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The Impact of Academic Achievement and Academic Self-Efficacy on Clinical Performance Ability of Dental Hygiene Students

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ABSTRACT

This study aims to investigate the academic achievement, academic self-efficacy, and clinical performance ability of dental hygiene students, and to identify factors that influence clinical performance ability. A self-administered questionnaire survey was conducted targeting third and fourth-year dental hygiene students in the Gyeonggi region. A total of 144 collected responses were included in the statistical analysis, and hierarchical multiple regression analysis was conducted to identify the factors influencing clinical performance ability. The academic achievement of the participants was 3.43±0.64 points, academic self-efficacy was 3.42±0.57 points, and clinical performance ability was 3.88±0.61 points. Clinical performance ability showed significant differences according to general characteristics such as GPA ($p<0.01$), practice satisfaction ($p<0.05$), and major satisfaction ($p<0.001$). Clinical performance ability was positively correlated with academic achievement ($r=0.496$, $p<0.01$) and academic self-efficacy ($r=0.456$, $p<0.01$). Hierarchical regression analysis to identify factors affecting clinical performance ability revealed that academic achievement (β =0.360, $p<0.01$) and academic self-efficacy (β =0.237, $p<0.05$) were influencing factors. As a result, it was confirmed that academic achievement and academic self-efficacy affect clinical performance ability, and educational strategies and various convergent education programs are needed to improve the academic achievement and academic self-efficacy of dental hygiene students.

1. Introduction

Recently, with the improvement of people's quality of life, interest in oral health has been increasing, and the specialization and segmentation of the dental field have been achieved due to significant advances in the medical field (Ahn & Song, 2015). In response to these changes and societal demands, dental hygienists working in dental clinics are required to have the professional ability to make accurate judgments and solve problems in given situations (Jang, 2015). Therefore, the education field for dental hygiene has been evolving into one that fosters professional dental hygienists capable

of meeting societal work demands. The goal of this education is to enhance clinical performance abilities along with dental hygiene expertise, enabling dental hygienists to perform professionally in various situations. Consequently, it is necessary to investigate the level of clinical performance ability of dental hygiene students participating in clinical practice and identify the factors influencing the improvement of clinical performance ability.

Academic achievement refers to the abilities acquired or the results of learning, indicating the goals of university education being realized through the teaching and learning process (Kim & Kim, 2021). Students with high academic achievement positively impact themselves, fostering a strong will to achieve their goals and improving their performance capabilities (Jafari et al., 2019). Previous studies on nursing students also suggest a relationship between academic achievement and clinical performance ability (Kim & Kim, 2021), predicting that academic achievement is a factor influencing clinical performance ability.

Academic self-efficacy is the confidence in one's ability to successfully perform academic tasks and is a crucial variable in explaining individual achievement outcomes (Bandura, 1977). Students with high academic self-efficacy are more likely to choose challenging tasks and put in greater effort to perform given tasks, driven by the motivation to learn knowledge and skills in new situations (Bandura, 1977). In other words, academic self-efficacy leads students to set goals with positive expectations about their academic performance, thereby enhancing academic performance (Gil, 2021). Additionally, academic self-efficacy reduces academic stress and increases major satisfaction (Jung & Jeong, 2018). For successful academic achievement, it is necessary to identify the academic self-efficacy of dental hygiene students, understand its impact on academic achievement, and further assess the ability to perform clinical practice.

Clinical performance ability is an essential indicator of dental hygiene education, evaluating the competency level of dental hygienists after graduation (Jang, 2015). To acquire clinical performance ability, clinical practice education is conducted, integrating and encompassing all subjects. This systematic school education emphasizes fulfilling the duties and responsibilities of dental hygienists by promoting behavioral changes in students, such as acquiring knowledge, skills, and attitudes (Jang, 2015). Various clinical practice education programs must be implemented to minimize the gap with the dental field and train dental hygienists with the professional competencies required in the medical field.

Reviewing previous studies on clinical performance ability, research on nursing students (Lee & Hong, 2020) reported that higher satisfaction with clinical practice leads to higher clinical performance ability. Kang and Kim's study (2022) found that clinical practice satisfaction, academic self-efficacy, and communication clarity are factors influencing clinical performance ability. However, studies on dental hygiene students mostly focus on variables such as clinical practice satisfaction, stress, and problem-solving ability, with insufficient research identifying factors influencing clinical performance ability. Therefore, this study aims to investigate the academic achievement, academic self-efficacy, and clinical performance ability of dental hygiene students, understand the impact of academic achievement and academic self-efficacy on clinical performance ability, and provide foundational data for planning concrete measures to improve the clinical performance ability of dental hygiene students.

2. Methods

2.1 Research subjects

This study utilized a convenience sample of dental hygiene students in the Gyeonggi region from September 1 to September 27, 2023. The subjects were third and fourth-year students who had completed clinical practice courses. After fully explaining the purpose and procedures of the study, self-administered surveys were collected from students who consented to participate. The sample size was determined using the G*Power 3.1 for Windows program, with a significance level of 0.05, an effect size of 0.15, a power of 0.95, and 5 variables, requiring 138 participants. However, considering the dropout rate, approximately 160 participants were selected as the study subjects. A total of 144 participants were included in the final analysis, excluding 16 with insufficient responses.

2.2 Research tools

The research tools used in this study consisted of 57 items: 5 items on general characteristics, 9 items on academic achievement, 28 items on academic self-efficacy, and 15 items on clinical performance ability.

2.2.1 Academic achievement

Academic achievement was measured using a 9-item scale developed by Rovai et al. (2009) for college students, adapted and measured by Park et al. (2010). The measurement criteria used a 5-point Likert scale, ranging from '1 = Not at all' to '5 = Very much', with higher scores indicating higher academic achievement. In Park et al. (2010), Cronbach's α was 0.90, and in this study, Cronbach's α was 0.88.

2.2.2 Academic self-efficacy

Academic self-efficacy was measured using the scale employed in Kang and Kim's (2022) study, consisting of 28 items. The sub-factors consisted of task difficulty preference, self-regulation efficacy, and confidence. The measurement criteria used a 5-point Likert scale, ranging from '1 = Not at all' to '5 = Very much', with higher scores indicating higher academic self-efficacy. In Kang and Kim's (2022) study, Cronbach's α was 0.81, and in this study, Cronbach's α was 0.85.

2.2.3 Clinical performance ability

Clinical performance ability was measured using a tool modified and supplemented for this study based on Jang (2005). It consisted of 15 items, with measurement criteria using a 5-point Likert scale, ranging from '1 = Very poor' to '5 = Very good', with higher scores indicating higher clinical performance ability. In Jang's (2005) study, Cronbach's α was 0.91, and in this study, Cronbach's α was 0.93.

2.3 Analysis methods

The collected data were statistically analyzed using SPSS 21.0 (IBM SPSS Statistics, New York, USA), with a significance level of α =0.05 for statistical tests. Frequency analysis was conducted for the general characteristics of the subjects. Independent sample t-tests and one-way ANOVA were performed to examine academic achievement, academic self-efficacy, and clinical performance ability according to general characteristics, with Scheffe's post-hoc test used for statistically significant groups. Pearson's correlation analysis was conducted to examine the relationships among academic achievement, academic self-efficacy, and clinical performance ability, and hierarchical multiple regression analysis was conducted to identify factors affecting clinical performance ability.

3. Results

3.1 General characteristics of the subjects

General characteristics of the subjects, 94.4% were female and 5.6% were male. The distribution by academic year was 63.2% in the third year and 36.8% in the fourth year. The average GPA distribution was as follows: 18.8% had a GPA of 4.0 or higher, 36.1% had a GPA between 4.0 and 3.5, 32.6% had a GPA between 3.5 and 3.0, and 12.5% had a GPA below 3.0. The satisfaction with clinical practice was reported as 19.4% dissatisfied, 35.4% neutral, and 45.1% satisfied. The satisfaction with the major was reported as 16.7% dissatisfied, 22.9% neutral, and 60.4% satisfied (Table 1).

Table 1. General characteristic of the subjects

Characteristics	Division	N	%
Gender	Male	8	5.6
	Female	136	94.4
Grade	3rd	91	63.2
	4th	53	36.8
GPA(Grade Point Average)	≥4.0	27	18.8
	3.5～<4.0	52	36.1
	3.0～<3.5	47	32.6
	<3.0	18	12.5
Clinical practice satisfaction	Dissatisfied	28	19.4
	Moderate	51	35.4
	Satisfied	65	45.1
Major satisfaction	Dissatisfied	24	16.7
	Moderate	33	22.9
	Satisfied	87	60.4
Total		144	100.0

3.2 Academic achievement, academic self-efficacy, and clinical performance ability by general characteristics

The academic achievement, academic self-efficacy, and clinical performance ability according to the general characteristics of the participants are shown in (Table 2). Characteristics showing differences in academic achievement include the fourth-year students scoring 3.58 points higher than the third-year students ($p<0.05$). The highest GPA was 4.0 or above, with a score of 3.77 ($p<0.01$). Both clinical satisfaction (3.69 points) and major satisfaction (3.47 points) showed the highest satisfaction ($p<0.001$). Characteristics showing differences in academic self-efficacy include males scoring higher than females, with an average of 3.91 points ($p<0.01$). The highest GPA was 4.0 or above, with an average of 3.89 points ($p<0.001$). Both clinical satisfaction (3.59 points) and major satisfaction (3.46 points) showed the highest satisfaction ($p<0.05$). Characteristics showing differences in clinical performance ability include the highest GPA being 4.0 or above, with an average of 4.09 points ($p<0.01$). Both clinical satisfaction (4.04 points) and major satisfaction (3.33 points) showed the highest satisfaction ($p<0.01$). The average academic achievement was 3.43±0.64 points, the average academic self-efficacy was 3.42±0.57 points, and the average clinical performance ability was 3.88±0.61 points.

Table 2. Academic achievement, academic self-efficacy, and clinical performance ability by general characteristics

Characteristics		Academic achievement		Academic self-efficacy		Clinical performance ability	
		Mean±SD	*p**	Mean±SD	*p**	Mean±SD	*p**
Gender	Male	3.83±0.61	.098	3.91±0.38	.008	3.82±0.53	.763
	Female	3.41±0.63		3.39±0.56		3.88±0.62	
Grade	3rd	3.34±0.60	.035	3.35±0.53	.066	3.81±0.59	.098
	4th	3.58±0.68		3.54±0.61		3.99±0.64	
GPA (Grade Point Average)	≥4.0	3.77±0.69[a]	.003	3.89±0.62[a]	<.000	4.09±0.65[a]	.006
	3.5～<4.0	3.49±0.58[ab]		3.44±0.53[b]		3.98±0.64[ab]	
	3.0～<3.5	3.20±0.60[ab]		3.29±0.44[bc]		3.64±0.46[b]	
	<3.0	3.43±0.64[b]		3.01±0.41[c]		3.87±0.65[ab]	
Clinical practice satisfaction	Dissatisfied	3.13±0.84[b]	<.001	3.22±0.61[b]	.003	3.76±0.66[b]	.019
	Moderate	3.26±0.46[b]		3.32±0.50[ab]		3.74±0.58[b]	
	Satisfied	3.69±0.56[a]		3.59±0.56[a]		4.04±0.59[a]	
Major satisfaction	Dissatisfied	3.45±0.47[ab]	<.001	3.34±0.42[ab]	.010	3.03±0.48[b]	<.001
	Moderate	3.30±0.38[b]		3.30±0.33[b]		3.02±0.40[b]	
	Satisfied	3.47±0.49[a]		3.46±0.42[a]		3.33±0.53[a]	
Total		3.43±0.64		3.42±0.57		3.88±0.61	

*by t-test for two groups and one-way ANOVA(post-test Scheffe) for three or more groups
[a,b,c]The same letter indicates no significant difference by Scheffe test at α =0.05

3.3 Correlation among academic achievement, academic self-efficacy, and clinical performance ability

The correlation among academic achievement, academic self-efficacy, and clinical performance

ability of the subjects is shown in Table 3. There was a positive correlation between academic achievement and academic self-efficacy (r=0.624, p<0.01). Additionally, academic achievement (r=0.496, p<0.01) and academic self-efficacy (r=0.456, p<0.01) both showed positive correlations with clinical performance ability.

Table 3. Correlation among academic achievement, academic self-efficacy, and clinical performance ability

Variables	Academic achievement	Academic self-efficacy	Clinical performance ability
Academic achievement	1		
Academic self-efficacy	.624**	1	
Clinical performance ability	.496**	.456**	1

**p<0.01, by Pearson's correlation analysis

3.4 Factors influencing clinical performance ability

Hierarchical multiple regression was conducted to identify factors influencing clinical performance ability, with a focus on academic achievement and academic self-efficacy. In the first model, variables that showed significant differences in the analysis according to general characteristics—GPA, clinical practice satisfaction, and major satisfaction—were included. In the second model, academic achievement and academic self-efficacy variables were added. The results indicated that in the second model, academic achievement (β =0.360, p<0.01) and academic self-efficacy (β =0.237, p<0.05) significantly influenced clinical performance ability. The regression model of the second model was significant (F=11.130, p<0.001), with an explanatory power of 26.2%.

Table 4. Factors influencing clinical performance ability

Variables	Model 1					Model 2				
	B	SE	β	t	p*	B	SE	β	t	p*
(Constant)	3.680	.082		44.989	<.001	1.844	.305		6.039	<.001
GPA(≥4.0=1)	.200	.130	.127	1.530	.128	-.015	.124	-.009	-.121	.904
Clinical practice satisfaction (Satisfied=1)	.125	.114	.174	1.884	.062	.094	.103	.076	.916	.361
Major satisfaction (Satisfied=1)	.113	.117	.090	.966	.335	.096	.112	.077	.859	.392
Academic achievement						.345	.097	.360	3.545	.001
Academic self-efficacy						.255	.105	.237	2.437	.016
R^2				.080				.287		
adj R^2				.061				.262		
$\triangle R^2$				.080				.207		
F(p)				4.045(.008)				11.130(<.001)		
$\triangle$F(p)				4.075(.008)				20.051(<.001)		

*by hierarchical multiple regression

4. Discussion

This study aimed to identify the factors influencing the development of professional clinical performance abilities in dental hygiene students, focusing on academic achievement and academic self-efficacy, by assessing the level of clinical performance abilities formed through clinical practice. The differences in academic achievement, academic self-efficacy, and clinical performance abilities according to the general characteristics of the subjects were examined.

The average academic achievement was 3.43 points, with differences observed according to academic year, GPA, clinical practice satisfaction, and major satisfaction. These results were slightly higher than those found in Kang & Park's (2021) study on dental hygiene students, which reported an average academic achievement of 3.20 points. Additionally, Cho & Kim's (2022) study on nursing students found differences in academic achievement according to gender, major satisfaction, personality traits, academic performance, and health status. The characteristics of GPA and major satisfaction were consistent with the findings of this study. The average academic self-efficacy was 3.42 points, with higher scores observed in males than females, and higher scores associated with higher GPAs, clinical practice satisfaction, and major satisfaction. These results were similar to Jun's (2014) study, which found that higher academic performance, major satisfaction, and clinical practice satisfaction were associated with higher self-efficacy. The average clinical performance ability was 3.88 points, with higher scores associated with higher GPAs, clinical practice satisfaction, and major satisfaction. These results were consistent with Jang's (2015) study, which found that higher clinical practice satisfaction improved clinical performance ability. Additionally, similar results were found in Park (2022), where higher major satisfaction, more positive perceived health status, and higher satisfaction with practical classes were associated with higher clinical performance ability.

The correlation among the variables showed a positive correlation between academic achievement and academic self-efficacy, as well as positive correlations between academic achievement and clinical performance ability, and between academic self-efficacy and clinical performance ability. These results were similar to Park's (2022) study, which found significant positive correlations between clinical performance ability, academic achievement, and self-efficacy.

Hierarchical multiple regression analysis identified academic achievement and academic self-efficacy as significant factors influencing clinical performance ability. This finding was consistent with Park's (2022) study, which found that academic achievement and self-efficacy were significant factors influencing clinical performance ability in nursing students. Additionally, Kim & Kim's (2021) study on nursing students found academic achievement to be a significant factor influencing clinical performance ability.

In summary, academic achievement and academic self-efficacy were identified as factors enhancing the clinical performance abilities of dental hygiene students. Therefore, it is necessary to develop educational programs to improve academic achievement as a strategy to enhance clinical performance abilities in dental hygiene students. High academic self-efficacy leads students to set goals with positive expectations about their academic performance, which can enhance learning behavior in task selection and resolution. Therefore, it is necessary to encourage various extracurricular activities and clinical practice-related programs in addition to the regular curriculum during university life.

Meanwhile, this study has significance in that it explored the relationship between clinical performance ability and variables such as academic achievement and academic self-efficacy among dental hygiene students, a relatively under-researched group compared to nursing students. However, the study has limitations due to the convenience sample of dental hygiene students, which may limit the generalizability of the results. Therefore, repeated studies that include various factors which could influence clinical performance ability are needed.

5. Conclusion

This study aimed to investigate the academic achievement, academic self-efficacy, and clinical performance ability of dental hygiene students, and to identify the factors influencing clinical performance ability. A self-administered questionnaire survey was conducted with third- and fourth-year dental hygiene students in the Gyeonggi region, and a total of 144 responses were analyzed. The conclusions are as follows:

1. The average academic achievement of the subjects was 3.43±0.64 points, the average academic self-efficacy was 3.42±0.57 points, and the average clinical performance ability was 3.88±0.61 points.

2. Significant differences in academic achievement were observed according to academic year ($p<0.05$), GPA ($p<0.01$), clinical practice satisfaction ($p<0.001$), and major satisfaction ($p<0.001$). Significant differences in academic self-efficacy were observed according to gender ($p<0.01$), GPA ($p<0.001$), clinical practice satisfaction ($p<0.01$), and major satisfaction ($p<0.05$). Significant differences in clinical performance ability were observed according to GPA ($p<0.01$), clinical practice satisfaction ($p<0.05$), and major satisfaction ($p<0.001$).

3. Positive correlations were found between academic achievement and academic self-efficacy ($r=0.624$, $p<0.01$), academic achievement and clinical performance ability ($r=0.496$, $p<0.01$), and academic self-efficacy and clinical performance ability ($r=0.456$, $p<0.01$).

4. Factors influencing clinical performance ability were identified as academic achievement ($\beta=0.360$, $p<0.01$) and academic self-efficacy ($\beta=0.237$, $p<0.05$).

As a result, it was confirmed that academic achievement and academic self-efficacy influence clinical performance ability. Therefore, educational strategies and various convergent education programs that can improve the academic achievement and academic self-efficacy of dental hygiene students are necessary.

Notes

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Conflicts of Interest

The authors declare no conflict of interest.

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