



Personality traits and academic attitudes of medical students in the COVID-19 pandemic: a person-centered approach, empirical research, Korea

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Purpose: Since the coronavirus disease 2019 (COVID-19) pandemic, the educational environment has moved toward online-based education, which may significantly impact medical students' educational experiences. However, the same events may be understood differently by different individuals depending on their personalities. Therefore, the changing educational environment during the COVID-19 pandemic may not have been perceived equally by all students. This study aimed to investigate medical students' personality profiles and the difference between academic burnout and engagement according to their personality profiles.

Methods: During the 2021–2022 academic year, when online-based education was implemented due to the pandemic, a survey was conducted among medical students in Korea (N=325). First, we used latent profile analysis to identify the sub-types of the Big Five personalities. Second, we used analysis of variance and post hoc comparisons to study the difference between academic burnout and engagement among these sub-types.

Results: The Big Five personality traits of medical students in our sample were classified into three profiles. Profiles with relatively high neuroticism, while other personality traits were low, had both the highest academic burnout and academic engagement. Alternatively, the profiles showing relatively low neuroticism, while other personality traits were high, had the lowest academic burnout and the highest academic engagement.

Conclusion: Personality is a stable trait that affects an individual's behavior and response to the environment. Thus, individuals with specific personalities differ in their reactions to their environment. This may provide an advantage to some medical students' careers.

Key Words: Medical student, Personality, Burnout, Engagement, Latent profile analysis, COVID-19

Introduction

Human life has been significantly impacted by the

coronavirus disease 2019 (COVID-19) pandemic, and people have subsequently experienced many social, cultural, and technological changes. Higher education institutions have also undergone many changes, and con-

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sequently, student learning experiences are expected to vary significantly compared to before the pandemic [1–3]. Due to the pandemic and lockdown, public gatherings and commuting were restricted, and distance learning was implemented in educational institutions. In-person teaching and assessments changed to online-based or blended learning, which involved a mix of online and face-to-face classes. Rather than the previous face-to-face educational format, classes in which instructors delivered a message to students through online media became more common. These changes in the educational environment have put additional pressure on students to adapt to online learning methods and increased their academic burden. Students have also faced difficulties in maintaining their academic motivation [4]. Therefore, in light of the changes in the academic environment and students' educational experiences due to COVID-19, it is necessary to understand the academic attitude reflecting students' motivation [5].

Grimes [6] in 1997 suggested that an individual's learning performance is influenced by an interaction of their internal and external factors. Thus, it may be critical to examine how an individual's internal characteristics affect their attitude toward learning when their external (educational) environment changes (e.g., due to the pandemic) [7]. Personal construct theory suggests that people develop personal constructs to interpret events and that these events are subjectively interpreted according to the constructs; thus, the same event or object can be interpreted differently by each individual [8]. These personal constructs may differ depending on the individual's personality. Therefore, an understanding of the same event can vary depending on the personality trait that represents an individual's stable characteristic. Thus, the changed educational environment due to COVID-19 may not be perceived equally by all students, and their educational attitudes may vary depending on their stable personality characteristics [9]. Hence, it is essential to

understand what personalities affect students' academic attitudes in the changed medical education environment due to COVID-19.

Situational strength theory states that the effect of a personality trait on a behavior or attitude depends on the strength of the situation [10]. Situational strength refers to the cues provided by the external environment that determine the desirability of potential behaviors, and situational strength determines the extent to which personality influences behavior [10]. When the situation is strong, people will promote or inhibit certain behaviors regardless of individual characteristics, while in weak situations, the influence of individual characteristics on behavior and attitudes will be stronger. For example, in situations where group norms are clear, people are likely to exhibit consistent behavior in accordance with those norms. However, when the norms are weak or the contextual cues are ambiguous, the interpretation of the situation may vary depending on individual characteristics, and these differences in interpretation can lead to different attitudes and behaviors [11]. During COVID-19, universities have implemented widespread remote learning, and changing students' study patterns and routines. In particular, the shift from traditional face-to-face to virtual learning has allowed students more discretion in their studies, which has weakened the strength of the situation [12].

In other words, the current online-based educational environment shows a weak intensity in the situation, as medical students have a discretionary start and end of classes [11], and when a situation's intensity is weak, personality may have a greater influence than when the situation is stronger [12]. It may be meaningful, then, to examine the influence of personality, which is a stable characteristic, on students' academic attitudes during this period. In previous studies, personality traits have been mainly studied through the Big Five model, and studies

on the relationship between individual personality and other variables were conducted using the variable-centered method [13,14]. However, each personality trait of the Big Five model does not exist in isolation; all of the Big Five traits coexists within an individual. Thus, a realistic personality can only be reflected when these traits are viewed collectively. Of course, variable-centered research can also comprehensively consider the Big Five personalities. For example, studies can explore correlation and interaction between each dimension of the Big Five. However, it is difficult to represent a realistic personality because high or low scores are classified as artificial cut-off scores [15]. For example, each trait of the Big Five may influence burnout or engagement but it may be offset by combinations of other personalities, which may not necessarily equal the sum of each personality [16]. In addition, classifying individuals into groups of high or low trait levels in variable-focused studies, is artificial because these classifications are based on mean and standard deviations. Although this is easy to implement, there are questions about using labels low and high to characterize falling below and above the mean and homogeneity of the each low and high group [17,18].

It is necessary to study the Big Five personalities from a holistic perspective with real scores, which is possible through a person-centered rather than a variable-centered method. If individual's personality profiles are confirmed through a person-centered method and the differences among profiles are revealed, more realistic personality research is possible, as well as research on "person" rather than "trait" [19]. Therefore, we aimed to investigate the difference between academic burnout and engagement in personality profiles of medical students who attended online classes during COVID-19.

A study on the effects of the Big Five traits on burnout and engagement found that there are personality differences that affect burnout and engagement. For example, neu-

roticism had a significant impact on burnout, and neuroticism and conscientiousness had a significant impact on academic engagement [14]. Similarly, in a study of medical students, self-directedness [15] (a sub-dimension of conscientiousness) and negative affective (related to neuroticism) had a significant effect on academic burnout of medical students [20]. As such, an individual's personality can significantly impact academic burnout and engagement, but these studies have limitations in that they identified the relationship between each personality factor of the Big Five and academic burnout or engagement through a variable-focused study. Therefore, we intend to investigate the personality profile of medical students in this study and explore whether the personality profile has a differential effect on academic burnout and engagement.

Methods

During the 2021-2022 academic year, when online-based education was implemented due to COVID-19, we conducted a survey among medical students in Korea. The research ethics committee provided approval and student participation was voluntary.

1. Participants

The survey questions in this study do not include sensitive content for students. In addition, we ensured the anonymity of participants because we did not collect identifiable personal information other than the minimum information required for the study. Therefore, we judged that the effect of the survey content on the welfare and rights of the participants was insignificant. The institutional review board also agreed to this and exempted the participants' written consent (AJOURB-SUR-2021-545). After explaining the study, we presented information

to participants to ensure confidentiality. And we informed that only those who agreed to participate in the study could participate in the survey, and students who agreed to participate voluntarily participated. A total of 336 students participated, and 11 students who did not complete their responses were excluded. The sample included 325 responses that were used in the final analysis. Among the participants, 64.6% and 35.1% were male and female, respectively. By grade, 10.8%, 10.2%, 17.5%, 31.1%, 14.8%, and 15.7% were in grades 1, 2, 3, 4, 5, and 6, respectively. The average age was 22.92 years (standard deviation=2.07).

2. Measures

1) Big Five

The International Personality Item Pool (IPIP) by Goldberg [21] in 1999 was used to measure the Big Five personalities. IPIP measures five personality factors of extraversion, conscientiousness, openness, neuroticism, and agreeableness. Its validity and reliability have been verified in many studies [22]. The 50-item IPIP comprises ten items for each personality factor. Responses were measured using a 5-point Likert scale. Cronbach’s α were openness to experience=0.81, conscientiousness=0.82, extraversion=0.90, agreeableness=0.84, and neuroticism=0.90.

2) Burnout

Academic burnout was assessed using the 15-item Maslach Burnout Inventory–Student Survey (MBI–SS) [23]. The MBI–SS comprises dimensions of exhaustion, cynicism, and efficacy that were measured using a 7-point Likert scale. Reliability analysis revealed a Cronbach’s α of 0.88.

3) Engagement

Academic engagement was assessed using the 17-item Utrecht Work Engagement–Student (UWES–S) [23]. UWES–S consists of vigor, dedication, and absorption. Responses were measured using a 7-point Likert scale. Cronbach’s α was 0.90.

3. Analysis strategy

We aimed to identify personality sub-types of the Big Five in our sample using the person-centered method and subsequently study the difference between academic burnout and engagement according to these sub-types. First, we used latent profile analysis (LPA) to identify the sub-type. Akaike’s information criterion (AIC), Bayesian information criterion (BIC), and sample-adjusted BIC (SABIC) were used to evaluate model fit, and the Lo–Mendell and Rubin (LMR) test was used for model comparison. The LMR test is similar to the χ^2 difference test and compares K profiles with K–1 profiles. A statistically significant LMR index indicates that K profiles are a significantly better fit compared to a model with one less profile. Second, analysis of variance and post hoc comparisons were used to analyze the differences between academic burnout and engagement between the sub-types.

Results

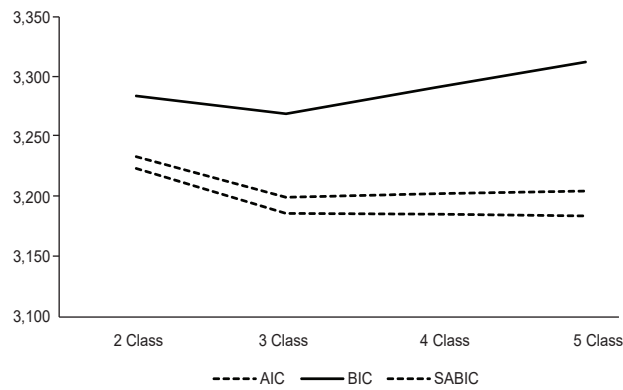
An LPA analysis was performed to verify the Big Five personality profiles, and the results are presented in Table 1 and Fig. 1. The AIC showed a similar level after a sharp

Table 1. Comparing Model Fit for Different Profiles

	AIC	BIC	SABIC	LMR	p-value
2 Class	3,223.850	3,284.391	3,233.640		
3 Class	3,186.236	3,269.480	3,199.698	48.224	<0.01
4 Class	3,185.544	3,291.492	3,202.678	12.336	0.111
5 Class	3,184.128	3,312.778	3,204.933	13.041	<0.01

AIC: Akaike’s information criterion, BIC: Bayesian information criterion, SABIC: Sample-adjusted BIC, LMR: Lo-Mendell and Rubin.

Fig. 1. Comparing Model Fit Indices



AIC: Akaike's information criterion, BIC: Bayesian information criterion, SABIC: Sample-adjusted BIC.

Fig. 2. Profile Pattern

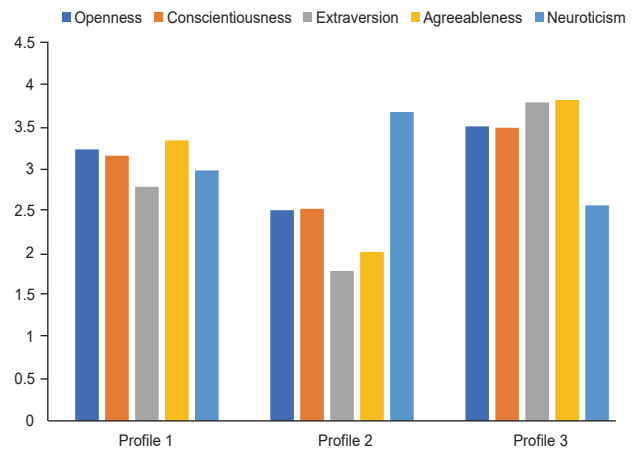


Table 2. Effect of Personality Profile on Academic Burnout and Engagement

	Adaptive	Maladaptive	High adaptive	χ^2
Burnout	3.98	5.16	3.21	36.007***
Engagement	3.56	2.54	4.00	16.741***

***p<0.001.

decrease in class 3; BIC and SABIC were the lowest in class 3. LMR supported class 3 as well. Therefore, we selected class 3 as the final profile.

The detailed features of each profile are presented in Fig. 2. Profile 1 showed intermediate levels of all personality traits; 212 participants (63%) were included this profile. Profile 2 showed relatively high neuroticism, while other personality traits were low; nine students (3%) fit this profile. Profile 3 showed relatively low neuroticism, while other personality traits were high; 104 participants (34%) fit this profile. With the LPA, a profile of less than 5% of the total sample can be considered a spurious profile due to over-extraction [24]. In this study, two profiles were 3% of the sample. However, when determining the optimal number of profiles, the results and theories of previous studies need to be considered as well [25]. Class 3 in this study is the same as the Big Five LPA results for 3,137,694 individuals of Fisher and Robie [16] in 2019. Profile 2 in this study can be classified as a “maladaptive” personality profile. Therefore, three classes were selected as the final Big Five personality profiles,

and, similar to Fisher and Robie [16] in 2019, profile 1 was named “adaptive,” profile 2 “maladaptive,” and profile 3 “highly adaptive.”

Next, differences among the personality profiles were analyzed and the results are presented in Table 2. As shown in Table 2, there were significant differences in both academic burnout ($F=36.007$, $p<0.001$) and engagement ($F=16.741$, $p<0.001$). The post-hoc analysis showed that differences in academic burnout and engagement were significant in all profiles. The “highly adaptive” profile showed the lowest academic burnout and the highest academic engagement, “maladaptive” showed the highest academic burnout and lowest academic engagement, and the “adaptive” profile showed an intermediate level of academic burnout and engagement.

Discussion

This study aimed to examine the effect of personality on academic attitudes in medical students who attended

online classes during the COVID-19 pandemic. We analyzed the participants' personality profiles using a person-centered approach, and investigated the difference between academic burnout and engagement according to these personality profile.

First, the findings suggested that medical students were classified into three personality profiles, as per previous personality profile studies. This results matched the personality profiles of the larger population [16], and we found that the medical students' Big Five personalities were divided into the same three profiles as the larger population.

Second, socio-analytic theory suggests that people have two broad motivations for getting along with other members of a group and getting ahead status than other members of the group [26]. Personality is closely related to these motivations, so people with certain personalities may have an advantage in career success [16]. This study also found that certain personality types affected academic attitudes in medical school education. The group with low neuroticism and high scores on other traits of the Big Five showed low academic burnout and high engagement, and they were classified as a highly adaptive group. Conversely, the group with high neuroticism and low on other Big Five personalities showed high academic burnout and low engagement, and were classified as a "maladaptive" group. Interestingly, a previous study of the relationships between the Big Five showed that neuroticism, which is related to negative emotion, was strongly related to burnout [14], and the effects of each Big Five personality on burnout and engagement were different in previous studies. For example, in Kim et al. [14] in 2009, conscientiousness had an essential effect on engagement. However, Qureshi et al. [27] in 2016 found that agreeableness had an important effect on engagement along with conscientiousness. In other words, individual personality traits had different effects on burnout and engagement.

However, in this study, personality profiles with the highest academic burnout also showed the lowest academic engagement. This result is interpreted as the combination of personalities in the profile. In particular, the "maladaptive" group had high neuroticism, and extraversion whereas agreeableness had relatively lower characteristics than the other traits. In variable-centered Big Five studies, neuroticism was related to burnout, and extraversion and agreeableness were mentioned as traits related to engagement. In the personality profile, the "maladaptive" group in this study reflects the personality characteristics mentioned in these individual studies; thus, academic burnout was the highest and, conversely, intellectual engagement was the lowest.

Third, although the same personality groups as Fisher and Robie [16] in 2019 were observed in this study, the proportions of each personality group differed. In Fisher and Robie [16] in 2019, "maladaptive" was 19% of the total, compared to 3% in this study. Thus, very few medical students had this personality type, which may be a characteristic unique to medical students. On the one hand, "maladaptive" is also a personality profile that is distinct from other personality profiles. For example, in the studies by Ferguson and Hull [28] in 2018, personality profiles were categorized as "excitable," with relatively high means across all personality subscales, "reserved" profile, with relatively low scores on the five personality subscales, and "well-adjusted" with high extraversion, openness, agreeableness, and conscientiousness, but lower neuroticism. Compared to these studies, "adaptive" and "high adaptive" are profiles that are common to other studies, but "maladaptive" is a distinct profile. The Big Five personalities are stable personality traits, so the generalizability of the Big Five personality profiles is an important issue that needs to be validated. Therefore, it is necessary to explore whether personality subgroups are generalized in various samples, while differences in the

proportions of each personality group occur through future studies.

This empirical study was based on a survey, with several limitations. First, it is cross-sectional, and the causal relationship between variables cannot be guaranteed. In addition, it cannot be generalized to all students as it was targeted toward medical students. Therefore, in future research, it is necessary to confirm the causal relationships between variables by different measurement points of personality and academic attitude. In addition, by conducting the same research on different student groups or cultures, the differences between these groups should be investigated, and any differences should be further researched to examine the cause of these differences. Second, this study did not include academic performance. This study includes personality, which is a major variable. Therefore, the survey was conducted anonymously for honest responses from students, and as a result, we could not include their objective academic performance. Therefore, future studies need to investigate whether academic attitudes lead to actual academic performance. Third, this study confirmed the differences in students' academic attitudes in the educational environment, according to relatively stable personalities, that changed due to the COVID-19 pandemic. However, the characteristics of individuals can be classified in various ways. For example, individual differences can be classified according to the degree of continuous, concreteness, and situational causality [29]. They can also be classified according to related domains such as emotion, cognition, and motivation [30]. Therefore, in future research, it is necessary to reflect on these personality theories and include various individual differences in the research.

The practical implications of this study are as follows. As medical school administrators, educators, and counselors, you can play a pivotal role in using the distinction between academic burnout and engagement to inform and

shape student education and counseling programs. Specifically, it is necessary to regularly assess student burnout and engagement to prevent burnout and maintain high levels of student motivation. It is crucial to consider each student's unique personality when implementing programs, as this personalized approach can significantly enhance the effectiveness of interventions. As shown in this study, students with high neuroticism, which is relatively high compared to other personality factors, can implement stress management and emotional support enhancement programs to prevent burnout. On the other hand, differentiated programs, such as leadership and teamwork enhancement programs, can be implemented to increase the program's effectiveness for students with high extraversion and low neuroticism. Second, the findings of this study can be used to improve the learning experience in online educational environments. For example, self-directed learning can be more actively promoted for students with high autonomy, and interaction through group projects can be promoted for students who prefer collaborative learning. Medical schools can also implement a mentoring program based on personality profiles, matching students with experienced seniors or professors to help them build on their strengths and overcome weaknesses. With these interventions, students can be expected to perform more effectively in their studies according to their personality traits, reducing academic burnout and increasing engagement.

The COVID-19 pandemic has brought about many changes in individuals' way of life, and medical school education has also applied online-based and non-face-to-face education. This environmental change provides medical students with a changing educational experience, which requires them to adapt to the new environment and maintain their academic motivation. Personality is a stable trait that affects an individual's behavior and response to the environment. Thus, individuals with specific per-

sonalities differ in how they react to their environment and this may be advantageous in a medical student's career. To confirm this, a person-centered analysis through a combination of personalities rather than individual personalities is required. According to this study, people with an adaptive profile have a low risk of burnout during the COVID-19 pandemic, while maintaining high motivation.

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