



Factors Affecting Scaling Experiences of Adolescent Children from Multicultural and Native Families

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Background: Multicultural families are constantly on the rise as marriage migrants and foreign workers increase. Multicultural families appear to record poor health levels compared to native families. As health is a social issue, children of surviving generations of multicultural families are also a growing interest. This study was conducted to confirm the effect of multicultural families and parents' educational level on the scaling experience of children.

Methods: For this study, the 2016~2018 Korea Youth Risk Behavior Web-based Survey data were used. In order to make the two groups of adolescents belonging to multicultural and native families similar, a total of 5,362 people were included in the survey, consisting of 2,681 individuals each from multicultural and native families using the propensity score matching method. Logistic analysis was performed to identify factors influencing the scaling experience of adolescent children.

Results: The results confirm that, even after controlling for factors such as parents' educational level, household income, and children's oral health behavior, parents' nationality appeared to have a statistically significant effect on their children's scaling experience. In addition, it was confirmed that the experience of oral health education had a significant effect.

Conclusion: Cultural heterogeneity and the lack of adequate language ability of immigrants affects health behavior and medical accessibility. Therefore, children from multicultural families are more likely to be exposed to unhealthy environments compared to the children of native Korean families. Based on an understanding of the socioeconomic multicultural background of individuals, education and public policy should be prepared to improve the awareness for the need for preventive oral health and provide unhindered accessibility to dental services.

Key Words: Adolescent, Dental scaling, Multicultural family

Introduction

According to the statistical year book of immigration and foreign policy, the number of foreigners residing in Korea has almost doubled from 1,158,866 in 2008, the year in which the multicultural family support policy was enacted, to 2,367,607 in 2018¹⁾. This phenomenon naturally leads to an increase in the number of children who belong to multicultural families. According to the 2018 Youth Statistics, the number of students in multicultural families was 122,212, accounting for approximately 2.19% of the total number of students (5,593,000), an increase of 14.5% compared to 2017²⁾. While the overall school-age population

is expected to continue to decline, the proportion of children from multicultural families is expected to continue to rise in the future. Therefore, policy makers are expected to be interested in the health conditions of multicultural adolescents and children and prepare appropriate policies^{2,3)}.

Family support is one of the most influential factors for children's growth and development. Therefore, understanding multicultural children requires understanding the characteristics of multicultural families⁴⁾. In particular, the family environment of children and the degree of integration of families may differ depending on the socioeconomic characteristics of the multicultural family, such as the migration background of parents. It is necessary to

Received: May 11, 2020, Revised: May 29, 2020, Accepted: June 4, 2020

eISSN 2233-7679

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understand the risk factors that negatively affect health behavior⁵⁾. In general, members of multicultural families appear to have poor health status compared to members of native families^{5,6)}. In particular, it was found that the health of children of multicultural families is adversely affected because they are restricted from using medical services due to their parents' economic burden and lack of language skills, which are necessary to avail those services⁵⁾.

As health-related beliefs and behaviors that determine health are formed during adolescence, it is necessary to properly manage potential risk factors during this period to lead a healthy life in both adulthood and adolescence^{7,8)}. In adolescence, gingivitis and periodontitis are prone to various causes such as lack of time for oral hygiene and stress, making oral health care necessary^{9,10)}. Children of ethnic minority and immigrant communities are exposed to a dynamic environment with respect to cultural change^{11,12)}. These changes in the environment may increase the risk of developing periodontal disease because it affects the family's and children's ability to cope with potential stressful situations, which in turn can affect dental procedures and visits¹²⁾. In addition, the parents of ethnic minorities who have fatalistic attitudes to health, may not actively seek preventive treatment or follow preventive recommendations^{13,14)}. Based on reports that the environment of multicultural families is related to children's oral health, this study aims to identify differences in oral health behaviors of children according to the socioeconomic level of native and multicultural families. In addition, we would like to examine the factors that affect the adolescent children's scaling experience. At this time, in order to reduce the bias of the research study, the sample was divided into two similar groups comprising multicultural families and native families and analyzed.

Materials and Methods

1. Research subjects

In this study, data from 2016~2018 the "Korea Youth Risk Behavior Web-based Survey" were used. This survey is conducted by the Korea Centers for Disease Control and Prevention to determine the health status of Korean adolescents using a self-completed questionnaire survey

method for middle and high school students online¹⁵⁾. The survey contents are divided into 14 areas such as smoking, drinking, eating habits, mental health, oral health, and health equity, and consist of a total of 125 questions¹⁵⁾. This study aimed to identify factors affecting oral health in native and multicultural families and adolescents. Native families were defined as those families in which the father and the mother of the child is of Korean nationality, and multicultural families were defined as those families in which the father or the mother was of another nationality. When selecting adolescents of multicultural families and native families in observational studies, selection bias may occur, and it is impossible to accurately deduce the causality of the results. In addition, such results may be prone to error, as one could overestimate or underestimate the results^{16,17)}. Therefore, it is necessary to select a variable that can control the confounding variable in the design of the study, calculate the controlled confounding variable as a constant covariates, and then apply a similar method between the experimental group and the control group¹⁸⁾. In this study, the two groups were made similar by using the propensity score matching method and a logistic regression was used for the propensity score estimation algorithm. Further, the matching algorithm was 1:1 matched using nearest neighbor matching. Covariates were gender, age, and household income, and binary treatment indicators were based on multicultural families. The number of adolescents before matching was 178,664, but after matching, it was distributed equally to 2,681 adolescents from multicultural families and 2,681 adolescents from native families (Table 1).

2. Research variables

In this study, we used the question "Have you been scaling in the past 12 months?" as the dependent variable. Covariate variables include gender, grade, and household income level. The independent variables included parents' nationality and educational level, adolescents' academic performance, the number of brushings per day, and participation in school oral health education in the past year.

3. Analysis methods

A chi-square test was conducted to compare the

Table 1. Sample Characteristics

PSM	Classification	Multicultural	Native	Total	χ^2	p-value
Before PSM (n=178,664)	Gender				10.72	<0.001
	Man	1,288 (1.40)	90,640 (98.60)	91,928 (100)		
	Woman	1,393 (1.59)	86,298 (98.41)	87,691 (100)		
	Grade				167.18	<0.001
	Middle school	1,683 (1.86)	88,815 (98.14)	90,498 (100)		
	High school	998 (1.12)	88,123 (98.88)	89,121 (100)		
	Household income				409.47	<0.001
	Lower	677 (2.79)	23,581 (97.21)	24,258 (100)		
	Middle	1,305 (1.56)	82,542 (98.44)	83,847 (100)		
Higher	699 (0.98)	70,815 (99.02)	71,514 (100)			
After PSM (n=5,362)	Gender				0.00	>0.999
	Man	1,288 (50.00)	1,288 (50.00)	2,576 (100)		
	Woman	1,393 (50.00)	1,393 (50.00)	2,786 (100)		
	Grade				0.00	>0.999
	Middle school	1,683 (50.00)	1,683 (50.00)	3,366 (100)		
	High school	998 (50.00)	998 (50.00)	1,996 (100)		
	Household income				0.00	>0.999
	Lower	677 (50.00)	677 (50.00)	1,354 (100)		
	Middle	1,305 (50.00)	1,305 (50.00)	2,610 (100)		
Higher	699 (50.00)	699 (50.00)	1,398 (100)			

Values are presented as number (%).

PSM: propensity score matching.

p-value of chi-squared test.

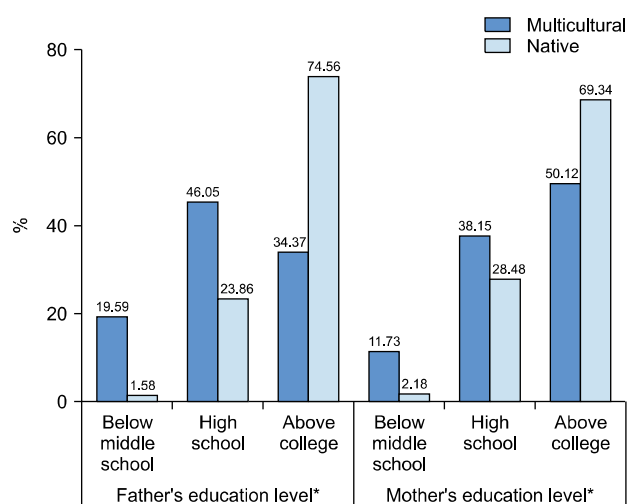


Fig. 1. Comparison of parents' educational level of multicultural and native families. p-value of chi-squared test. *p<0.05.

educational level of parents and educational performance of adolescents between multicultural and native families. In addition, a chi-square test was performed to examine the difference in scaling experience according to the parents' educational level, general characteristics and

academic performance of adolescents. Finally, a logistic regression analysis was performed to confirm the factors influencing the scaling experience. The analysis of this study was performed using STATA software version 14.0 (Stata Corp., College Station, Tx, USA), and the statistical significance level was set to 0.05.

Results

1. General characteristics of research subjects

Fig. 1 shows the results of comparing the educational level of parents of multicultural families and native families. In the case of fathers of multicultural families, "high school graduation" or higher was the highest at 46.05%, and "below middle school graduation" was at 19.59% of the total population (p<0.05). In contrast, in the case of the fathers of a native family, "above college graduation" was highest at 74.56%, and "below middle school graduation" was at 1.58%, which was very low (p<0.05). In terms of education level for mothers, 'above college graduation' for both multicultural and native

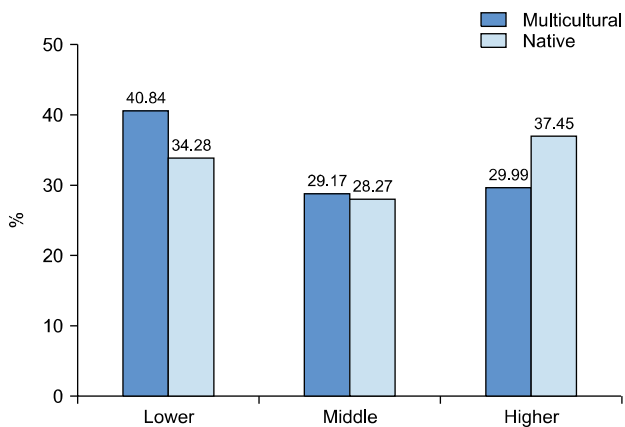


Fig. 2. Comparison of academic performance of multicultural and native families. p-value of chi-squared test. p<0.05.

families was high, at 50.12% and 69.34%, respectively (p < 0.05). Fig. 2 shows the comparison of adolescents' academic performance. In the case of multicultural family adolescents, the "Lower" group was the highest at 40.84%, while for the native family adolescents, the "Higher" group was the highest at 37.45% (p < 0.05).

2. Comparison of children's scaling experiences according to the characteristics of adolescents and parents' educational level

Table 2 shows the differences in children's scaling experiences according to their general characteristics, oral health behaviors, and parents' educational level. It was

Table 2. Adolescent Children's Scaling Experience according to Parents' Educational Level and Adolescent's General Characteristics

Classification	Multicultural	Native	Total	χ^2	p-value
Gender				21.43	< 0.001
Man	1,599 (76.54)	490 (23.46)	2,089 (100)		
Woman	1,616 (70.35)	681 (29.65)	2,297 (100)		
Grade				2.58	0.11
Middle school	2,040 (74.13)	712 (25.87)	2,752 (100)		
High school	1,175 (71.91)	459 (28.09)	1,634 (100)		
Academic performance				27.56	< 0.001
Lower	1,240 (76.59)	379 (23.41)	1,619 (100)		
Middle	936 (74.76)	316 (25.24)	1,252 (100)		
Higher	1,039 (68.58)	476 (31.42)	1,515 (100)		
Patient's nationality				29.23	< 0.001
Multicultural	1,327 (77.83)	378 (22.17)	1,705 (100)		
Native	1,888 (70.42)	793 (29.58)	2,681 (100)		
Household income				34.19	< 0.001
Lower	849 (76.08)	267 (23.92)	1,116 (100)		
Middle	1,606 (75.36)	525 (24.64)	2,131 (100)		
Higher	760 (66.73)	379 (33.27)	1,139 (100)		
Father's educational level				25.83	< 0.001
Below middle school	183 (77.87)	52 (22.13)	235 (100)		
High school	748 (74.73)	253 (25.27)	1,001 (100)		
Above college	1,283 (67.00)	632 (33.00)	1,915 (100)		
Mother's educational level				18.59	< 0.001
Below middle school	133 (74.72)	45 (25.28)	178 (100)		
High school	749 (74.97)	250 (25.03)	999 (100)		
Above college	1,381 (67.73)	658 (32.27)	2,039 (100)		
Tooth brushing (per 1 day)				9.04	0.01
None	69 (84.15)	13 (15.85)	82 (100)		
1 ~ 2 times	334 (77.14)	99 (22.86)	433 (100)		
≥ 3 times	2,812 (72.64)	1,059 (27.36)	3,871 (100)		
Oral health education				12.54	< 0.001
No	2,248 (74.91)	753 (25.09)	3,001 (100)		
Yes	967 (69.82)	418 (30.18)	1,385 (100)		

Values are presented as number (%). p-value of chi-squared test.

found that adolescent women experienced (29.65%) more scaling than adolescent men (23.46%). In addition, there was a positive relationship between academic performance and the incidence of scaling experience ($p < 0.05$). It was found that native adolescents received more scaling by 7.41% than adolescents from multicultural families ($p < 0.05$). Similarly, it was ascertained that higher the household's income level and parents' educational level, the higher the incidence of a scaling experience ($p < 0.05$). In addition, it was found that adolescents who had received oral health education at school were 5.09% more likely to experience scaling than those who did not

($p < 0.05$).

3. Factors influencing adolescent children's scaling experience

Table 3 shows the factors influencing the scaling experience of adolescent children. Firstly, children of native families were 1.28 times more likely to experience scaling than multicultural families ($p < 0.05$). Scaling experience of female adolescents was a higher 1.40 times odd ratio than male adolescents ($p < 0.05$). There was also a difference depending on the household's income level. In the case of the "higher" group, the scaling experience

Table 3. Factors Affecting Adolescent Children's Scaling Experience

Classification	Odds ratio (95% confidence interval)	Standard error	z	p-value
Gender				
Man	(Reference)			
Woman	1.40 (1.18 ~ 1.65)	0.12	3.95	< 0.001
Grade				
Middle school	(Reference)			
High school	1.17 (0.98 ~ 1.39)	0.10	1.75	0.08
Academic performance				
Lower	(Reference)			
Middle	1.02 (0.82 ~ 1.27)	0.11	0.18	0.86
Higher	1.20 (0.98 ~ 1.48)	0.13	1.76	0.08
Patient's nationality				
Multi	(Reference)			
Native	1.28 (1.04 ~ 1.56)	0.13	2.37	0.02
Household income				
Lower	(Reference)			
Middle	1.11 (0.89 ~ 1.39)	0.13	0.91	0.37
Higher	1.43 (1.12 ~ 1.84)	0.18	2.81	0.01
Fathers' education level				
Below middle school	(Reference)			
High school	1.16 (0.78 ~ 1.72)	0.23	0.73	0.46
Above college	1.32 (0.87 ~ 1.99)	0.28	1.29	0.20
Mothers' education level				
Below middle school	(Reference)			
High school	0.82 (0.54 ~ 1.25)	0.18	-0.91	0.36
Above college	0.95 (0.62 ~ 1.45)	0.21	-0.25	0.81
Tooth brushing (per 1day)				
None	(Reference)			
1 ~ 2 times	1.08 (0.50 ~ 2.34)	0.42	0.21	0.84
≥ 3 times	1.39 (0.68 ~ 2.86)	0.51	0.91	0.36
Oral health education				
No	(Reference)			
Yes	1.24 (1.04 ~ 1.48)	0.11	2.38	0.02
Constant	0.07 (0.03 ~ 0.17)	0.03	-5.78	< 0.001

p-value of logistic regression.

was about 1.43 times higher than the “lower” group ($p < 0.05$). In addition, the group that experienced school oral health education were 1.24 times more likely of receiving scaling than the group who did not experience school oral health education ($p < 0.05$).

Discussion

As multicultural families increase, the interest in health gaps between members of multicultural families and native ones is increasing. In particular, the differences in the level of oral health between multicultural and native adolescents, attributed to parents’ health beliefs and the lack of access to dental care caused by the unavailability of health insurance, has negative consequences for adolescents in multicultural families^{11-14,19}. Therefore, this study was conducted to examine the differences in scaling experiences of adolescent children between multicultural and native families and to confirm the risk factors of poor dental health of multicultural families by matching the propensity scores using the Korea Youth Risk Behavior Web-based Survey data (2016~2018).

As a result of performing a bivariate analysis using the matched data to confirm the difference in scaling experience according to the parents’ nationality and educational level and the characteristics of adolescent, there was a statistically significant difference with regards to the following independent variables: parents’ nationality and educational level, children’s gender, academic performance, household income, the number of brushings and school oral health education. In essence, as the level of education of parents increased, the level of scaling experience increased. These results support the findings of previous research. In previous studies, the higher the parent’s education level, the higher the oral health-related knowledge and the more attention is paid to the children’s oral health, but if the parent’s education level is low, the oral health-related knowledge is insufficient and the children’s oral health is negligible^{20,21}. Positive oral health behavior of a child, was associated with a higher probability of the experience of scaling as it was more likely that a preventive dental visit was undertaken. These results show that, in general, oral health behavior and scaling are classified as actions to

promote oral health, so the direction of the relationship appears to be positive^{22,23}.

By controlling for other independent variables such as the educational level of parents of the adolescents, household income, and oral health behavior, it was ascertained that the nationality of parents was a determining factor in a positive incidence of scaling of young adolescents. A study comparing Latino children’s dental health in the United States shows that immigrant children with less regular oral checkups, exhibited similar results when compared to non-immigrant children²⁴. In other studies, Asian immigrants’ access to dental health was hindered by disability, cultural differences, and communication difficulties. In view of these results, it seems that the patient’s dental visits and the behavioral risk factors of oral health are closely related to socioeconomic factors and the cultural background of individuals. For example, in Chinese communities, there is a tendency to mix traditional and Western medical methods in treating oral diseases. Due to these cultural differences, it is thought that children of multicultural families experience less scaling for preventive dental treatment¹⁹. Because an individual’s cultural background can influence the motivation and response to health messages and spur preventive action, it can lead to marked differences in the use of dental services between different populations. In order to bridge the gap in dental care utilization that may arise from these differences, we suggest steps to improve the communication between dental staff and patients by providing interpretation and translation services. Furthermore, it is also recommended that strides are to be made to improve the awareness of patient values and beliefs of those from multicultural families by dental teams. Lastly, it is thought that recommendations and treatment plans for oral health should be provided more actively.

Adolescents who were exposed to school oral health education experienced scaling 1.24 times higher than those who did not. The purpose of oral health education is to encourage hygienic oral health habits by providing knowledge and information of the causes of oral disease and at the same time motivating educators for oral health management and establishing that prevention of oral diseases is possible²⁵. When appropriate oral health

education is provided, oral health behaviors can be improved and oral health can be expected to improve accordingly. Particularly, because adolescence is a period of transition into adulthood, in which an individual undergoes physical, emotional, and social changes, it is also a period in which individuals are likely to develop lifestyle habits that persist into adulthood. In order to promote oral health not only in adolescence but also in adulthood, it is thought that efforts to improve oral health behavior through active school oral health education should be continued.

In this study, raw data from the 2016~2018 Korea Youth Risk Behavior Web-based Survey, which is representative of Korean adolescents, was analyzed, and differences in scaling experiences according to parents' nationality, educational level, and general characteristics were identified. Propensity score matching prevented underestimation in the analysis, as the number of "experimental group-multicultural families" that are likely to occur in survey research was relatively small compared to "control group-native families". Therefore, the results of this study can be considered significant because the experimental and control groups are similarly distributed. Therefore, any inferences and estimated values are likely to be stable. In addition, the relationship between multicultural families and their children's scaling experiences was identified. These limitations of this study include the inability to establish a longitudinal relationship between the variables due to a lack of evidence from cross-sectional studies, and an inability to take into account various factors that can affect dental behavior due to the limitations of secondary data. However, this study can be meaningful in that it has tried to increase the internal validity of the research model by developing a fine grained analysis, by accounting for the influence of socio-economic conditions of multicultural families on adolescents scaling experiences.

Notes

Conflict of interest

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

Ethical approval

This study was approved by institutional review board of the Daejeon Institute of Science and Technology (IRB-2019-002-018).

Author contributions

Conceptualization: Eunsuk Ahn. Data acquisition: Eunsuk Ahn. Formal analysis: Eunsuk Ahn. Supervision: Jin-Young Yang, Ki-Eun Kim. Writing-original draft: Eunsuk Ahn, Jin-Young Yang, Ki-Eun Kim. Writing-review & editing: Eunsuk Ahn, Jin-Young Yang, Ki-Eun Kim.

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