

Original Paper

Behavioral and Emotional Factors Identifying Dental Students' Academic Performance and Depression Tendency in Japan

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Abstract

This study primarily aimed to identify the mechanism through which behavioral and emotional factors relate to Japanese dental students' academic performance, and secondarily to explain which emotional and behavioral factors and academic performance are related to dental students' depression. A questionnaire survey was administered to 92 first-year undergraduate dental students during the 2018 academic year at a Japanese university. Regarding the mechanism of students' academic performance, results of path analysis revealed that procrastination behavior positively affected emotional irritation and emotional irritation negatively affected academic performance. Correlation analysis revealed that depression tendency was positively related to emotional irritation and procrastination behavior. This study shows that undergraduate dental students' stable emotion (lack of irritation) is likely associated with their academic success and their psychological health. Hence, to aid in the reduction of dental students' depression and to improve their academic performance, we propose that educators should display acceptance of students' emotions as an alternative to suggesting solutions from their own viewpoint.

Keywords

dental students, academic performance, academic stress, study skills, depression

1. Introduction

Japanese undergraduate dental students cannot become licensed dentists unless they pass the National Board Dental Examination. Over the last four years, undergraduate dental students' pass rate in this examination has been lower than 70% (Ministry of Health, Labour and Welfare, 2019). This low pass rate likely affects even freshmen dental students. Moreover, most students hope to pass the national

licensure examination without repeating academic years. These factors may cause students in this field to experience stress and anxiety throughout their academic lives.

Furthermore, previous studies have shown that among undergraduate students in health-related fields, depression, anxiety, and stress are common phenomena (Rehmani, Khan, & Fatima, 2018). In order to establish a direct link between these phenomena and academic performance and explain the hypotheses of this study, this paper discusses previous research on the factors associated with academic performance.

Aboalshamat, Hou, and Strodl (2015) explored the relationship between medical and dental students' academic performance and their psychological well-being, using the variables of depression, anxiety, stress, self-efficacy, and satisfaction. They found that the only factor that had a negative relationship with academic performance was depression. This perspective forms the foundation of Hypothesis 1 of the current study, according to which academic performance is negatively related to depression tendency.

Almalki (2019) reported that there is a significant correlation between test anxiety and academic performance among dental undergraduate students. The current study refers to the test anxiety as "emotional irritation," which is defined as anxiety about successfully understanding academic content and being able to advance to the next year and finally being able to pass the national dentist licensure examination in the final year. This perspective forms the foundation of Hypothesis 2 of the current study: emotional irritation is negatively related to academic performance. Furthermore, Hypothesis 3 was based on Ogawauchi (2016), who reported that procrastination behavior might cause poor academic outcomes.

Lastly, concerning the relationship between behavior and emotional or psychological health, Kohama (2010) reported that procrastination behavior might induce negative emotion, such as depression or impatience. Based on this perspective, we formulated Hypotheses 4 and 5. According to Hypothesis 4, procrastination behavior is positively related to emotional irritation. According to Hypothesis 5, procrastination behavior is positively related to depression tendency.

Thus, prior research has only studied the relationship between academic performance and various emotional or behavioral factors separately. In other words, thus far, there has been no attempt to define the mechanism of academic performance by considering the aforementioned three variables together.

The primary aim of the current study was to identify the mechanism through which two factors (emotional and behavioral), when analyzed together, influenced academic outcomes. We performed these analyses because understanding the mechanism underlying the relationship of these factors with dental students' academic performance may help them enhance their academic behavior. The results could also aid professionals who support dental students in providing targeted interventions aimed at enhancing students' academic performance.

Furthermore, the secondary aim was to clarify which of three factors—emotion, behavior, and academic performance—related to students' depression tendencies. Although previous research showed

how these factors relate to depression individually, we found no attempts to investigate how these three factors, when analyzed together, relate specifically to dental students' depression tendencies.

2. Method

2.1 Sample and Data Collection

We included 92 Japanese participants (55 male and 37 female) in this study. This cross-sectional study's data were gathered from a 2018 first-year medical psychology class at a private Japanese dental university. Data were reported in Japanese.

Participation in the research was voluntary, and participants' anonymity was secured. The following ethical statements were included in the questionnaire: "Participation in the survey will not influence academic performance," and "Participants' personal information will not be shared, as the responses are statistically and anonymously processed." Written informed consent was obtained from all participants. This study was approved by the Institutional Review Board of (IRB) of the author's affiliation (Ethical Approval No: 599).

2.2 Measurement

The survey included questions covering four variables: emotional irritation, procrastination behavior, depression tendency, and academic performance. Academic performance was based on final cumulative Grade Point Averages (GPA) of students' first year in the program. Except for academic performance, the scales involved Likert-type responses ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The measurement instruments are described below. Most of the items used in this study were drawn from existing Japanese research, while some were newly created.

2.2.1 Emotional Irritation

To measure participants' emotional irritation, we created an Irritation Scale composed of six items: four items from the Daily Hassles Measurement scale developed by Munakata, Nakao, Fujita, and Suwa (1986), and two items originally created for the current study. The two original items were the following: "I feel irritated due to the large study workload" and "I feel irritated and worried that I may have to repeat an academic year." The reason for implementing these two items was that most of the general students at a four-year college can acquire a bachelor's degree in four years if they complete individual courses needed to graduate. However, Japanese dental students must attend college for six years and pass a graduation examination to obtain a bachelor's degree. Furthermore, those who pass the graduation examination must pass the national dentist examination to become a dentist. Accordingly, it was expected that, during the examination period, the participants might be worried about the contents described in these two items. The Irritation Scale had a Cronbach's alpha coefficient of .88 in the current study.

2.2.2 Procrastination Behavior

To measure participants' procrastination behavior, we first intended to utilize 10 items from the Academic Procrastination scale developed by Ogawauchi (2016). However, in the current study, three

items were removed due to low factor loading based on factor analysis. The three items deleted were the following: “I started following the study plan, but could/did not continue,” “I do not feel like studying if I think that there is enough time before the deadline,” and “I stop studying when I come across things I do not know.” The scale had a Cronbach’s alpha coefficient of .85 in the current study.

2.2.3 Depression Tendency

Depression tendency was measured using six items derived from Suzuki et al.’s (1997) Depression-Anxiety subscale (part of their Stress Response Scale-18). The scale had a Cronbach’s alpha coefficient of .88 in the current study. Sample items include “I feel depressed.”

2.3 Data Analysis

We used SPSS version 20.0 to analyze demographic traits, descriptive results, and correlations among this study’s primary variables of emotional irritation, procrastination behavior, depression tendency, and academic performance (GPA). Subsequently, to identify a mechanism that links emotion and behavior to GPA, we formulated a hypothetical model based on the results of the correlation analyses and tested it using path analysis with AMOS 20.0.

3. Result

3.1 Participant Characteristics

The participants were categorized into three age groups: the first group consisted of 48 individuals (52.1%) under 20 years old, the second consisted of 34 individuals (37.4%) between 20 and 24 years old, and the third consisted of 10 individuals (10.8%) 25 years old or older. Seventy-five (81.5%) engaged in extracurricular activities, and 17 (18.5%) did not.

3.2 Descriptive Statistics and Correlations between Variables

Means, standard deviations, and correlations among the studied variables are shown in Table 1. Emotional irritation was the only variable that was significantly related to GPA ($r = -.34$, $p < .01$) and was significantly and positively related to procrastination behavior ($r = .39$, $p < .01$). Contrary to expectations, there was no significant correlation between procrastination behavior and GPA ($r = -.15$, n.s.); therefore, Hypothesis 3 was not supported. Furthermore, no significant correlation was found between GPA and depression tendency ($r = -.01$, n.s.); therefore, Hypothesis 1 was not supported. Depression tendency, however, was significantly and positively related to emotional irritation and procrastination behavior ($r = .43$, $p < .01$; $r = .33$, $p < .01$, respectively). Hence, Hypothesis 5 was supported.

Table 1. Means, Standard Deviations, and Correlations between Variables

		<i>M</i>	<i>SD</i>	1	2	3
1	Grade point average (academic performance) (<i>n</i> = 91)	2.70	0.73			
2	Depression Tendency (<i>n</i> = 91)	2.55	1.07	-.01		
3	Emotional irritation (<i>n</i> = 91)	2.79	1.00	-.34**	.43**	
4	Procrastination behavior (<i>n</i> = 92)	3.06	0.90	-.15	.33**	.39**

3.3 Path Analysis Results for GPA

To identify the mechanism that linked irritation (emotion) and procrastination (behavior) to participants' GPA/academic performance, we formulated a hypothetical model based on the results of correlation analyses. This model showed that procrastination behavior exerted a positive effect on emotional irritation and the latter had a negative effect on GPA. As there was no direct correlation between procrastination behavior and GPA ($r = -.15$, n.s.), we did not include this relationship.

To illustrate the hypothetical model, we conducted a path analysis. The final model fit the data well: $\chi^2 = 0.30$, $df = 1$, $p = .58$ (see Figure 1). Regarding additional fit indices, Goodness-of-Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI) were calculated, and were found to be greater than 0.90. In addition, the Root-Mean-Square Error of Approximation (RMSEA) turned out to be less than 0.50. Explained variances (R^2) for this model were .16 and .10 for emotional irritation and GPA, respectively. Regarding the mechanism underlying GPA, results showed that procrastination behavior exerted a significant positive effect on emotional irritation ($\beta = .39$, $p < .001$), and, therefore, Hypothesis 4 was supported. Emotional irritation, in turn, significantly and negatively affected GPA ($\beta = -.31$, $p < .01$) and, therefore, Hypothesis 2 was supported. In other words, participants' emotional irritation was directly associated with GPA.

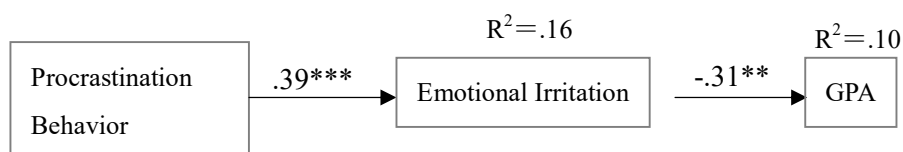


Figure 1. An Empirical Model of GPA in Relation to Procrastination Behavior and Emotional Irritation

4. Discussion

4.1 The Mechanism Underlying Academic Performance

The current study attempted to identify the mechanism through which emotional irritation and procrastination behaviors, when analyzed together, influenced academic performance. The results

illustrated a link from behavior to emotion that led to students' academic performance. Therefore, Hypothesis 2, which stated that emotional irritation would be negatively related to academic performance, was supported. Furthermore, correlation analysis confirmed that procrastination behavior had no correlation with GPA; therefore, Hypothesis 3 was not supported. In summary, the aforementioned findings lead us to the conclusion that an emotional factor may be directly related to academic performance, whereas a behavioral factor may not.

This result was inconsistent with that of previous research showing a different underlying mechanism among these three variables, indicating a link from emotion to behavior, which then affected academic performance (Umemoto, Ito, & Tanaka, 2016). Previous research found that behavioral engagement directly influenced academic performance, while emotional engagement was indirectly related to academic performance through behavior, especially among general students at a four-year college than dental students at a six-year college in Japan.

When combined, controlling emotional irritation may be a determinant of Japanese dental students' academic performance. Conversely, academic behavior among general students by itself may be the most important factor related to their academic performance. Specifically, considering that the pass rate of the national dentist licensure examination in Japan has remained lower than 70% for the last few years, it could be assumed that providing further support to alleviate the psychological anxiety/burden of dental students will contribute to their academic success.

According to Hypothesis 4, procrastination behavior is positively related to emotional irritation, and this was supported by both the correlation and path analyses. This confirmed the findings of numerous previous studies (e.g., Kohama, 2010). Fear of failure is mentioned as a reason for procrastination behavior (Atalayin, Balkis, Tezel, & Kayrak, 2017). Thus, it could be supposed that dental students engaged in procrastination behavior because of anxiety about failing course examinations.

4.2 The Relationship of Depression Tendency with Students' Emotional and Behavioral Aspects and Academic Performance

The current study also investigated the factors related to dental students' depression tendencies by analyzing emotional and behavioral factors combined with academic achievement (GPA). The results of correlation analysis showed that academic anxiety and procrastination had a positive association with students' depression. Hence, Hypothesis 5 (procrastination behavior is positively related to depression tendency) was supported. This finding is also partially supported by prior research (Hayashi, 2009), where procrastination behavior was found to indirectly affect depression via negative automatic thoughts (e.g., I am not going to finish on time). The correlations include a direct and an indirect effect between the variables. Therefore, that Hypothesis 5 was supported in the current study could be interpreted to mean that depression tendency might directly relate to procrastination behavior as well as indirectly through emotional irritation. Furthermore, contrary to our expectations, there was no correlation found between GPA and students' depression tendencies; therefore, Hypothesis 1 was not supported. Although academic achievement inevitably induces stress among dental students (Jham et

al., 2018), this stress does not necessarily relate to their depression tendency.

In summary, this study shows that the factor primarily related to dental students' academic performance and their depression tendency was an emotional factor: their emotional irritation. Thus, it may be inferred that dental undergraduate students' emotional stability (lack of irritation) will contribute to their academic success and their psychological health.

4.3 Limitations and Recommendations for Future Research

A limitation of the current study is that the sample was relatively small; future research needs to increase the number of research participants and verify the generalizability of the current findings and the proposed model. Furthermore, we hope that future studies will develop an emotion-based practical intervention to follow up with the findings of this study, considering that students' emotional irritation levels were associated with their academic success and their psychological health.

5. Conclusion

The results of this study show that, as undergraduate dental students' emotional irritation grows, their academic performance may worsen, and they may easily enter a depressive state. Consequently, professionals engaged in dental undergraduate students' psychological and academic support in Japan can utilize our findings to help diminish students' depression and improve their academic performance. Accordingly, rather than suggesting solutions from their own viewpoints, we recommend that educators adopt an understanding attitude toward dental students' concerns and anxieties about their academic performance and future.

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Disclosure Statement

No potential conflict of interest was reported by the authors.

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