in their 60s showed a higher acceptance compared to those in their 40s or 50s, while those in their 40s to 60s in the acceptance group showed a similar level of acceptance as those in their 30s. These results suggest that the desire and demand for orthodontic treatment is as high among middle-aged adults as in young adults.

In Model 2, in which oral hygiene-related characteristics were added to the general characteristics, oral health status, dental treatment experience, regular oral examinations, and the number of brushings were found to be related to the acceptance of orthodontic treatment. Lee¹⁴ reported that acceptance and positive perception regarding orthodontic treatment led to not only better knowledge and attitude toward orthodontic treatment but also higher interest in dental condition. Lee and Suhr¹⁸ also reported that the demand for orthodontic treatment was largely based on esthetic requirements and was affected by the mother's education level, malocclusion patterns, and regional characteristics. In this study, the acceptance for orthodontic treatment was higher in both the experience (OR: 2.38) and acceptance (OR: 1.30) groups when the participants underwent regular oral examinations, while the acceptance was low in the acceptance group if the participants believed that their oral health status was good. This indicates that higher the interest in orthodontic treatment and perception regarding orthodontic treatment, the greater the acceptance for orthodontic treatment. These findings suggest that regular oral examinations are important.

In Model 3, the influence of age and marital status was similar to that observed in the previous models. The acceptance for orthodontic treatment was lower in participants aged 30–60 years than in those in their 20s; however, comparisons between the middle-aged participants showed a high acceptance in participants in their 30s. This indicates a potential demand for orthodontic treatment even in middle-aged adults and suggests that efforts are necessary to create this demand in adult patients. With respect to marital status, having a spouse had a negative influence on the orthodontic treatment decision. Thus, unlike in Model 1 or 2, the duration or cost of orthodontic treatment might have been combined factors affecting the orthodontic treatment decision. These results show that the orthodontic treatment decision could be influenced by various factors such as the duration, cost, information, and psychological aspects, and systematic considerations are necessary for these factors in the future.

Experience with dental treatment resulted in a higher acceptance in Model 3 compared to that in Model 2, which suggests that perceptions regarding orthodontic treatment and the availability of information regarding orthodontic treatment in addition to the past dental

treatment experience had a combined influence on the orthodontic treatment decision. In Model 3, regular oral examinations were also associated with higher acceptance in all groups, similar to that seen in Model 2, suggesting that the satisfaction and interest in one's own dental condition influenced the treatment decision.

The duration of treatment also affected the treatment decision. Lee¹⁹ reported that the appropriate duration for orthodontic treatment was 19–24 months and that the level of satisfaction might decrease with a longer treatment period. In this study as well, the duration of treatment was found to negatively influence the treatment decision in the experience group, and efforts to complete the treatment within the appropriate treatment duration seem to be necessary.

Regarding information on orthodontic treatment, both, the experience and acceptance groups showed a higher acceptance for orthodontic treatment when the information was obtained through an internet search. However, information obtained through mass media was associated with the lowest acceptance. This indicates that patients trust the information on the internet more than that in the mass media, indicating an influence of the source of the information on the treatment decision.

Perceptions regarding orthodontic treatment had a major influence on the orthodontic treatment decision. The higher the perception, the more likely it was for participants in the experience and acceptance groups to decide. In particular, the experience group showed an OR of 4.36, indicating a very high correlation. Hamdan²⁰ reported that patients generally had a good attitude toward orthodontic treatment and felt the need for it. Deli et al.²¹ reported that positive attitudes and perceptions regarding orthodontic treatment largely depended on age, gender, and geographical context, and these characteristics had a major impact on orthodontic treatment decisions. These results indicate that perception regarding orthodontic treatment is an important factor in making decisions.

CONCLUSION

These findings suggest that various factors such as general and oral hygiene-related characteristics, demand for orthodontic treatment, psychosocial impact of dental esthetics, and perceptions regarding orthodontic treatment influence the orthodontic treatment decision in adults. Individuals seeking orthodontic treatment were found to undergo regular dental treatment and oral examination compared to those who did not and had a higher perception regarding orthodontic treatment and more negative values about the psychosocial impact of dental esthetics.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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