A Cross-Sectional Study of The Background Factors Associated With Academic Motivation Upon Admission To A Medical School in Japan

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Research Article

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Abstract

Background
To become a doctor with a high level of professionalism and ethical standards, it is important to have and maintain a high level of motivation from the time of admission to medical school. However, no studies in Japan have quantitatively investigated the factors related to motivation immediately after enrollment. In this study, we identified the background factors that influence the motivation of medical students immediately after admission.

Methods
A cross-sectional study was conducted. First-year medical students answered our questionnaire three weeks after admission. The questionnaire comprised 16 demographic items, and the 28-item Academic Motivation Scale was used to quantify motivation.

Results
Our analysis showed that amotivation, representing low self-determinant motivation, was significantly higher in students whose parents were medical professionals and in students who did not talk about their problems than in those whose parents were not medical professionals and those who did talk about their problems, respectively. Intrinsic motivation, which indicates the level of self-determinant motivation, was significantly lower in students who belonged to a sports club.

Conclusions
No previous studies have suggested that having parents who are medical professionals might be a factor associated with their children's decreased motivation when entering medical school in Japan. However, further research is needed to analyze this relationship.

Introduction
Physicians are expected to have a high level of professionalism.¹,² Professionalism includes behaving ethically and being impartial and honest with patients. To achieve these goals, it is necessary to maintain a high level of motivation and constantly develop one's abilities. All medical school faculty members are responsible for selecting highly motivated students and training them, leading to an increase in well-trained medical professionals. Furthermore, this is the first step toward contributing to the improvement of patient outcomes in medical care.
The importance of motivation has been discussed for decades, and the quality of motivation has been found to affect patient outcomes, the academic performance of students, well-being during school, and professional identity. Previous research on the motivation of medical students has identified various factors influencing it. However, few studies have explored the correlations between motivation and background factors immediately after medical school enrollment. Therefore, this study clarified the factors that influence motivation at the time of admission to medical school.

**Methods**

**Design**

This cross-sectional study investigated the relationship between individual backgrounds and motivation among medical students at their enrollment.

**Japanese medical education**

In Japan, most medical school candidates are high school students. A small number of students re-enter university after having graduated from another university or after having worked. In addition, Japanese medical schools have certain reserved spaces called regional quotas to secure human resources to eliminate the uneven geographical distribution of physicians. Newly graduated physicians who are a part of the regional quota are required to devote themselves to local community medicine for a set number of years.

**Participants**

A questionnaire survey was conducted among medical students one month after their admission to Shimane University. Shimane University is a national university in relatively rural Japan, and its academic level of admission is near the average of Japanese medical schools. The inclusion criteria were defined as those who responded to the questionnaire and had no missing data. The exclusion criteria were those who did not consent to the questionnaire, did not respond, whose mark sheets could not be read by the machine, or whose responses were insufficient for analysis.

**Sample size**

The sample size ($N=81$) was calculated by considering the following assumptions: total student number ($N=103$), the 95% confidence level, margin of error ($d=5\%$).

**Ethical standards**

We conducted this study under the condition that the information obtained would be used solely for this study, following the ICMJE requirements on privacy and informed consent from study participants and the Personal Information Protection Law in Japan. It is completely anonymized and cannot be used to identify individuals. Therefore, after consulting with the IRB in Shimane University Hospital, we omitted approval from the Ethical board. We also explained they were free to refuse to participate, their
participation or refusal would be unknown to their instructors, and there would be no negative consequences to their standing in the program or university if they failed to participate.

**Measures**

In the questionnaire, we investigated respondents’ background factors and motivation. The background factors included age, gender, the experience of failing or waiting for the entrance examination, hometown, whether they gained entrance as part of a regional quota, whether they have parents who are medical professionals, scholarship and its classification on their entrance permission, extracurricular activities, smoking habits, average hours of sleep, breakfast habits, time spent working part-time during the week, what matters in daily life, concerns, and whether they have someone to talk to about their problems (Appendix 1).

We used the Academic Motivation Scale (AMS) to evaluate motivation, quantifying the extensively studied self-determination theory (SDT). The AMS is an SDT-based questionnaire developed in France to measure motivation. It was translated into English in 1992 and has been shown to be valid and appropriate. The AMS classifies motivation into three categories: Intrinsic Motivation (IM), Extrinsic Motivation (EM), and Amotivation.

IM refers to the pleasure or satisfaction one derives from working on an object for its own sake. IM can be further divided into three categories: IM-to know, IM-to accomplish, and IM-experience. IM-to know refers to the pleasure one feels in learning, exploring, or trying to understand something new. IM-to accomplish refers to the satisfaction one feels in trying to accomplish or create something. IM-experience describes the state of participating in an activity to experience the stimulating sensations that result from that activity.

EM is further divided into three categories: EM-identified, EM-introjected, and EM-externally regulated. EM-identified refers to the state in which people judge the value and importance of an object and choose it for themselves. In contrast, EM-introjected refers to the state in which people begin to internalize the object based on past experiences, and EM-externally regulated refers to the state in which the reason for doing something is externally controlled.

Unlike the above two types of motivation, amotivation is a state of not finding a connection between the target and one’s own behavior. The higher the value of amotivation, the less motivation one has for the issue at hand. These motivation elements are hierarchical in SDT, with amotivation being the most non-self-determined state, followed by EM-externally regulated, EM-introjected, EM-identified, and IM (Fig. 1). SDT states that IM and EM-identified positively affect academic performance and well-being, while high non-self-determined motivations, such as amotivation, have a negative impact.

The AMS is divided into seven subscales (three IM, three EM, and one amotivation) as described above, which are evaluated with 28 question items. Four questions are assigned to each subscale in a random order, and each question is answered on a seven-point scale. The questions in the AMS translated into
Japanese were used in this study. The translated Japanese questions were back-translated using Google Translate to ensure that the content was completely understandable (March 7, 2021). A reliability test of the AMS used in this study showed that it had a Cronbach's alpha of 0.84, indicating that the results of this questionnaire were highly reliable.

Procedure

On May 8, 2019, the survey was administered before the liberal arts class on ethics and professionalism. The questionnaire was distributed to the class, and the students were informed that submitting the questionnaire was not mandatory and that the submission and their answers would have no effect on their grades. In addition, we explained that this was an anonymous survey and how to handle personal information.

We used response sheet card for the questionnaire and collected them after the class. The faculty of the academic affairs division used a read-only machine to scan the mark sheets. They sent personal information in the format of a .csv file without being linked to the analyst, and we analyzed the data. As described above, we were allowed to omit the Ethics Committee review because only participants whose consent could be obtained were included, anonymity was ensured, there were no particular harmful effects, and the content was within the scope of our daily educational work to improve medical education.

Data analysis

Chi-square tests or Fisher's exact tests were used to compare nominal variables. For continuous variables, t-tests or Wilcoxon rank-sum tests were used as appropriate with Cohen's $d$ being used to estimate the effect size of score differences. For multiple logistic analysis, we incorporated several important factors that were likely to be significant ($p < .10$), and several items suggested to be important by previous studies, avoiding multicollinearity: gender, age, recommended admission, receiving a scholarship, parents are medical professionals, an absence of concerns, not having someone to talk to about one's problems, and belonging to an athletic club. None of the variance inflation factor values exceeded 10, and the mean VIF of the model was less than 1.27. All analyses were performed using the Stata statistical software, version 14.0 (Stata Corp. 2015, Stata 14 Base Reference Manual). All tests were two-sided, with $p < .05$ being considered statistically significant.

Results

A total of 103 medical students participated in the class (100% of the total number of students), and 96 responded (93.2% of the total number of students). Altogether 81 questionnaires (78.6%) with consent were collected and analyzed in accordance with the exclusion criteria described previously. Table 1 shows the participant characteristics. About 40% of the students were female, and one in five were students who re-enrolled after graduating from another school. More than 80% of the students belonged to athletic teams, and less than 40% had parents in the medical profession. More than 80% of the students had
some problems with their school life; however, more than one in six students did not discuss their problems with others.

Table 2 shows the overall results of the AMS. The mean of amotivation was 6.84 (SD = 4.84). Among IMs, the value of IM-to know was the highest. The value of EM-identified, which is the most self-identified motivation among EMs, was the highest.

Tables 3 and 4 show the results of the multivariate linear analysis adjusted for the total value of amotivation and IM.

Background factors selected for amotivation values were analyzed similarly. Only two background factors were significantly correlated with higher amotivation scores: having a parent in the medical profession (β = 2.536, 95% CI [0.277, 4.795]) and not having anyone to talk to about problems (β = 3.280; 95% CI [0.494, 6.067]).

Being a member of an athletic club had a significant impact on the total IM (β = -.329, 95% CI [-18.16, -0.497]). This suggests that belonging to an athletic club during the first three weeks of school had a negative impact on IM. The other background factors were not statistically significant after adjustment.

These results suggest that belonging to an athletic club, having a parent in the medical profession, and a tendency to not talk about one's problems were correlated with the inability to maintain self-determinant motivation. In contrast, none of the other factors, such as gender, age, retake status, hometown, or scholarship, were significantly correlated with motivation values.

**Analysis of the factors that seem to affect AMS**

Table 5 shows the comparison of AMS values for the three factors that seem to affect AMS as a result of the multivariate analysis. A comparison of the AMS of students who belonged to an athletic club with that of those who did not indicate a significant difference in the total value of IM (mean total value of IM in the athletic club: 54.22 vs. 63.00 in the non-athletic club group, p = .041). In addition, the mean IM-experience was significantly lower (mean IM-experience in the athletic group: 15.12 vs. 19.69 in the non-athletic group, p = .006). There were no statistically significant differences between the other items.

Regarding the AMS for students whose parents are medical professionals, their amotivation value was significantly higher (mean value of 8.41 vs. 5.96 for the group of students whose parents are not, p = .0058). As for other AMS values, IM-to know was significantly lower in the group with parents who are medical professionals (mean value of 20.88 vs. 23.00 for the group whose parents are not, p = .0166). There were no significant differences between the other values.

The results of the AMS comparison between the group who did not talk about their problems with others and the other group showed that the amotivation value was significantly higher in the group who did not
discuss their problems (mean amotivation value of 9.50 vs. 6.28 in the other group, \( p = .039 \)). There were no significant differences between the other values.

**Discussions**

The purpose of this study was to examine the background factors associated with the motivation of medical students at the time of admission. Our primary results were threefold. First, students who belonged to an athletic club had a lower IM, especially IM-experience, than those who did not. Second, students whose parents were medical professionals had higher amotivation and lower IM-to-know than students whose parents were not medical professionals. Third, students who do not discuss their problems with others had higher amotivation than students who did discuss their problems. These three factors and motivation are correlated, indicating that each of these three factors decreased self-determinant motivation. In contrast to previous studies, other background factors, such as age and gender, were found to have limited correlations with motivation at the time of enrollment.\(^5,7,12\)

The reasons why students whose parents are medical professionals have high non-self-determinant motivation are as follows. Such students are expected since childhood to take over family-owned hospitals or clinics later in life, and they see their parents working as medical professionals, which may lead to them experiencing high external motivation. Previous studies have not pointed out that the lower motivation of medical students is linked to the fact that their parents are medical professionals. In Japan, there is a large difference between the tuition fees of public medical schools (flat payment, about 3.5 million yen for 6 years) and that of 31 private medical schools (median: 34,096,000 yen, minimum: 19,100,000 yen, maximum: 47,365,000 yen). The parents of many students in private medical schools are doctors. Since this survey was conducted at a public university, it is probable that these factors may be related to the difference in parents’ financial ability; thus, a multi-center survey is needed in the future.

Next, we examined why students who do not discuss their problems with others have high levels of non-self-determinant motivation. There are three possible reasons students do not tell anyone about their problems. First, they have no one to talk to; second, they solve their problems by themselves; and third, they cannot solve their problems, and hence, the problems accumulate. Previous studies have shown that students who lacked support from their peers tend to be depressed.\(^13,14\) In addition, medical students with depressive tendencies have been shown to have predominantly higher amotivation, consistent with our results.\(^15,16\) Interventions for this situation have been studied, and we hope that early detection and intervention can improve medical students’ motivation.\(^17\)

Finally, we discuss the cause of the low self-determinant motivation of students belonging to an athletic club. It has been shown that exercise can improve academic performance and mental health.\(^18–22\) However, few previous studies have described the relationship between belonging to an athletic club and motivation at the time of entrance. In addition, when the students have joined an athletic club just after entering school, the effects of exercise, as shown in previous studies, may not be obtained. The ‘act’ of belonging to an athletic club may be correlated with motivation. To the best of our knowledge, none of
the previous studies have shown a correlation between belonging to an athletic club at the time of admission and motivation or academic performance, so we believe this to be a new finding in regard to Japanese medical schools.

**Limitations**

This study had several limitations that merit noting. First, it was a single-center study in Japan, and therefore, it cannot be generalized to medical students in all countries. Second, we could not specify the parents’ occupation, only whether their occupation was as a medical professional, and the results may differ depending on the type of medical role. The third point is that the AMS is based on the Japanese translation of the English questionnaire, and we could not verify whether the AMS can be validated in the Japanese education system, although we have conducted back-translation. However, to the best of our knowledge, this is the first study conducted in Japan using the AMS to assess medical students’ motivation at the time of admission, and we believe it will be a fundamental pilot study in Japan.

**Conclusions**

Our study showed that students whose parents are medical professionals and do not discuss their problems with others are associated with lower motivation when admitted to medical school. Further research is needed to determine whether these results are applicable to other universities and countries and clarify the factors that influence motivation at the time of medical school enrollment.

**List Of Abbreviations**

AMS  
Academic Motivation Scale  
EM  
extrinsic motivation  
IM  
intrinsic motivation  
SDT  
self-determination theory  
VIF  
variance inflation factor

**Declarations**

*Ethical Approval and Consent to Participate*

We obtained the informed consent from the participants under the condition that the information obtained would be used solely for this study, in accordance with the ICMJE requirements on privacy and informed consent from study participants and the Personal Information Protection Law in Japan,
and with the Helsinki Declaration of 1965, as revised in 2013 in Brazil. Our study data was completely anonymized, cannot be used to identify individuals, and no more than minimal risk. Hence, we approval by the Ethics Committee of Shimane University Hospital was omitted.

**Consent for Publication**

Not applicable.

**Data availability statement**

Raw data were generated at Shimane University. Derived data supporting the findings of this study are available from the corresponding author T.W. on request.

**Competing interests**

The authors declare that they have no competing interests.

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**Author contributions**

NN and TW designed the study, the main conceptual ideas, and proof outline. NN and TW analyzed all the data. KK supported the writing of the manuscript, and KO supported data collection. TW supervised all the processes. All authors discussed the results and commented on the manuscript. All authors read and approved the final manuscript.

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KO is a professor and dean of the faculty of medicine at Shimane University, Japan. As a leader, he works to reform medical education pre- and post-graduation. As a business person, he is highly regarded for his exceptional leadership and management skills in Japan's medical education field.

TW is an associate professor at General Medicine Center, Shimane University Hospital, Japan. He completed General Internal Medicine training in Japan and obtained his medical degree from Okayama University. He completed the Harvard Medical School Global Clinical Scholar Research Training program in 2019 because he believed there is a strong demand to train academic generalists in Japan. Exposure to undergraduate and postgraduate medical education led him to pursue research on diagnostic error, clinical education, and disruptive physician behavior.

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Tables
Table 1
Characteristics of participants (N = 81)

| Characteristic                                                                 | n   | %   |
|--------------------------------------------------------------------------------|-----|-----|
| Gender                                                                         |     |     |
| Male                                                                           | 48  | 59.3|
| Female                                                                         | 33  | 40.7|
| Median age (IQR)                                                              | 19 (18, 21) |     |
| Mean age (SD)                                                                 | 21 (4.37) |     |
| Experience of failing or waiting for the entrance examination                 |     |     |
| None                                                                           | 32  | 39.5|
| One year                                                                       | 33  | 40.7|
| More than one year                                                             | 13  | 16.1|
| Re-entrance after graduating from another university                         | 7   | 8.6 |
| Re-entrance after working                                                      | 11  | 13.6|
| Duty to work at Shimane prefecture                                             | 18  | 22.2|
| Coming from Shimane prefecture                                                 | 25  | 30.9|
| Receiving a scholarship                                                       | 35  | 43.2|
| Experience with smoking                                                       | 9   | 11.1|
| Belonging to an athletic club                                                 | 68  | 84.0|
| Parents in the medical profession                                             | 29  | 35.8|
| Duration of sleep                                                             |     |     |
| < 6 hours                                                                      | 5   | 6.2 |
| 6–7 hours                                                                      | 37  | 45.7|
| 7–8 hours                                                                      | 31  | 38.3|
| > 8 hours                                                                      | 8   | 9.9 |
| Breakfast habits                                                               |     |     |
| ≥ 5 days per week                                                             | 63  | 77.8|
| ≤ 4 days per week                                                             | 18  | 22.2|
| Recommended admission                                                          | 33  | 40.7|
| Characteristic                                      | n  | %  |
|---------------------------------------------------|----|----|
| Working at a part-time job > 10 hours per week    | 6  | 7.4|
| What is important                                 |    |    |
| Family                                            | 26 | 32.1|
| Friends                                           | 18 | 22.2|
| Grade                                             | 12 | 14.8|
| Others                                            | 25 | 30.9|
| Concerns about campus life                        |    |    |
| Grade                                             | 29 | 35.8|
| Financial                                         | 11 | 13.6|
| Nothing                                           | 14 | 17.3|
| Other                                             | 27 | 33.3|
| A partner whom you can consult                    |    |    |
| Friends                                           | 42 | 51.9|
| Family                                            | 19 | 23.5|
| Do not discuss with others                        | 14 | 17.3|
| Other                                             | 6  | 7.4|

Table 2  
Results of the Academic Motivation Scale (N = 81)

|                             | M (SD)  | Median (IQR) |
|-----------------------------|---------|---------------|
| Amotivation                 | 6.84 (4.85) | 5 (4–8)       |
| Total Intrinsic Motivation  | 55.63 (12.26) | 56 (49–63)   |
| IM–To Know                  | 22.21 (4.61)  | 23 (20–25)    |
| IM–To Accomplish            | 17.57 (5.11)  | 18 (14–21)    |
| IM–Experience               | 15.85 (4.77)  | 16 (13–19)    |
| EM– Identified              | 24.09 (4.20)  | 25 (22–27)    |
| EM–Introjected              | 13.67 (5.4)   | 14 (10–17)    |
| EM–Externally Regulated     | 19.07 (6.21)  | 20 (16–24)    |
Table 3
Results of the multiple linear regression for amotivation (N = 81)

|                        | β   | SE  | t    | 95% CI        | p    |
|------------------------|-----|-----|------|---------------|------|
| Gender (Male)          | 0.68| 1.14| 0.59 | -1.59         | 2.94 | .554 |
| Over 24 years old      | 2.04| 1.71| 1.19 | -1.37         | 5.46 | .236 |
| Recommended admission  | -0.79| 1.22| -0.65| -3.22         | 1.63 | .517 |
| Receiving a scholarship| -0.16| 1.09| -0.01| -2.19         | 2.16 | .988 |
| Parents in the medical profession | 2.54| 1.13| 2.24 | 0.28          | 4.80 | .028 |
| No concerns about campus life | 0.04| 1.37| 0.03 | -2.69         | 2.76 | .979 |
| Do not discuss with others | 3.28| 1.40| 2.35 | 0.49          | 6.07 | .022 |
| Belonging to athletic club | 3.07| 1.69| 1.82 | -0.30         | 6.44 | .073 |

Note. Higher amotivation values indicate lower motivation.

Table 4
Results of the multiple linear regression for total Intrinsic Motivation (N = 81)

|                        | β   | SE  | t    | 95% CI        | p    |
|------------------------|-----|-----|------|---------------|------|
| Gender (Male)          | -0.29| 2.98| -0.10| -6.22         | 5.65 | .924 |
| Over 24 years old      | -3.28| 4.49| -0.73| -12.23        | 5.67 | .467 |
| Recommended admission  | -1.33| 3.39| -0.42| -7.69         | 5.02 | .677 |
| Receiving a scholarship| 2.22| 2.86| 0.78 | -3.48         | 7.92 | .440 |
| Parents in the medical profession | -4.56| 2.97| -1.53| -10.48        | 1.37 | .129 |
| No concerns about campus life | 0.89| 3.58| 0.25 | -6.25         | 8.03 | .804 |
| Does not discuss with others | 0.55| 3.66| 0.15 | -6.76         | 7.85 | .882 |
| Belonging to athletic club | -9.33| 4.43| -2.11| -18.16        | -0.50| .039 |
Table 5
Difference in academic motivation score between students who are subject to three influential factors on academic motivation score and the other students (N = 81)

| Parents in the medical profession | Medical Profession (n = 29) | Other Students (n = 52) | p-value |
|-----------------------------------|-----------------------------|------------------------|---------|
|                                   | Mean (SD)                   | Mean (SD)              |         |
| Amotivation                       | 8.41 (5.81)                 | 5.96 (4.01)            | .006    |
| Total Intrinsic Motivation        | 52.14 (12.87)               | 57.58 (11.58)          | .052    |
| IM—to know                       | 20.83 (4.92)                | 22.98 (4.29)           | .017    |
| IM—to accomplish                  | 16.59 (5.13)                | 18.12 (5.06)           | .127    |
| IM—experience                     | 14.72 (4.43)                | 16.48 (4.88)           | .151    |
| EM—identified                     | 20.21 (5.92)                | 18.44 (6.33)           | .291    |
| EM—introjected                    | 14.59 (5.51)                | 13.15 (5.47)           | .379    |
| EM—externally regulated           | 23.34 (4.97)                | 24.50 (3.69)           | .352    |
| Does not discuss problems with others | Not Discussed (n = 14) | Other Students (n = 67) |         |
| Amotivation                       | 9.50 (7.23)                 | 6.28 (4.04)            | .039    |
| Total Intrinsic Motivation        | 56.79 (12.49)               | 55.39 (12.29)          | .736    |
| IM—to know                       | 22.00 (5.04)                | 22.25 (4.56)           | .900    |
| IM—to accomplish                  | 18.36 (5.96)                | 17.40 (4.95)           | .499    |
| IM—experience                     | 16.43 (4.86)                | 15.73 (4.78)           | .861    |
| EM—identified                     | 20.64 (5.75)                | 18.75 (6.29)           | .263    |
| EM—introjected                    | 14.29 (5.28)                | 13.54 (5.57)           | .822    |
| EM—externally regulated           | 22.86 (3.35)                | 24.34 (4.33)           | .067    |
| Belongs to athletic club          | Athletic club (n = 68)      | Other students (n = 13) |         |
| Amotivation                       | 7.15 (5.13)                 | 5.23 (1.77)            | .240    |
| Total Intrinsic Motivation        | 54.22 (11.78)               | 63.00 (12.56)          | .041    |
| Motivation Type         | Medical Profession (n = 29) | Other Students (n = 52) | p-value |
|------------------------|----------------------------|-------------------------|---------|
|                        | Mean (SD)                  | Mean (SD)               |         |
| IM–To Know             | 21.84 (4.77)               | 24.15 (3.18)            | .201    |
| IM–To Accomplish       | 17.26 (5.02)               | 19.15 (5.46)            | .243    |
| IM–Experience          | 15.12 (4.39)               | 19.69 (5.02)            | .006    |
| EM–Identified          | 24.01 (4.38)               | 24.46 (3.23)            | .979    |
| EM–Introjected         | 13.93 (5.35)               | 12.31 (6.24)            | .197    |
| EM–Externally Regulated| 19.04 (6.29)               | 19.23 (6.04)            | .985    |

**Additional Files**

Additional Files are not available with this version

**Figures**

| Behaviour | Non-self-Determined | Self-Determined |
|-----------|---------------------|-----------------|
| Type of motivation | Amotivation | Controlled motivation | Autonomous Motivation |
| Type of regulation | No regulation | External | Introjected | Identified | Intrinsic |
| AMS Motivation Type | Amotivation | Extrinsic Motivation | Intrinsic Motivation |
| AMS Name | Amotivation | EM - Externally regulated | EM - Introjected | EM - Identified |

**Figure 1**

Classification of motivation in the Self-Determination Theory