

## Study of the Influence of Life Events and Coping Methods on the Mental Health of Medical Students

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### Abstract

Between December 2006 and June 2007, we conducted a questionnaire survey on the stress level, mental health, and coping methods among a total of 221 students at the School of Medicine, Faculty of Medicine, Fukuoka University, including 96 first-year students, 81 fourth-year students, and 44 fifth-year students. We conducted a statistical analysis on respective items using Hisata's life experiences scale for university students, the Japanese version of the shortened GHQ (General Health Questionnaire) comprising 12 questions, and Sakata's coping scale (12 questions). As a result: 1. it was revealed that the level of mental health of the medical students was lower compared to their self-awareness of their stress level; 2. stress from inner matters, human relations, and academic performance influenced the mental health of the medical students; and 3. it was found that coping by avoidant thinking as well as by asking for help had a negative influence on mental health, while coping by positive thinking worked positively for social activities.

**Key words:** Medical students, Life events, Mental health, Stress coping

### Introduction

In modern society, which is rapidly changing and becoming more complex, people are exposed to much physical and psychosocial stimulation, leading to the manifestation of various forms of maladaptive conditions. On a global basis, it has been reported that medical students suffer from various stresses in their daily campus and private lives, responsibility and anxiety regarding their futures as medical practitioners, examinations in educational environments such as CBT (Computer Based Test) for evaluation of knowledge and OSCE (Objective Structured Clinical Examination) for evaluation of skills and attitudes regarding consultation, the hurdle of the national examination for medical practitioners after graduation, and the stress involved in having to adjust themselves to these<sup>1) 2) 3) 4)</sup>. These stresses also include issues such as human relations, along with academic performance and romance, with excessive stress potentially leading to

physical and mental problems, lower self-evaluation of the students, and also influencing their learning ability and academic work. Students carry out various methods of coping with these stresses (coping strategies) to maintain physical and mental health. Recently, the relationship between stress and health in medical students has been attracting a great deal of attention, with some studies revealing that stress in academic work and the lives of medical students influences individual mental and physical condition<sup>5) 6)</sup>. Moreover, correct evaluations of stress related to medical education are being made<sup>7)</sup>.

We hereby report on our investigation into the relationship between stressful life events and coping in medical students at Fukuoka University, with the addition of a discussion.

### Subjects and Methods

Between December 2006 and June 2007, we conducted a questionnaire survey among a total of 221 students at

the School of Medicine, Faculty of Medicine, Fukuoka University, including 96 first-year students (66 male and 30 female), 81 fourth-year students (49 male and 32 female), and 44 fifth-year students (28 male and 16 female). The actual survey was conducted during school hours for the first and fourth-year students, and during the period of psychiatric clinical training for the fifth-year students. The following questionnaire was used for the survey.

### **1. Hisata's life experiences scale for university students**

From 9 life fields according to Hisata's life experiences scale for university students<sup>8)</sup>, 7 life fields with a certain degree of impact that medical students may experience (human relations, academic performance, extracurricular activities, romance, family relationships, concerns about the future, and personal inner world) were selected, and each item was evaluated on a scale of 1 to 5. We investigated how much the students felt stress in the abovementioned 7 life fields over the past month. 1 point was given for "no stress" and 5 points were given for "complete stress," indicating that higher scores reflected higher stress levels.

### **2. Japanese version of the shortened GHQ (General Health Questionnaire) comprising 12 questions**

GHQ was developed by Goldberg from England as a screening test for nonorganic and nonpsychotic mental disorders and was selected by the WHO as the most appropriate screening test for neuropsychiatric disorders. It was introduced to Japan in 1985. GHQ, in addition to the 60-question version, includes four shortened versions, a 30-question version, a 28-question version, a 20-question version, and a 12-question version, which were created by selecting items from the 60-question version which are highly capable of distinguishing mental disorders. The usefulness of the shortened versions has been indicated by Fukunishi<sup>9)</sup>. We herein used the 12-question version in order to reduce burden on the subjects.

Because GHQ is commonly used as the scale of mental health in studies with healthy subjects, GHQ was used as the scale of mental health in this study. The GHQ scoring method was used for evaluation, with 0-0-1-1 points given to the choices in series and calculated as scores.

### **3. Sakata's coping scale (12 questions)**

As a coping scale, Sakata's scale (1989)<sup>10)</sup> was partly modified and used. This test consists of 12 questions, and for the events answered in Hisata's life experiences scale

for university students, each item was rated on a scale of 1 to 3 under the teaching of "how to cope with the events." 0 was given to "not used at all" while 3 points were given to "used very often," indicating that higher scores reflected a higher frequency of using a coping method.

It should be noted, GHQ and coping, was subjected to factor analysis. The factor analysis, based on the correlation matrix between a number of variables, is an analysis method of extracting latent factors that define their relationships. The strength and direction of the relationship between the extracted factors and the variables is represented as the factor loadings. In any factor, some slight number of variable groups, showed a strong correlation (factor loadings), it is possible to know which factor is representative of any variable group. Based on these correlations (factor loadings) the representative meaning of a factor, is read out and a suitable agent name is added. Factor analysis is a statistical technique to combine a number of related independent variables into a small number of "factors".

For the scoring of GHQ and coping, the measure score of the factor is obtained by dividing the sum of raw scores of strongly correlated (high factor loadings) question groups in every extracted factor by the number of questions.

## **Results**

### **1. The stress level in university life events**

Fig. 1 shows the stress level of each life event in 7 life fields. As seen in the figure, it appears that the level is higher in academic performance and human relations than other items but the average was approximately 3 points, which is the "neither low nor high" level, and the stress level of the medical students was not high.

### **2. The total score of GHQ**

The total score of GHQ is 5.03 points. A cut-off value is 4 points, indicating that the level of mental health of the medical students at Faculty of Medicine, Fukuoka University is low.

### **3. Analysis of coping factors**

It has been commonly discussed in previous studies that types of coping are divided into active coping and passive coping. Therefore, we conducted an analysis of coping factors in order to learn the structure of stress coping in medical students. Regarding the factor analysis, once factors were extracted using the principal factor method,

factor rotation was performed by varimax rotation. Taking the eigenvalue for each factor into consideration, a 5-factor solution was finally employed. The factor loading of the coping scale is shown in Table 1. The rate of variance contribution (eigenvalue) was 14.3% (1.72), 13.0% (1.56), 12.2% (1.47), 10.9% (1.31), and 10.6% (1.27), for the first factor, second factor, third factor, fourth factor, and fifth factor, respectively, while the cumulative percentage of these variance contribution rates was 61.0%. The items were selected on the basis of factor loading of 0.450. Regarding the first factor, the coping (hereinafter CP) items, CP7 (I believe this experience is good for me) and CP8 (I believe I can benefit from this experience) indicated high factor loading, so the first factor was named “positive thinking” according to the previous study by Nishimura<sup>6)</sup>. Regarding the second factor, the items CP1 (wait for time to pass), CP2 (let things take their course), CP11 (do something as a distraction), and CP12 (avoid the problem) indicated high factor loading, so the second factor was named “avoidant thinking” according to the

previous study. Regarding the third factor, the items CP3 (strive to eliminate the current situation) and CP4 (strive to eliminate the cause of the problem) indicated high factor loading, so the third factor was named “problem solving” according to the previous study. Regarding the fourth factor, the items CP5 (ask people for help) and CP6 (ask for advice) indicated high factor loading, so the fourth factor was named “asking for help” according to the previous study. Regarding the fifth factor, the items CP9 (speak poorly of the person who caused the problem) and CP10 (blame the person who caused the problem) indicated high factor loading, so the fifth factor was named “blaming others” according to the previous study. These coping factors are similar to the survey by Folkman et al.<sup>11)</sup> in content and appear to be factors that are reliably extracted.

Next, with these 5 factors as a subscale, the rough point total of the group of items shown in Table 1 was obtained, which was subsequently divided by the number of items to obtain the scale score.

**Table 1.** Factor loading of the coping scale

|   | I                 | II                | III             | IV              | V              |
|---|-------------------|-------------------|-----------------|-----------------|----------------|
| CP7 (I believe this experience is good for me)          | <b>.899</b>       | .068              | .096            | .074            | .034           |
| CP8 (I believe I can benefit from this experience)      | <b>.897</b>       | .035              | .156            | .068            | -.011          |
| CP1 (wait for time to pass)                             | .123              | <b>.660</b>       | -.102           | -.001           | -.244          |
| CP2 (let things take their course)                      | .150              | <b>.647</b>       | -.122           | .060            | -.243          |
| CP11 (do something as a distraction)                    | -.007             | <b>.490</b>       | .102            | -.019           | .256           |
| CP12 (avoid the problem)                                | -.144             | <b>.657</b>       | -.019           | .035            | .302           |
| CP3 (strive to eliminate the current situation)         | .094              | .032              | <b>.917</b>     | .107            | .035           |
| CP4 (strive to eliminate the cause of the problem)      | .160              | -.139             | <b>.712</b>     | .199            | -0.06          |
| CP5 (ask people for help)                               | .073              | .045              | .183            | <b>.756</b>     | .203           |
| CP6 (ask for advice)                                    | .061              | .011              | .110            | <b>.785</b>     | .134           |
| CP9 (speak poorly of the person who caused the problem) | -.008             | .023              | -.060           | .196            | <b>.772</b>    |
| CP10 (blame the person who caused the problem)          | .030              | -.015             | .018            | .113            | <b>.579</b>    |
|   | positive thinking | avoidant thinking | problem solving | asking for help | blaming others |
| Eigenvalue  | 1.72              | 1.56              | 1.47            | 1.31            | 1.27           |
| Rate of contribution (%)                                | 14.3              | 13                | 12.2            | 10.9            | 10.6           |

Numbers in bold in Table1 represent 0.450 of factor loadings or more.

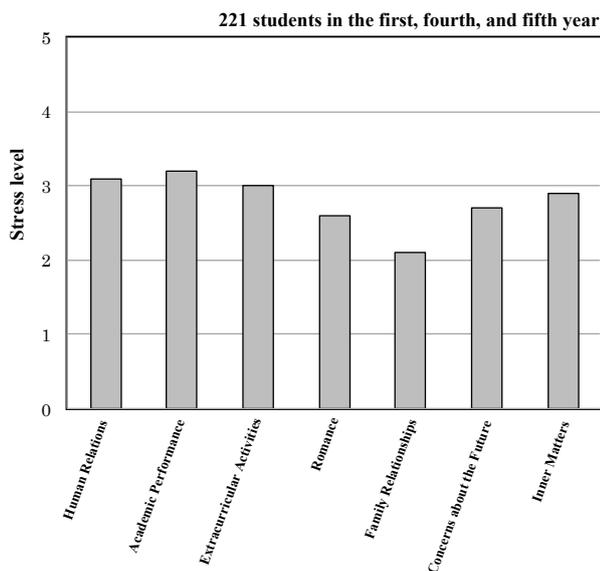
Questions 7 and 8 of coping, having a strong correlation to factor I (high factor loadings), are grouped in one, and taking into account the contents of the questions, factor I is named “positive thinking”.

Questions 1, 2, 11 and 12 of coping, having a strong correlation (high factor loadings) to factor II, are combined into one. Taking into account the contents of the questions, factor II is named “avoidant thinking”.

Questions 3 and 4 of coping, having a strong correlation (high factor loadings) to factor III, are put together in one group. Taking into account the contents of the questions, factor III is named “problem solving”.

Questions 5 and 6 of coping, having a strong correlation (high factor loadings) to factor IV, are grouped in one. Taking into account the contents of the questions, factor IV is named “asking for help”.

Questions 9 and 10 of coping, having a strong correlation (high factor loadings) to factor V, are compiled in one. Taking into account the contents of the questions, factor V is named “blaming others”.



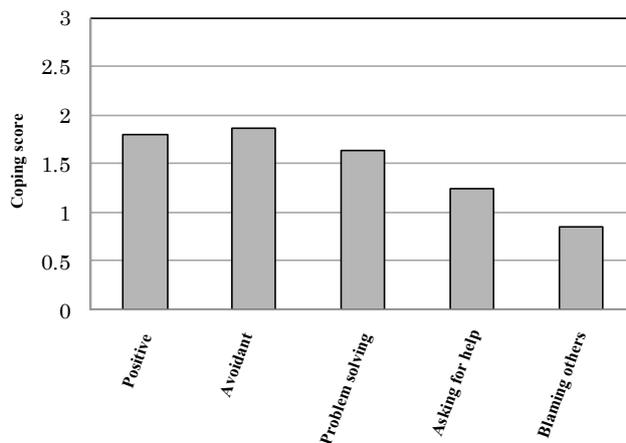
**Fig. 1** The stress level in university life events of medical students

Fig. 2 shows the scale score. From Fig. 2, the results obtained indicated somewhat used positive thinking, avoidant thinking, and problem solving for coping, and in contrast, few medical students blamed others.

#### 4. Investigation of the factor structure for GHQ

Seeing the stress level in 7 life fields and the correlation coefficient of each coping factor in a preliminary manner, in the 12-question version of GHQ, a significant correlation was found between human relations ( $r=0.35, p<0.01$ ), extracurricular activities ( $r=0.18, p<0.01$ ), romance ( $r=0.26, p<0.01$ ), family relationships ( $r=0.19, p<0.01$ ), personal inner matters ( $r=0.37, p<0.01$ ), positive thinking coping ( $r=0.15, p<0.05$ ), and avoidant coping ( $r=0.15, p<0.05$ ). Therefore, we conducted a factor analysis of the 12-question version of GHQ in order to investigate the structure of mental health in more detail. Regarding the factor analysis, once factors were extracted with the principal factor method, factor rotation was performed by varimax rotation. Taking the eigenvalue for each factor into consideration, a 2-factor solution was finally employed. The factor loading is shown in Table 2. The rate of variance contribution (eigenvalue) was 29.4% (3.53) and 14.3% (1.71) for the first factor and second factor, respectively, while the cumulative percentage of these variance contribution rates was 43.7%. The items were selected on the basis of factor loading of 0.450.

Regarding the first factor, the items of mental health level (hereinafter GHQ), GHQ2: sleeplessness, GHQ5: stress, GHQ6: worries, GHQ8: depression, GHQ9: loss of



**Fig. 2** Coping items

self-confidence, GHQ10: uselessness, and GHQ12: neurosis indicated high factor loading, so the first factor was named “anxious depression factor” according to the previous study by Nishikawa<sup>12)</sup>.

Regarding the second factor, the items GHQ1: concentration, GHQ3: motivation in life, GHQ4: decision, GHQ7: positivity, and GHQ11: happiness were extracted, so the second factor was named “social activity factor.”

Next, with these 2 factors as a subscale, the rough point total of the group of items shown in Table 2 was obtained as the scale score.

#### 5. The influence of stress level and coping on health condition

We conducted a multivariate analysis in order to investigate the influence of stress level and coping on mental health condition. Regarding criterion variables, the scale score of the first factor “anxious depression” and the scale score of the second factor “social activity” among the scale scores in GHQ were used. We conducted a hierarchical multiple regression analysis on each of the two scale scores. Regarding explanation variables, academic year (first year versus fourth and fifth year), sex, stress level in each life field, and coping score were entered. The contribution significance was investigated regarding how much each explanation variable was able to account for the variance in the criterion variables.

In the subscale of GHQ “anxious depression factor” in Table 3, the score is adjusted such that higher scores reflect higher levels of anxious depression. As shown in

**Table 2.** Factor loading of the GHQ scale

|                               | I                                | II                         |
|-------------------------------|----------------------------------|----------------------------|
| GHQ2: sleeplessness           | <b>.562</b>                      | -.025                      |
| GHQ5: stress                  | <b>.723</b>                      | .019                       |
| GHQ6: worry                   | <b>.658</b>                      | .137                       |
| GHQ8: depression              | <b>.855</b>                      | -.072                      |
| GHQ9: loss of self-confidence | <b>.813</b>                      | .016                       |
| GHQ10: uselessness            | <b>.680</b>                      | -.031                      |
| GHQ12: neurosis               | <b>.588</b>                      | -.081                      |
| GHQ1: concentration           | -.083                            | <b>.476</b>                |
| GHQ3: motivation in life      | -.178                            | <b>.720</b>                |
| GHQ4: decision                | .076                             | <b>.453</b>                |
| GHQ7: positivity              | .100                             | <b>.577</b>                |
| GHQ11: happiness              | .000                             | <b>.632</b>                |
|                               | anxious<br>depression<br>factors | social<br>activity factors |
| Eigenvalue                    | 3.53                             | 1.71                       |
| Rate of contribution (%)      | 29.4                             | 14.3                       |

Numbers in bold in Table2 represent 0.450 of factor loadings or more.

Questions 2, 5, 6, 8, 9, 10, 12 of GHQ having a strong correlation to factor I (high factor loadings of 0.450 or more), are compiled into a group. Taking into account the content of the questions, the factor I is named “anxious depression factors”.

Questions 1, 3, 4, 7, 11 of GHQ having a strong correlation to factor II (high factor loadings of 0.450 or more), are combined in a group. Taking into account the content of the questions, the factor II is named “social activity factors”.

**Table 3.** Multiple regression analysis of the first factor of GHQ

| (GHQ1)                     | R <sup>2</sup> | ΔR <sup>2</sup> | β       |
|----------------------------|----------------|-----------------|---------|
| Anxious depression factors |                |                 |         |
| Inner matters              | 0.272          | 0.272           | 0.330** |
| Human relations            | 0.348          | 0.076           | 0.346** |
| Avoidant thinking          | 0.359          | 0.011           | 0.114*  |
| Asking for help            | 0.368          | 0.009           | 0.113*  |

\*p< .05, \*\*p< .01

**Table 4.** Multiple regression analysis of the second factor of GHQ

| (GHQ2)                 | R <sup>2</sup> | ΔR <sup>2</sup> | β       |
|------------------------|----------------|-----------------|---------|
| Social activity factor |                |                 |         |
| Positive thinking      | 0.115          | 0.115           | 0.335** |
| Academic performance   | 0.136          | 0.021           | -0.158* |

\*p< .05, \*\*p< .01

Table 3, “stress related to inner matters” ( $\Delta R^2=.272$ ,  $\beta=.330$ ,  $p<.01$ ), “stress related to human relations” ( $\Delta R^2=.076$ ,  $\beta=.346$ ,  $p<.01$ ), “coping by avoidant thinking” ( $\Delta R^2=.011$ ,  $\beta=.114$ ,  $p<.05$ ), and “coping by asking for help” ( $\Delta R^2=.009$ ,  $\beta=.113$ ,  $p<.05$ ) from among “anxious depression factors” had significant main effects on health condition with a significant  $\beta$  coefficient. It was suggested that, regarding “anxious depression” factors, inner matters and human relations were involved, while coping by avoidant thinking

and coping by asking for help were influential.

Next, regarding the subscale of GHQ “social activity factor” in Table 4, the score was adjusted such that higher scores reflected more enhanced social activities. “Coping by positive thinking” ( $\Delta R^2=.115$ ,  $\beta=.335$ ,  $p<.01$ ) and “stress of academic performance” ( $\Delta R^2=.021$ ,  $\beta=-.158$ ,  $p<.05$ ) had a significant  $\beta$  coefficient. Regarding “social activities,” it was suggested that higher coping by positive thinking scores reflect more increased social activities, and conversely, academic performance stress reduces social activities.

## Discussion

### 1. Stress in medical students

It has been reported that medical students suffer from high levels of stress, leading to alcohol and drug abuse brought on by stress<sup>13)</sup>, difficulty in human relations<sup>14)</sup>, depression and anxiety<sup>15) 16)</sup>, and sometimes even suicide<sup>17)</sup>. In a report by Marie et al., it was reported that the prevalence of depression in medical students (first, third, and sixth-year students) in Sweden was 12.9%, which was higher than that in the general population<sup>18)</sup>.

In a review of a survey on stress in medical students in the U.S., it was reported that medical students showed higher anxiety scores compared to healthy subjects, and the level of depression markedly increased in the first year of enrollment in the U.S.<sup>19)</sup>. Moreover, in a study using GHQ in England, it was reported<sup>4)</sup> the mental condition of first-year medical students worsened as the semester progressed. In the report from Sweden, it was reported that pressure from academic work in the first year is high, in addition to pointing out health problems such as lack of sleep and drinking<sup>16)</sup>. On the other hand, in Pakistan, India, and Thailand, it has been reported that stress levels became higher in third and fourth-year students<sup>20) 21) 22)</sup>.

Regarding the survey in Japan, in the stress survey among medical students assigned to the basic research laboratory in the third year at the University of Occupational and Environmental Health, Japan, who were placed in an unusual environment, the average score of the 12-question version of GHQ was 2.38 which was not so high, but as high as 38% indicated 3 or higher at the cutoff point (generally 3 points or 4 points are used as the cutoff point)<sup>23)</sup>. This suggests the possibility that higher GHQ scores reflect more problems being caused in human relations. Regarding the medical students at the Faculty of Medicine, Fukuoka University, that we investigated herein, it appears that although stress was normal on the

scale of life experiences, mental health was not so good on the scale of mental health. However, due to differences in sociocultural background and educational situations in the countries where the abovementioned studies were conducted, it is necessary to pay attention when comparing them with our results.

Regarding the study comparing other faculties, in the report by Fukushima Medical University<sup>24)</sup>, when GHQ and QOL were compared between medical students and other students, the average GHQ value was 8.08 in the Faculty of Medicine and 8.06 in other faculties, with an average QOL value of 3.19 in the Faculty of Medicine and 3.14 in other faculties, indicating no differences between both. Ko et al. reported that among first-year law and medical students, the life event score of the law students was markedly lower than that of the medical students<sup>25)</sup>. Firth et al. also reported that medical education is recognized as stressful but there is uncertainty about whether it is different from advanced education in other faculties<sup>26)</sup>.

## 2. Stress management in medical students

Regarding how medical students in England cope with stress, drinking alcohol, smoking and drug abuse have been pointed out<sup>1) 26) 27) 28) 29) 30)</sup>. Moreover, for medical students in Pakistan, coping such as via sports, music, and going out with friends for leisure has been reported<sup>21)</sup>. Regarding coping with the medical students at the Faculty of Medicine, Fukuoka University, it was characterized by coping through positive thinking, avoidant thinking, and problem solving as opposed to blaming others. It is necessary in the future to compare with other universities in order to see whether the abovementioned coping tendency is characteristic of medical students in the Faculty of Medicine, Fukuoka University.

For medical students in the Faculty of Medicine, Fukuoka University, it was suggested that regarding “social activities,” higher positive thinking scores reflected an increase in social activities, and conversely, higher anxiety regarding academic performance reflected a reduction in social activities. The longitudinal study in Sweden reported that stress and burnout depended on individual characteristics and environments<sup>31)</sup>. In that report, it was reported that individual or organizational intervention could prevent burnout of medical students. In the review of the study on medical students as subjects<sup>19)</sup>, it was reported that stress management was mentally useful such as in reducing stress. It has been indicated that, for

medical students and interns who received education on stress management, immune function was improved, depression and anxiety was reduced, knowledge of stress was improved, sympathy was also improved, multiple ways to cope with anxiety about the future and ways of active coping could be used, negative coping was reduced, and ability to solve problems was improved<sup>19)</sup>.

In the overseas report about environmental problems, some countries reduce the number of lectures per week<sup>32)</sup>, change the style of the faculty curriculum (lecture in small groups, decrease in rote memorization, etc.), and provide mental support service such as counseling and social support such as child care facilities<sup>33)</sup>. Changes in the structure of education and evaluation systems have also been pointed out, and in Nepal, the building of a new amusement facility for boarding students is being considered<sup>7)</sup>.

As above, it is believed that the stress environment surrounding medical students is different depending on the country and academic year. In the case of medical students at Faculty of Medicine, Fukuoka University, according to the life experiences scale for university students, many students were aware that their stress level was not high, but regarding the GHQ score, their level of mental health was much worse than the students’ self-awareness of stress. Namely, it was revealed that the students were not aware that their mental health was poor. An approach to noticing our own stress is required in stress management. Coping by avoidant thinking and coping by asking for help worked negatively in terms of mental health, while conversely, coping by positive thinking actively enhanced social activities. Regarding the medical students in the Faculty of Medicine, Fukuoka University, it has been suggested that other ways of coping except blaming others are used in a relatively balanced manner; however, the students who largely use avoidant coping and ask for help are in a highly anxious state, so it is believed that there is a need to teach coping. Particularly, it is believed that supportive services are required such as counseling on the stresses of inner matters, human relations, and academic performance. According to Dickstein et al., it was reported that, although mental services were required for approximately 20% of medical students, many medical students found it difficult to adjust themselves and few students asked for mental services<sup>34)</sup>. Thus, we will have to devise a method of providing mental services.

While several proposals have been presented above, it is believed that good measures for mental health can

be taken by further investigating the characteristics and environments of the medical students at Faculty of Medicine, Fukuoka University.

### Conclusion

In this study, we conducted a questionnaire survey regarding mental health, the campus life experiences, and coping among 221 students in their first, fourth, and fifth year at the School of Medicine, Faculty of Medicine, Fukuoka University. As a result:

1. It was revealed that the level of mental health of medical students was much worse compared to their self-awareness of their stress level.
2. Stress related to personal inner matters, human relations, and academic performance influenced the mental health of the medical students.
3. It was found that coping by avoidant thinking and coping by asking for help had a negative influence on mental health, and conversely, coping by positive thinking actively enhanced social activities.

From these, we also briefly discussed mental health measures to be taken by the medical students at the Faculty of Medicine, Fukuoka University.

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