

Original article

The Mental Health Status of Japanese High School Students with Autism Spectrum Disorder Tendency

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Compared to elementary and junior high schools, the development of a high school support system for special needs education has been delayed. Among adolescents, autism spectrum disorder (ASD) characteristics can be a risk factor for mental health. This study examined the relationship between degree of ASD tendency and mental health status in high school students. Results show that the higher the ASD tendency, the worse the mental health status. The study demonstrates that mental health status can be estimated using the level of ASD tendency. It was also suggested that the correlation would be observed regardless of the degree of ASD knowledge of the teachers involved. Results also suggest that high schools need special support for students with ASD tendency, regardless of the presence or absence of ASD diagnosis. Since almost none of the high school teachers in charge have adequate knowledge to recognize and support students with high ASD tendency, it is necessary for them to undergo training according to their degree of ASD knowledge and have a support system.

Key words: autism spectrum, mental health, high school

Introduction

On April 1, 2007, the amendment of a portion of the School Education Act (the Revised School Education Act) was enforced, and special needs education (SNE) was implemented in earnest. In addition to the support provided in regular elementary and junior high school classes, targeted students receive support through special needs classes and special needs services in resource rooms. According to a survey conducted by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), 6.5% of elementary and junior high students in regular classes, and 2.1% of high school students (full-time course: 1.6%; part-time course:

14.1%; correspondence course: 15.7%) experience significant difficulties in various aspects of learning and behavior (MEXT, 2012). These difficulties exist despite the fact that these students do not experience delays in intellectual development (MEXT, 2012).

Still, the Revised School Education Act does not provide a special curriculum for special needs classes in high schools. Additionally, the High School Standards Act (November 6, 1961 law, Number 188) makes no provision that places teachers in high school special needs classes. Consequently, establishing special needs classes in high schools is difficult. In 2018, a system of special needs services was implemented in high school resource rooms. Thus, teachers in regular high school classes, teachers in resource rooms, and SNE coordinators were required to acquire knowledge and support skills related to

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developmental disorders. However, the establishment of an SNE support system for high schools has been delayed compared that of elementary and junior high schools. Notably, this delay is more pronounced in private high schools (MEXT, 2018).

This study focused on autism spectrum disorder (ASD), a developmental disorder characterized by restrictive, repetitive behavior, and social communication challenges. Globally the prevalence of ASD increased by 78% between 2002 and 2012 (Brock, Huber, Barter, Juarez, & Warren, 2014). In Japan, more consultations were conducted with students (including those at tertiary institutions) with ASD than those with any other developmental disorder (Satou & Tokunaga, 2006).

Notably, when students with ASD become aware of their differences during adolescence, their symptoms of depression may intensify (Gillberg, 1984; Komoto, Usui, & Hirata, 1984). Furthermore, students with ASD who attend mainstream high schools reported higher levels of anxiety and reactive anger than their peers (Ambler, Eidels, & Gregory, 2015). Weiss, Isaacs, Diepstra, Wilton, Brown, McGarry, and Lunsy (2018) reported that young adults with ASD were more likely to have at least one psychiatric diagnosis compared to their peers with other developmental disabilities. Therefore, planning for mental health care of transition-age adults with ASD should be a priority for health policies. However, few studies have investigated what characteristics of ASD are associated with mental health problems in high school students with ASD. Determining these characteristics would be useful not only for students with ASD tendency but also for teachers and other supporters. In light of this need, this study sought to provide insight into the current state of high school students' ASD tendency and mental health. Moreover, it is necessary to consider a high level of ASD knowledge among teachers. Properly recognizing whether a student with high ASD tendency (AQ 33 or higher) is enrolled in

a class, would depend on the extent of a teachers' knowledge of ASD. A highly knowledgeable teacher with an LS-ASD score of 0.700 or higher is required (Sakai, T., Kanazawa, Shitara, & Sakano, 2011) to recognize and provide appropriate support and care for students with a high ASD tendency. Therefore, we will measure teachers' knowledge of ASD because we believe that it could be a factor affecting students' mental health.

In this article, we have described having characteristics of ASD as having ASD tendency.

Methods

Procedure and Sample Characteristics

Letters for study description were mailed to nine public and three private high schools in the Chubu region; co-educational schools with regular courses and the academic level considered were restricted to that of the average high school. Subsequently, questionnaires were sent to high schools that agreed to allow their teachers and students to participate. The study took place between July and August 2015. To avoid sampling bias in favor of teachers who were aware which of their students had ASD, and teachers struggling to manage in such classes, only schools where all teachers and students could cooperate were targeted. A request was made that the implementation manual was followed, to ensure that surveys were conducted in the same manner across all schools.

The student surveys were conducted during class by the teacher in charge, and the teacher surveys were conducted by the head teacher in the staff room. Two schools met the complete criteria and fully cooperated (School A: 689 students/39 teachers; School B: 1,773 students/67 teachers). The data of the students and teachers who completed all the items of all the surveys were analyzed. All subjects provided informed consent for

inclusion before their participation. The study was conducted in accordance with the protocol approved by the Ethics Committee of the University of Tsukuba

(Tsuku24-120, Japan).

Measures for Student Analysis

1. Age
2. Gender
3. Class
4. Autism Spectrum Quotient (AQ; Wakabayashi, Tojo, Baron-Cohen, & Wheelwright, 2004)
The AQ comprises 50 items: 10 in each of the five areas that characterize ASD, namely: social skills, switching of attention, local details, communication, and imagination. Each item is assessed on a two-point scale indicating *yes* or *no*. Cronbach's α coefficient of the entire scale was 0.81. A cutoff point of 33 points was considered valid. Students with a score of 33 points or greater have a high tendency for ASD and are deemed to have ASD.
5. Profile of Mood States - Brief Form, Japanese version (POMS; Yokoyama, 2005) The POMS measures mood states and measures mood disturbance according to six subscales: depression–dejection, tension–anxiety, anger–hostility, vitality, fatigue, and confusion. The 30 items were assessed on a five-point scale ranging from *not at all* to *very frequent*. The raw scores were influenced by sex and age. Thus, the T-score was calculated and used for analysis. If the T-score was less than 60 points, the mood was considered normal. If the score was between 60 and 75 points, an evaluation was made regarding the need to consult a physician – taking other factors into consideration, as well. Ultimately, the higher the score, the worse the mental health.

Measures for Teacher Analysis

1. The class they headed
2. Literacy Scale of Characteristic of Autistic Spectrum Disorder (LS-ASD; Sakai, Shitara, Wakita, Anazawa, Sakano, & Sonoyama, 2014)
The LS-ASD was developed by combining items from the *DSM-IV-TR* (American Psychiatric

Association, 2000), the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (World Health Organization, 1992), and *Definition and Criterion of Educational Countermeasures* (MEXT, 2002). This scale also measures knowledge levels regarding ASD characteristics and is framed by item response theory. The response options are “yes,” “no,” and “*don't know*.” Twenty-two items expected to provide sufficient test information for targeting general high school teachers were selected. The knowledge level calculated was approximately -2.000 to 2.000 , with a mean between 0.000 and 1.000 meaning one standard deviation. The higher the characteristic value, the higher the knowledge level.

Data Analysis

Analysis was conducted using SPSS for Windows, Version 22.

Results

Students

The data were examined separately to confirm differences between the schools because two private high schools (Schools A and B) responded that they could cooperate with the survey. Of the 689 and 1,773 students of School A and School B, respectively, 1,706 completed all the items in the survey (School A=486 persons: male=245, female=241; School B=1220: male=638, female=582). Of these students, 43 scored 33 or more on the AQ (School A=14: male=7, female=7; School B=29: male=12, female=17).

The AQ scores, descriptive statistics of the POMS T-score, and the results of the *t* test are presented in Table 1. In both schools, no statistically significant differences were observed for the total scores of the AQ subscales and the POMS. However, students at School A scored significantly higher on the social skills component of the AQ subscale, and the anger–hostility and fatigue subscales of the POMS. School

Table 1 Descriptive statistics of students of schools A and B

	<i>n</i> =486 (Male=245, Female=241)				<i>n</i> =1220 (Male=638, Female=582)				<i>t value</i>	<i>d</i>
	<i>Min</i>	<i>Max</i>	<i>Ave</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Ave</i>	<i>SD</i>		
Age	15	18	16.14	1.04	15	19	16.12	0.99	<i>n.s.</i>	0.02
AQ total score	7	39	21.60	5.65	5	40	21.33	5.65	<i>n.s.</i>	0.04
Social skill	0	10	4.43	2.35	0	10	4.09	2.35	2.72**	0.12
Attention switching	0	9	5.13	1.82	0	10	5.14	1.76	<i>n.s.</i>	0.00
Local details	0	10	4.56	1.93	0	10	4.77	2.01	-1.97*	0.09
Communication	0	9	4.10	2.14	0	10	3.98	2.09	<i>n.s.</i>	0.05
Imagination	0	9	3.39	1.73	0	9	3.36	1.70	<i>n.s.</i>	0.01
Total Mood Disturbance	-11	92	33.34	19.34	-16	99	33.50	19.07	<i>n.s.</i>	0.00
Tension-Anxiety	33	83	52.55	11.12	33	83	54.27	11.32	-2.84**	0.13
Depression-Dejection	39	88	55.35	11.96	39	88	56.77	12.09	-2.21*	0.10
Anger-Hostility	37	87	55.30	13.27	37	87	53.33	11.97	2.85**	0.13
Vigor	27	77	46.70	10.78	27	77	46.22	10.61	<i>n.s.</i>	0.04
Fatigue	35	78	59.12	10.07	35	78	56.95	10.56	3.88***	0.17
Confusion	32	88	57.92	11.37	33	88	59.90	11.43	-3.22**	0.14

***: $p < .001$, **: $p < .01$, *: $p < .05$

Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor, Fatigue, Confusion are Tscore.

Table 2 The relationship between AQ and POMS score of students schools A and B

	AQ total score	Social skill	Attention switching	Local details	Communication	Imagination
Total Mood Disturbance						
School A <i>n</i> =486	.41**	.27**	.33**	.08	.37**	.08
School B <i>n</i> =1220	.37**	.27**	.34**	.02	.32**	.10**

** : $p < .01$

B students scored significantly higher on local details of the AQ and for tension–anxiety, depression–dejection, and confusion in the POMS.

Next, Pearson’s correlation coefficient was calculated for the AQ subscales and state of mental health (Table 2).

Regarding the relationship between the total mood disturbance indicated by the POMS (which comprises six subscales) and the AQ score, a significant positive correlation was observed for the total score of the AQ (School A: $r = .41$, $p < .01$; School B: $r = .37$, $p < .01$), social skills (School A: $r = .27$, $p < .01$; School B: $r = .27$, $p < .01$), attention switching (School A: $r = .33$, $p < .01$; School B: $r = .34$, $p < .01$), and communication

(School A: $r = .37$, $p < .01$; School B: $r = .32$, $p < .01$). A significant positive correlation was observed for imagination ($r = .10$, $p < .01$) only in School B. In both schools, no significant correlation was observed for local details.

A multiple linear regression (stepwise method) was calculated for each school to predict the state of students’ mental health, based on their AQ subscales (Table 3). In both schools, the model fit well when communication, attention switching, local details, and social skills were the explanatory variables. Significant regression equations were observed: $F(4, 481) = 29.77$, $p < .000$ with an R^2 of .20, and $F(4, 1215) = 61.48$, $p < .000$ with an R^2 of .17. Students’

Table 3 Summary of regression analysis for variables predicting mental health of students

	Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p value</i>	<i>VIF</i>
	Communication	2.28	0.45	0.25	5.07	< 0.001	1.48
School A <i>n</i> =486	Attention switching	2.14	0.48	0.20	4.48	< 0.001	1.21
	Local details	1.35	0.42	0.14	3.23	< 0.001	1.05
	Social skill	0.85	0.40	0.10	2.01	0.04	1.44
School B <i>n</i> =1220	Attention switching	2.44	0.32	0.23	7.71	< 0.001	1.24
	Communication	1.59	0.28	0.17	5.59	< 0.001	1.42
	Social skill	1.07	0.25	0.14	4.30	< 0.001	1.39
	Local details	0.73	0.26	0.08	2.87	0.00	1.06

School A $R^2=0.20$ School B $R^2=0.17$ **Table 4** Descriptive statistics for teachers of schools A and B

	School A (<i>n</i> =36)				School B (<i>n</i> =67)				<i>t value</i>	<i>d</i>
	<i>Min</i>	<i>Max</i>	<i>Ave</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Ave</i>	<i>SD</i>		
ASD knowledge	-1.569	.810	-.257	.58	-1.866	1.413	.108	.73	-2.76**	0.46
Teacher who had high degree of knowledge		1 (2.8%)				13 (19.5%)				
Class teacher who had high degree of knowledge		1 (2.8%)				5 (7.5%)				

** : $p < .01$

Class Teacher/Teacher who had high degree of knowledge

: The number of teachers and rate who scored more than 0.700 on LS-ASD

predicted state of mental health was equal to 3.13 (Constant) + 2.28 (Communication) + 2.14 (Attention switching) + 1.35 (Local details) + 0.85 (Social skill) and 6.80 (Constant) + 2.44 (Attention switching) + 1.59 (Communication) + 1.07 (Social skill) + 0.73 (Local details).

Teachers

Of the 39 and 67 teachers at School A and School B, respectively, 103 (School A=36 persons, School B=67) completed all items on the survey. The ASD knowledge values and t-test results are presented in Table 4. School B teachers scored higher for ASD knowledge, and the effect size was approximately

moderate. The level of knowledge sufficient to identify students with high ASD tendencies in a classroom is approximately 0.7 or higher on LS-ASD (Sakai et al., 2011). Therefore, the number of teachers with such knowledge level was indicated (Table 4). There was one teacher (2.8%) in School A and 13 (19.5%) in School B with a knowledge level more than 0.7. Of these, one (2.8%) in School A and five (7.5%) in School B were classroom teachers.

Discussion

This study primarily aimed to examine high school students' ASD tendency and mental health status,

and to explore the relationship between these factors and teachers' ASD knowledge.

Statistical differences were observed for some subscales between the students of Schools A and B, although no statistical differences were observed for the total scores of the AQ and POMS at both institutions. School A students scored significantly higher on the social skills component of the AQ subscale, as well as anger–hostility and fatigue in the POMS. School B students scored significantly higher on the local details component of the AQ, as well as tension–anxiety, depression–dejection, and confusion in the POMS. However, all indicators for which a significant difference was observed had an effect size d of less than 0.2. Thus, there may have been substantial overlap for numerical values of 85.7% or more (Cohen, 1969). Although statistically significant, the effect size is small and a large portion of the data substantially overlap. We believe that the significant differences are owed to the large sample size and the detection of minor differences. However, we do not believe that a substantial difference can be determined from the effect size.

Consequently, a possible conclusion is that the mental health conditions and ASD tendency of students in both schools were similar. The percentage of students with an AQ score of 33 points or higher was 2.88% and 2.38% in Schools A and B, respectively. Of the 1,706 students investigated in this study, 43 (2.52%) scored 33 points or higher. Wakabayashi et al. (2004) reported that 3.8% of male and 1.8% of female university students with an AQ score of 33 points. These results indicate that students at Schools A and B do not have especially high ASD tendencies compared to those other schools. Wakabayashi et al. (2004) further revealed that university students had higher scores than adults. Although it might be logically invalid that high school students have higher scores than university students, the percentage of students scoring 33 points or higher in this study needs to be interpreted keenly. Future research should

investigate whether the tendency of increasing AQ scores is more significant in high school students than in university ones. The study observed a statistically significant positive correlation and a standardized partial regression coefficient (Tables 2 and 3) between total mood disturbance and almost all the AQ scales. This should be deemed a valid basis for extending support to students with ASD tendency, with or without official diagnosis, as soon as possible. The types and extent of characteristics possessed by students with high ASD tendency are of critical consideration, and students who struggle with communication and attention switching should receive support and care as soon as possible. Such assistance may, for example, help such students comply with teachers' instructions, show teachers how to better deliver their instructions and present information, or provide instructors tips for improved classroom structure. However, our results show the possibility that only the POMS score can be inferred from the AQ score. The causal relationship needs to be investigated by longitudinal studies.

Noncompliance, or the inability to follow instructions, is the most common behavioral concern observed in students with ASD (Charlop, Parrish, Fenton, & Cataldo, 1987; Henry, 1987). The literature indicates that when the level of noncompliance is under 40%, students have difficulties with schoolwork (Rhode, Jensen, & Reavis, 2010). Although these studies focused on students, an inference may be that noncompliance, which interferes with academic performance, becomes more serious as students age.

Students with communication and attention-switching problems are more likely to be noncompliant. In high school, the mental health of students who experience difficulties with schoolwork is likely negatively impacted because academic performance is assessed objectively by ranks and scores. School-related stress is also an indicator of the mental health of high school students, as academics has been reported to be a component of

school-related stress (Ishida, Imura, & Watanabe, 2017). Furthermore, because of the complexity of interpersonal relationships in adolescence, having trouble communicating with other students is also likely to be associated with poor mental health. This contextual information apparently reflects the result of the relatively higher correlation and relationships among communication, attention switching, and mental health.

Sakai et al. (2011) revealed that various public school teachers' degree of knowledge in various public high schools (average: 0.304; SD: 0.909) exceeded that which was observed in this study. In other words, the value of knowledge of most teachers in the two participant schools was low. Furthermore, in School A, teachers had both a low level of knowledge and a relatively small discrepancy (standard deviation), which may have delayed the introduction of SNE. Delays in SNE can logically delay appropriate support and care for students with ASD tendency, thereby influencing students' mental health.

Sakai et al. (2011) observed that teachers who demonstrated knowledge below the value equivalent of 0.7 in the LS-ASD (Sakai et al., 2014) did not realize despite the presence of one or more students whose AQ score was 33 or greater in the class. Thus, the high schools analyzed in this study may not have provided appropriate support and care to students with ASD tendency because almost all teachers did not recognize the students with high ASD tendency in their class. Although there was a significant difference in the knowledge of teachers at both schools, the relationship between ASD tendency and mental health status among students at both schools was similar. The reason for this result might be that the knowledge of most teachers was insufficient to identify students with ASD tendency.

In closing, further research may wish to fill the gaps resulting from the current study's limitations. Since this study was conducted only in an average

academic level and high schools with ordinary courses, it is necessary to conduct research in high schools with different academic abilities and courses. It would also be necessary to investigate the medical history of students and their circumstances, especially medical history related to mental health. Moreover, a study of the knowledge and skills of teachers should be conducted through teacher trainings suitable for each school and a longitudinal examination of how much training affects teachers and students with ASD tendency. This study could promote SNE in regular classes in high schools because effectivity has been demonstrated in studies on special needs schools (Jones & Chronis-Tuscano, 2008; Probst & Leppert, 2008).

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日本の高校における自閉症スペクトラム傾向のある生徒の精神的健康状態

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高等学校における特別支援教育の支援体制の整備は、小学校および中学校に比べて遅れている。一方で、高校生を含む思春期においては、自閉スペクトラム症（ASD）の特徴をもつことは、精神的健康状態のリスクとなり得る。そのため、高校生におけるASD傾向の程度と精神的健康状態の関連を質問紙調査によって検討した。ASD傾向が高いと、精神的健康状態が悪く、ASD傾向の高さにより、精神的健康状態を推定可能であった。また、学校間で教師のASDに関する知識の程度に差がある場合においても、生徒のASD傾向と精神的健康状態との関係は同様であった。これらの結果から、高等学校においては、ASDの診断の有無に関わらず、ASD傾向のある生徒への特別な支援や配慮の必要性が示された。また、高いASD傾向をもつ生徒を担当している教師であっても、ASDについて十分な知識をもつ教師は少なかったため、知識の程度に応じた研修を受け、支援体制を整える必要性があることが示唆された。

キー・ワード：自閉症スペクトラム 精神的健康 高等学校

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