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メタデータ	<p>言語: English</p> <p>出版者: The Fukushima Society of Medical Science</p> <p>公開日: 2024-12-04</p> <p>キーワード (Ja):</p> <p>キーワード (En): Cross-sectional study, Medical student, Mental disorder, Schizophrenia, Stigma, Humans, Students, Medical, Schizophrenia, Female, Male, Cross-Sectional Studies, Japan, Attitude of Health Personnel, Adult, Social Stigma, Young Adult, Surveys and Questionnaires, Health Personnel</p> <p>作成者: Kataoka, Mariko, Ohira, Tetsuya, Tsuboi, Satoshi, Miura, Itaru, Yabe, Hirooki</p> <p>メールアドレス:</p> <p>所属:</p>
URL	<p>https://fmu.repo.nii.ac.jp/records/2002113</p>



Comparison of attitudes toward schizophrenia among medical students and health professionals in Japan and their associated factors among medical students: a cross-sectional study

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(Received September 3, 2023, accepted June 24, 2024)

Abstract

Changing perceptions of schizophrenia is crucial for both medical professionals and students. This study examined negative attitudes toward schizophrenia among medical students, psychiatrists, psychiatric staff, physicians, and non-medical workers. We created an 18-item survey using a web-based tool to assess attitudes toward schizophrenia, focusing on three factors: stigma, underestimation of patients' abilities, and skepticism about treatment. To compare scores among the five participants' groups, we used analysis of covariance, adjusting for age and sex. The study included 237 medical students, 10 psychiatrists, 16 psychiatric staff, 26 physicians, and 98 non-medical workers. After adjusting for age and sex, the overall discrimination score for psychiatrists was significantly lower than those of medical students, physicians, and non-medical workers. Among medical students, a comparison of each score by grade revealed that underestimation of patients' abilities scores was significantly higher in the fourth year than in the third year. Furthermore, those aspiring to become psychiatrists had significantly lower adjusted mean and stigma scores than students with different career goals ($p < 0.05$). In conclusion, medical students, as well as physicians and non-medical workers, displayed higher levels of stigma towards schizophrenia than psychiatrists. It is essential to explore modifying factors to improve medical students' attitudes towards schizophrenia.

Key words : Cross-sectional study, Medical student, Mental disorder, Schizophrenia, Stigma.

Introduction

Today, schizophrenia remains stigmatized globally, and the experience of stigma for patients with schizophrenia makes improving their lives difficult¹⁾. The general public²⁾ and various medical professionals—such as nurses^{3,4)}, physicians⁵⁾, medical students⁶⁾, and even psychiatrists^{7,8)} — have negative attitudes toward schizophrenia. A comparative study on attitudes toward schizophrenia in Japan reported that psychiatrists had more positive attitudes toward schizophrenia than either physicians or the general population⁹⁾, and that the latter two groups

had similarly stigmatizing attitudes, although the Japanese name for schizophrenia was changed to a less stigmatizing name in 2002, promoting an anti-stigma movement¹⁰⁾.

It is important to improve attitudes toward schizophrenia, not only for medical professionals but also for medical students. In an Italian study, medical students and physicians showed greater stigma toward schizophrenia than nurses, that schizophrenic patients are dangerous and unpredictable, and that social distance from them is desirable⁶⁾. This is thought to be influenced by the fact that nurses work more closely with patients than doctors or

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medical students⁶⁾. Thus, a closer relationship with patients with schizophrenia may reduce stigma, whereas the factors that reduce stigma among medical students remain unclear.

One factor that influences medical students' attitudes toward schizophrenia is the spectrum of medical education^{11,12)} — both psychiatric education and psychiatric practical training^{13,14)} — which has been shown to improve medical students' negative attitudes toward schizophrenia. A follow-up study of medical students in Turkey showed that students' attitudes toward schizophrenic patients changed significantly more positively in each area of schizophrenia etiology, treatment, and social interaction as they progressed from the first year to the fifth year¹²⁾. Meanwhile, a study in Greece found that after completing medical training, more students believed that schizophrenia was irreversible, that they could not make reasonable decisions, that they could not work in regular jobs, and that they were dangerous to the public¹³⁾. However, there are no studies on stigma towards schizophrenia among Japanese medical students, and it is not clear what type of education is effective in improving medical students' attitudes towards schizophrenia in Japan.

Some factors outside of formal education may play a role. Studies in the United Kingdom¹⁵⁾ and Greece¹³⁾ suggest that personal experiences of mental health treatment or experiences with a family member or friends undergoing mental health treatment are factors related to having a less stigmatizing attitude toward mental illness. In addition, medical students with empathy and an interest in mental illness were more likely to become psychiatrists¹⁶⁾.

In this context, the aim of this study was to investigate attitudes toward schizophrenia among medical students, physicians, psychiatrists, psychiatric staff (non-psychiatrists), and non-medical staff, and to compare the level of stigma among medical professionals, including medical students, in Japan. In addition, we compared the level of stigma toward schizophrenia among medical students by grade to determine the effect of psychiatric education and psychiatric practical training on stigma. Furthermore, we sought to investigate factors that influence stigma towards schizophrenia among medical students. These investigations could contribute to medical education approaches to reduce stigma among medical students in Japan.

Materials and methods

The study was performed to investigate and

compare attitudes toward schizophrenia among medical students, psychiatrists, psychiatric staff (other than psychiatrists), physicians, and non-medical workers.

Study Design

A web-based survey tool was used to create and conduct a survey of the study participants at Fukushima Medical University in Fukushima, Japan. Study participants were 490 medical students in their third to sixth year of medical training, 13 psychiatrists, 25 psychiatric staff members, 48 physicians, and 222 non-medical workers, such as office workers at the General Affairs Division of the university. Of the 490 medical students, 133 were third-year, 147 were fourth-year, 100 were fifth-year, and 110 were sixth-year students.

In Japan, medicine is a 6-year academic degree program that includes a 2-year pre-clinical stage followed by a 4-year clinical stage. Psychiatric classes that cover schizophrenia are given during the fourth year and consist of classroom lectures on the pathology, symptoms, and treatment of schizophrenia. Psychiatric practical training is provided in the fifth year and consists of clinical lessons (bedside learning [BSL]) on the clinical characteristics of mental disorders and their biopsychosocial treatments. Since psychiatric practical training also includes clinical workshops and attendance at clinical facilities at the Department of Psychiatry at the University Hospital, medical students have the opportunity to speak directly with and spend time with patients with schizophrenia during BSL. Therefore, all fifth-year students who participated in this survey had previously completed classroom psychiatry lectures, and all sixth-year students had previously received psychiatric practical training.

All study participants were Japanese, belonged to one of the 5 participant groups, and had agreed to complete web-based surveys provided as questionnaires on Google Forms (an online questionnaire format service provided by Google). All participants received a hyperlink to Google Forms via email containing various questionnaires. No identifying information (e.g., name or date of birth) was required of study participants. The study was conducted from September to December 2016. The study received ethics approval from the Fukushima Medical University Ethics Committee (approval #2736).

Survey and Questionnaires

The survey used in this web-based study com-

prised three sections : demographic information, knowledge about schizophrenia, and attitudes toward schizophrenia, which were measured using 18 items.

The demographic information collected from potential study participants included age, sex, number of years of education, number of years of psychiatric education, number of books read on schizophrenia, and occupation/qualifications (medical students, psychiatrists, psychiatric staff other than psychiatrists, physicians other than psychiatrists, and non-medical workers). The demographic questionnaire also asked if any family member or close friends had experienced psychiatric illness ("Do you have family or close friends with a history of psychiatric illness?"); if any family members or close friends had been diagnosed with schizophrenia ("Does that include individuals with schizophrenia?"); and whether participants had been prescribed psychiatric medications ("Have you ever been prescribed psychiatric medications, such as anxiolytics, hypnotics antidepressants, antipsychotics, and/or anticonvulsants?"). Finally, for potential medical student participants, the following additional information was collected : year of medical training at Fukushima Medical University ; experience of taking psychiatric classes about schizophrenia at Fukushima Medical University ("Have you ever completed a psychiatry class on schizophrenia?"); BSL experience during the psychiatry term at Fukushima Medical University ("Have you completed BSL training during your psychiatric term?"); and hopes of becoming a psychiatrist ("Do you want to become a psychiatrist in the future?").

Participants' knowledge of schizophrenia was evaluated by three questions, each of which had 5 response options (1 correct answer and 4 incorrect answers). The first question was "Please select the approximate prevalence rate of schizophrenia" ; the response choices were : 1/50, 1/100 (correct answer), 1/300, 1/1,000, or "I don't know." The second question was "What is the typical age of schizophrenia onset?" ; the response choices were : childhood, adolescence to early adulthood (correct answer), late adulthood, middle age, or "I don't know." The third question was "What is the characteristic symptom of schizophrenia?" ; the response choices were panic attack, visual hallucinations, auditory hallucinations (correct answer), obsessive-compulsive behavior, or "I don't know." Participants were instructed to answer these questions without referring to any materials, including books.

To evaluate attitudes toward schizophrenia, an

18-item questionnaire was created initially based on a study approach by Hori *et al.*⁹⁾. That study questionnaire was based on the 13-item questionnaire developed by Uçok *et al.*⁷⁾. The reliability and validity of the Japanese version have been reported elsewhere⁹⁾. For the present study, an additional 5 items were added by referring to several other previous studies on attitudes toward schizophrenia¹⁷⁻²⁰⁾, resulting in the current 18-item questionnaire, presented in Table 2.

Participants were asked to answer each question with either "I agree" or "I disagree." For items 1, 10, 11, 12, 15, 16, 17, and 18, responses of "I agree" were scored 0 and items answered with "I disagree" were scored 1. For the other items (2, 3, 4, 5, 6, 7, 8, 9, 13, and 14), the scoring was reversed. Therefore, for all items a higher score indicated a more negative attitude. The total score for each item was defined as the *discrimination score*. The questionnaire focused on 3 factors :⁹⁾ *stigma*, *underestimation of patients' abilities*, and *skepticism regarding treatment*. The summed scores for each factor were defined as the stigma score, underestimation of patients' abilities score, and skepticism regarding treatment score.

Statistical Analysis

For continuous variables, the means and standard deviations were calculated ; for ordinal variables, the medians were calculated (25th-75th percentiles). For categorical variables, data were reported as percentages. Means, medians, and categorical variables were compared using the analysis of variance (ANOVA), the Kruskal-Wallis test, Fisher's exact test, and the χ^2 test. The differences among the five groups were also compared using the analysis of covariance (ANCOVA) adjusted for age and sex. When significant differences were obtained among the five groups, post hoc multiple comparisons by the Tukey test were performed to determine where the differences occurred among the five groups. The same method was used to analyze comparisons between grades among medical students.

Statistical significance was determined by a two-tailed test, with $p < 0.05$ as statistically significant and $p < 0.1$ as borderline statistically significant. Analyses were performed using the SAS, version 9.4 (SAS, Cary, North Carolina, USA).

Results

A total of 398 responses were provided for this

survey, including 6 responses that were invalidated because they included unanswered questions. An additional 5 responses were considered invalid because they were from individuals who listed their occupation as “other” (2 nurses, 1 public health nurse, 1 midwife, and 1 clinical laboratory technologist). After excluding these 11 surveys, 387 valid responses were obtained from the following groups of participants: 10 psychiatrists; 16 psychiatric staff; 26 physicians; 60 third-year, 67 fourth-year, 50 fifth-year, and 60 sixth-year medical students; and 98 non-medical workers. The 16 psychiatric staff comprised 5 nurses, 4 clinical psychologists, 1 psychiatric social worker, and 6 non-responders. The valid response rate was as follows: 77% for psychiatrists; 64% for psychiatric staff; 54% for physicians; 45% for third-year, 46% for fourth-year, 50% for fifth-year, 55% for sixth-year medical students; and 44% for non-medical workers.

Table 1 shows the participants’ demographic characteristics and knowledge of schizophrenia according to the 5 groups listed (medical students, psychiatrists, psychiatric staff, physicians, and non-medical workers). Because the basic demographic characteristics, including sex and age, differed significantly among the groups, these two variables were controlled for in the ANCOVA model when examining differences in attitudes.

In the medical student group, 174 students had completed a psychiatry class on schizophrenia during their fourth year, and 80 students had completed BSL training as part of the psychiatry term during their fifth year of the program. A further 60 students had not completed either a psychiatry class on schizophrenia or BSL training. Regarding the hope of becoming a psychiatrist in the future, 36 students reported this plan and 200 students did not.

Table 2 presents the results of the 18-item questionnaire on attitudes toward schizophrenia, organized by participant group. It was notable that only 1 psychiatrist believed that schizophrenia patients are untrustworthy (item 6), and no psychiatrists believed the following statements: schizophrenia patients are dangerous (item 4), schizophrenia patients should be in hospitals (item 8), schizophrenia patients cannot comprehend their illness (item 13), and schizophrenia patients cannot comprehend nor apply suggested treatments (item 14). By contrast, a substantial portion of the medical students, physicians, and non-medical workers agreed that they would not like to live in a neighborhood with an individual with schizophrenia and that

an individual with schizophrenia could harm children.

Figure 1 shows the age- and sex-adjusted means for the overall discrimination scores of the 5 participant groups. The overall discrimination scores were 7.8 ± 0.31 for medical students, 3.5 ± 1.53 for psychiatrists, 5.1 ± 1.21 for psychiatric staff, 7.2 ± 0.95 for physicians, and 7.8 ± 0.49 for non-medical workers. The age- and sex-adjusted overall discrimination score for psychiatrists was significantly lower than those of medical students ($p < 0.01$), physicians ($p < 0.05$), and non-medical workers ($p < 0.01$). The age- and sex-adjusted overall discrimination score for psychiatric staff was significantly lower than those of medical students and non-medical workers ($p < 0.05$). As shown in Figure 2, psychiatrists and psychiatric staff had significantly lower age- and sex-adjusted mean values for the stigma score than medical students and non-medical workers, with scores of 2.4 ± 0.11 for medical students, 1.2 ± 0.54 for psychiatrists, 1.3 ± 0.43 for psychiatric staff, 2.2 ± 0.34 for physicians, and 2.5 ± 0.17 for non-medical workers. The adjusted mean values for the score of underestimation of patients’ abilities were 0.36 ± 0.04 for medical students, 0.00 ± 0.11 for psychiatrists, 0.19 ± 0.14 for psychiatric staff, 0.31 ± 0.11 for physicians, and 0.40 ± 0.06 for non-medical workers, and psychiatrists group had significantly lower score than medical students and non-medical workers ($p < 0.05$). No significant differences were found in the adjusted values for the scores for skepticism regarding treatment among the 5 groups, with scores of 0.37 ± 0.04 for medical students, 0.20 ± 0.17 for psychiatrists, 0.31 ± 0.14 for psychiatric staff, 0.42 ± 0.11 for physicians, and 0.40 ± 0.06 for non-medical workers. Furthermore, the associations were essentially unchanged after further adjusting for the prescription of a psychiatric medication.

A comparison of each score by grade revealed no significant differences in stigma and skepticism regarding treatment scores among medical students, although the underestimation of patients’ abilities score was higher for the fourth-year students than that for third-year students ($p < 0.05$), with scores of 0.25 ± 0.07 for the third-year students, 0.49 ± 0.07 for the fourth-year students, 0.32 ± 0.08 for the fifth-year students, and 0.37 ± 0.07 for the sixth-year students (Figure 3). In addition, the discrimination score was significantly higher for fourth-year students than that for fifth-year students ($p < 0.05$), with scores of 4.6 ± 0.35 for the third-year students, 5.0 ± 0.33 for the fourth-year students, 3.9 ± 0.38 for

Table 1. Demographic Characteristics and Schizophrenia Knowledge of Participants

characteristics	Medical Students (<i>n</i> = 237)	Psychiatrist (<i>n</i> = 10)	Psychiatric staff (<i>n</i> = 16)	Physicians (<i>n</i> = 26)	Non-medical worker (<i>n</i> = 98)	<i>p</i> value
Sex (female), <i>n</i> (%)	93 (39)	2 (20)	10 (63)	3 (12)	53 (54)	<0.001
20-29, <i>n</i> (%)	234 (98.7)	4 (40.0)	4 (25.0)	7 (26.9)	22 (22.4)	<0.001
30-39, <i>n</i> (%)	3 (1.3)	5 (50.0)	5 (31.3)	10 (38.5)	27 (27.6)	
40-49, <i>n</i> (%)	0 (0.0)	1 (10.0)	5 (31.3)	5 (19.2)	34 (34.7)	
50-59, <i>n</i> (%)	0 (0.0)	0 (0.0)	2 (12.5)	3 (11.5)	10 (10.2)	
≥60, <i>n</i> (%)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.8)	5 (5.1)	
Education yr : mean ± SD	—	19.8 ± 2.3	16.3 ± 4.0	18.5 ± 2.2	15.4 ± 2.3	<.001
Experience of mental illness in family member or close friend (Yes), <i>n</i> (%)	84 (35)	4 (40)	6 (40)	7 (27)	30 (31)	0.81
Experience of schizophrenia in family member or close friend (Yes), <i>n</i> (%)	10 (8)	0 (0)	0 (0)	2 (29)	7 (18)	<0.01
Experience of being prescribed psychiatric medications (Yes), <i>n</i> (%)	18 (8)	4 (40)	4 (27)	11 (42)	26 (27)	<0.001
Psychiatric training, yr : median (25th-75th percentile)	—	3.3 (1.5-9.5)	2.5 (0.7-8.7)	0.2 (0.1-0.2)	0.0 (0.0-0.0)	<0.001
Books on schizophrenia, median (25th-75th percentile)	1.0 (0.0-2.0)	20 (10-20)	5.0 (3.0-20)	1.5 (0.5-2.5)	0.0 (0.0-0.0)	<0.001
Knowledge about prevalence rate of schizophrenia (Correct), <i>n</i> (%)	117 (50)	10 (100)	13 (81)	19 (73)	22 (22)	<0.001
Knowledge about onset age of schizophrenia (Correct), <i>n</i> (%)	147 (62)	10 (100)	16 (100)	22 (85)	34 (35)	<0.001
Knowledge about characteristic symptoms of schizophrenia (Correct), <i>n</i> (%)	158 (67)	10 (100)	15 (94)	22 (85)	26 (27)	<0.001
Correct answers, <i>n</i> : (25th-75th percentile)	2 (1-3)	3 (3-3)	3 (3-3)	3 (1-3)	0 (0-2)	<0.001

Numbers in parentheses indicate percentages (%)

Table 2. Participants Who Answered "I Agree" to Each Questionnaire Item Concerning Attitudes Toward Schizophrenia

Questionnaire item	Medical Students (<i>n</i> = 237)	Psychiatrist (<i>n</i> = 10)	Psychiatric staff (<i>n</i> = 16)	Physicians (<i>n</i> = 26)	Non-medical worker (<i>n</i> = 98)	<i>p</i> value
1. Patients with schizophrenia can work, <i>n</i> (%)	183 (78)	10 (100)	16 (100)	24 (92)	71 (74)	0.02
2. Would oppose if one of his/her relatives would like to marry someone who has schizophrenia, <i>n</i> (%)	97 (41)	5 (50)	5 (31)	13 (50)	47 (50)	0.44
3. Schizophrenia patients can be recognized by his/her appearance, <i>n</i> (%)	16 (7)	2 (20)	4 (25)	4 (15)	12 (12)	<0.001
4. Schizophrenia patients are dangerous, <i>n</i> (%)	71 (30)	0 (0)	2 (13)	2 (8)	26 (27)	0.18
5. Would not like to have a neighbor with schizophrenia, <i>n</i> (%)	74 (31)	2 (20)	3 (19)	11 (42)	36 (37)	0.39
6. Schizophrenia patients are untrustworthy, <i>n</i> (%)	67 (28)	1 (10)	3 (19)	6 (23)	38 (39)	0.13
7. Schizophrenia patients could harm children, <i>n</i> (%)	140 (59)	2 (20)	6 (24)	14 (54)	53 (55)	0.07
8. Schizophrenia patients should be kept in hospitals, <i>n</i> (%)	34 (14)	0 (0)	0 (0)	2 (8)	15 (16)	<0.001
9. Family members of people with schizophrenia should help with all aspects of care, <i>n</i> (%)	89 (38)	2 (20)	1 (6)	6 (23)	32 (33)	0.05
10. (Suppose you were a psychiatrist) I don't worry about examining a person who is diagnosed with schizophrenia, <i>n</i> (%)	108 (46)	9 (90)	7 (47)	15 (58)	61 (64)	0.003
11. Would a person with schizophrenia be treated in the appropriate department of the general hospital, <i>n</i> (%)	135 (57)	8 (80)	8 (50)	14 (54)	64 (68)	0.19
12. Schizophrenia can be treated, <i>n</i> (%)	213 (91)	8 (80)	13 (81)	21 (84)	84 (88)	<0.001
13. Patients with schizophrenia cannot comprehend their illness, <i>n</i> (%)	66 (28)	0 (0)	2 (13)	7 (27)	27 (28)	0.22
14. Patients with schizophrenia cannot comprehend nor apply suggested treatment, <i>n</i> (%)	20 (9)	0 (0)	1 (6)	1 (6)	11 (11)	<0.01
15. Patients with schizophrenia have the chance of recovery, <i>n</i> (%)	227 (96)	10 (100)	16 (100)	23 (88)	91 (95)	<0.01
16. It is important to always inform a person with schizophrenia of their illness, <i>n</i> (%)	180 (77)	10 (100)	15 (94)	22 (88)	82 (85)	<0.001
17. Patients with schizophrenia often benefit from pharmacologic intervention (i.e., antipsychotic medications), <i>n</i> (%)	214 (91)	10 (100)	16 (100)	26 (100)	81 (84)	<0.001
18. Patients with schizophrenia often benefit from psychotherapy, <i>n</i> (%)	221 (94)	10 (100)	16 (100)	26 (100)	79 (84)	<0.001

Numbers in parentheses indicate percentages (%)

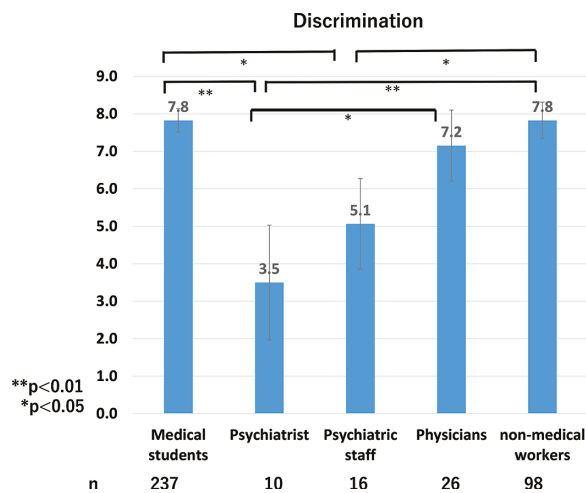


Fig. 1. Age- and sex-adjusted mean values of participants "discrimination" scores (** $p < 0.01$, * $p < 0.05$).

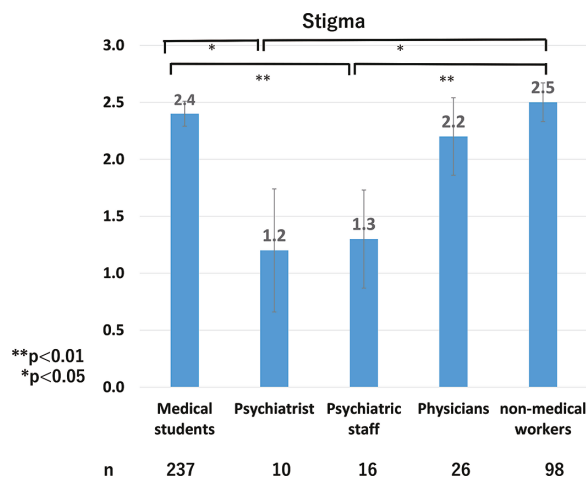


Fig. 2. Age- and sex-adjusted mean values of participants "stigma" scores (** $p < 0.01$, * $p < 0.05$).

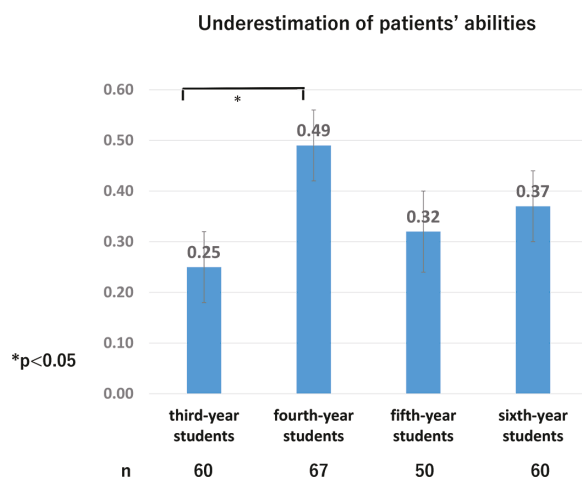


Fig. 3. Age- and sex-adjusted mean values of participants "underestimation of patients' abilities" scores (* $p < 0.05$).

the fifth-year students, and 4.7 ± 0.35 for the six-year students.

Among medical students, those who hoped to become a psychiatrist had a significantly lower age- and sex-adjusted mean discrimination score (3.6 ± 0.45) and stigma score (1.9 ± 0.28) than students who did not want to become a psychiatrist (4.7 ± 0.19 ; $p < 0.05$ and 2.5 ± 0.12 ; $p < 0.05$). For female medical students, skepticism regarding treatment scores was significantly lower than that of male students ($p < 0.05$), with scores of 0.3 ± 0.06 for women and 0.4 ± 0.04 for men. The following characteristics were not associated with adjusted discrimination score (all $p > 0.1$) for medical students: years of medical training, completion of a class on schizophrenia, BSL training during the psychiatric term, having a family member or close friend with a mental illness, having a family member or close friend with schizophrenia, having been prescribed psychiatric medication and numbers of books read on schizophrenia.

Discussion

The main finding of this cross-sectional study was that psychiatrists have less negative attitudes toward schizophrenia than medical students, physicians, and non-medical workers, which is consistent with the results of previous studies. Among medical students, the underestimation of patients' abilities score was significantly higher in the fourth year than in the third year. Furthermore, those who hoped to become a psychiatrist in the future demonstrated less negative attitudes toward schizophrenia than those who did not share this aspiration. Other factors, such as taking a psychiatry class on schizophrenia or completing BSL training during the psychiatric term, were not associated with negative attitudes toward schizophrenia. Therefore, other modifying factors beyond the hope of becoming a psychiatrist should be explored to improve the attitudes of medical students toward schizophrenia.

Regarding the attitudes toward schizophrenia, the results of comparisons between the five groups — medical students, psychiatrists, psychiatric staff, physicians, and non-medical workers — were broadly consistent with previous findings⁹. The negative attitudes of medical students toward individuals with schizophrenia were similar to those of both physicians and non-medical workers, which is also consistent with the findings of previous studies^{6,21}.

In this study, comparisons of scores for negative attitudes toward schizophrenia suggest that medical

students' attitudes toward schizophrenia are as discriminatory as those of physicians and non-medical workers. Whereas earlier investigations^{12,14)} reported that medical educational curricula on psychiatry improve the attitudes of medical students toward mental illness, in the present study, psychiatric education and practical training were not associated with improved negative attitudes among medical students; rather, the underestimation of patients' abilities scores on schizophrenia was worse in the grades that received psychiatric education. Reasons given for the ineffectiveness of psychiatric education in reducing stigma include the fact that not enough time is spent in psychiatric education to fully understand schizophrenia, and that stigma education is not included in psychiatric education in some countries¹³⁾, including Japan.

Furthermore, according to a previous study¹³⁾, the number of medical students who underestimated schizophrenia patients' abilities increased from 63.2% to 78.1% after psychiatric training. This increase may be due to the effects of a realistic assessment of the consequences of schizophrenia based on psychiatric training for medical students — for example, medical students being shocked when they first see a patient with schizophrenia who is experiencing hallucinations. Meanwhile, a previous study reported that educational programs for medical students in Japan resulted in positive changes in the students' attitudes toward mental illness, specifically, their attitudes toward close social distance to individuals with mental illness²²⁾. Based on these findings — as well as the findings of other studies in which medical students still treated schizophrenia patients with striking stigma throughout psychiatric education and training^{11,13)} — tools for improving medical students' attitudes, including schizophrenia anti-stigma programs, should be established in medical schools.

In contrast, the results of both the present study and those of Hori *et al.*⁹⁾ showed that few psychiatrists underestimate the abilities of patients with schizophrenia. This finding suggests that professional psychiatric skills, knowledge, and experience may be linked to less negative attitudes toward schizophrenia, but further investigation is needed to examine this hypothesis. Specifically, attitudes toward schizophrenia should be compared between medical students undergoing special psychiatric training (similar to the training for psychiatrists) and medical students who undergo the standard medical training program.

The present study's finding that female medical

students had less negative attitudes toward individuals with schizophrenia than their male counterparts supports previous research indicating that women are less stigmatized regarding mental illness than men^{15,23)}. Contrary to some previous findings^{12,15)}, in the current study neither personal experience with mental illness nor having a friend or family member with mental illness influenced medical students' attitudes toward schizophrenia. This result may relate to the hypothesis that high quality and frequency of contact with people with mental illness reduces stigma²⁴⁾. Therefore, continual contact with people with schizophrenia (similar to the level experienced by psychiatric professionals) would reduce stigmatization. In addition, personal experiences may need to include the cooperative pursuit of common goals²⁵⁾.

The current study indicated that whether or not a medical student hoped to become a psychiatrist affected their attitude toward schizophrenia. However, it is possible that students who hoped to become psychiatrists had less negative attitudes toward schizophrenia before they developed this aspiration. The hypothesis that the hope of becoming a psychiatrist influences attitudes toward schizophrenia relates to a factor presented in a 2011 study by Hori *et al.*⁹⁾ which concluded that it was unclear whether psychiatrists overall had less negative attitudes toward schizophrenia before they became psychiatrists. Therefore, tracking changes in attitudes toward schizophrenia displayed by medical students who hope to become psychiatrists could reveal whether schizophrenia anti-stigma education should be introduced. If specialists who hoped to become psychiatrists when they were medical students have more negative attitudes toward schizophrenia, educational methods are unlikely to reduce stigma, thus different methods are needed. In contrast, if specialists other than psychiatrists who decided to become psychiatrists when they were medical students have more negative attitudes toward schizophrenia, educational methods could work to reduce schizophrenia. This approach would support the argument presented in the study by Altindag *et al.*²⁶⁾ that anti-stigma programs for medical students or medical interns should be offered on a regular basis.

A strength of the current study was that it examined the presence of negative attitudes toward schizophrenia among medical workers, including medical students, and focused on factors having an impact on improving medical students' attitudes toward schizophrenia. This study also had several limitations. First, although the response rate of

psychiatrists was high (77%) and was considered to be representative, the relatively small number of registered psychiatrists may have led to type II errors due to the lack of statistical power for some analyses. Second, the binary-scaled format (i.e., “I agree”/“I disagree”) of the 18-item questionnaire leaves no room for “in-between” answers ; therefore, participants’ exact attitudes may not have been captured. Third, the response rates to the questionnaires in this study varied between groups, ranging from 44% to 77%. This difference in response rate may have affected the results. Finally, we only collected data in Fukushima, Japan, so the results may differ from studies based in other regions/countries. Overall, the present study results support the need for larger-scale studies, including other medical schools in Japan and other countries.

In conclusion, with the use of a web-based survey, the study data showed that medical students had almost equally negative attitudes toward schizophrenia as physicians and non-medical workers, while psychiatrists had less negative attitudes toward schizophrenia. Because current medical education, including psychiatric education and practical training, may not be associated with the negative attitudes of medical students, anti-stigma interventions should be introduced during medical school. Hoping to become a psychiatrist was a factor in improving the attitudes of medical students toward schizophrenia. This finding suggests that increasing interest in mental illness may decrease negative attitudes toward schizophrenia among medical students and should be examined in future prospective studies.

Acknowledgments

We are grateful to Dr. Horii Hiroaki for his approval of the Japanese version of the questionnaire. We are also thankful to all participants from Fukushima Medical University.

List of abbreviations

ANOVA : analysis of variance, ANCOVA : analysis of covariance, BSL : bedside learning, FMU : Fukushima Medical University.

Author Contributions : MK and TO conducted study design, literature search, data analysis, data interpretation, and drafting of manuscript. ST participated in the analysis and interpretation of the data. IM and HY participated in the discussion and

corrections of the manuscript. All authors were involved in the critical revision of drafts and approved the final manuscript version.

Funding : This research was supported by the Japan Society for the Promotion of Science (JSPS) KAKENHI under Grant Agreement No. 20K23163.

Competing interests : The authors have no conflicts of interest directly relevant to the content of this article.

Ethics approval : This study was approved by the Fukushima Medical University Ethics Committee (#2190).

Provenance and peer review : Not commissioned ; externally peer-reviewed.

Data availability statement : The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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