

Original Article

Relationship between Japanese Junior High School Students' Emotional Intelligence and Stress

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Abstract - This study examined Japanese junior high school students' levels of emotional intelligence and stress, sex differences in the 2 items, and the relationship between them using the Emotional Intelligence Scale for Children (EQS_C) and Public Health Research Foundation Type Stress Inventory for Junior High School Students (PSI). We surveyed 206 first- to third-grade students from 2 Japanese junior high schools in November 2018 and June 2019. The analysis population consisted of 164 students. On comparing male students' and female students' stress scores, female students' score for the superior subscale <stress responses> was higher. On comparing male and female students' emotional intelligence scores, there were no sex differences in any domain, but female students' score for the corresponding factor [empathy] was higher. There was a significant negative correlation between emotional intelligence and stress. On comparing stress scores between the high and low score groups for each domain of emotional intelligence, the low score group's score for <stress responses> was higher. Based on this, stress may be reduced by promoting emotional intelligence and improving stress-coping skills.

Keywords - Emotional intelligence, EQS, Junior high school students, Stress, PSI.

1. Introduction

Junior high school students who enter adolescence as the developmental stage between childhood and adulthood¹⁾ experience marked physiological, psychological, and social changes²⁾³⁾. It has been clarified that 10 to 20% of those at this stage are distressed by psychological problems and that mental disorders, such as depressive mood, anxiety disorder, and obsessive-compulsive disorder, and some form of maladjustment in interpersonal relationships or emotional/behavioral aspects are also prevalent among them⁴⁾⁵⁾. The environment surrounding children is stressful. According to the Survey on School-age Children's Problematic Behaviors and Other Problems Related to Student Guidance in FY2018 reported by the Ministry of Education, Culture, Sports, Science, and Technology, the number of violent acts committed by junior high school students is nearly 30,000⁶⁾. Various factors, including unfavorable interpersonal relationships in households or schools, poor academic performance, and the dissemination of the Internet, are associated with stress. Related problems, such as violent acts, bullying, and truancy, are still serious, and removing stressors is important. Still, it is also crucial to help these students understand and learn how to effectively manage stressful situations to prevent mental disorders and psychological maladjustment due to various stressors surrounding them.

Emotional intelligence, which was first defined by Mayer and Salovey⁷⁾⁸⁾, refers to the ability to monitor one's

own and others' emotions and to adopt appropriate behaviors while controlling one's emotions. It is thought indispensable for us to maintain our social lives, where we are expected to understand and appropriately manage our emotional conditions. Understanding and appropriately controlling one's emotional condition is also key to favorable interpersonal relationships. Acquiring emotional intelligence as a social skill different from academic skills is essential for junior high school students, who need to make themselves mentally independent from their parents, build favorable relationships with others, and form the foundation for becoming a member of society during this period⁹⁾. Emotional intelligence is a set of intrapersonal skills, including communication, emotional control, and emotion recognition skills, to accurately understand oneself and to demonstrate one's emotional intelligence as a basis for relationship-building and indispensable for stress management. Stress may increase if anger and other negative emotions are not appropriately controlled. Increased stress not only lead to a higher prevalence or deterioration of physical diseases, such as allergic diseases, cardiovascular diseases, diabetes, and cancer, but it is also a mental problem, which raises concerns in modern society, and has also been reported to be associated with truancy, social withdrawal, depression, and suicide⁴⁾⁵⁾. Based on these findings, growing to become able to manage stress on one's own is very important as a method of self-care for mental and physical health maintenance/promotion.



Various studies have examined emotional intelligence and stress, mostly involving adults. Thus, the number of those examining elementary and junior high school students' emotional intelligence and stress has been limited. Additionally, very few studies have clarified the relationship between emotional intelligence and stress. As there will be an increased need for educational approaches to support children/students in this area, it may be meaningful to address it. The purpose of the present study was to measure stress in junior high school students and their emotional intelligence using a stress inventory and emotional intelligence scale, respectively, and to clarify the relationship between stress and emotional intelligence in these students as a basis for discussing effective educational support for them.

2. Methods

2.1. Study period

November 2018 and June 2019.

2.2. Participants

Approximately 200 first- to third-grade students of 2 junior high schools consented to participate in the study.

2.3. Procedure

We requested the Section of School Education, Board of Education of a city to recruit cooperating junior high schools publicly and obtained cooperation from 2. We provided the principals and class teachers of these schools with written and oral explanations of the study objective and methods to obtain their approval after confirming the details of the study. We previously consulted with the teacher in charge of each class to avoid interfering with class sessions or events. We asked them to distribute 2 questionnaires to the students while ensuring they had plenty of time to appropriately and accurately respond to the questionnaires. Before they filled out the questionnaires, we explained that the study examined their daily behaviors and thoughts. As psychological considerations, we prevented the students from being forced to respond by the teacher in charge while providing them with a detailed preliminary explanation. We also explained that follow-up support from a teacher specializing in psychology would be available for those seeking the results and detailed explanations after the questionnaires and those with anxiety or worries. To prevent the scattering or loss of responses, we asked the students to voluntarily drop their responses immediately after answering in a collection box that was not under the supervision of the researcher or teacher in charge and regarded those who submitted their responses as consenting to participate in the study.

2.4. Data collection

Stress responses and stressors were measured using the Public Health Research Foundation Type Stress Inventory for Junior High School Students (PSI). Emotional intelligence was evaluated based on the Emotional Intelligence Scale for Children (EQS_C).

2.4.1. PSI

PSI is a stress check test developed by Okayasu et al.¹⁰⁾ to periodically examine children's mental health at consultation institutions and schools. Comprising 3 superior subscales, <stress responses>, <stressors>, and <social support>, to measure children's/students' current mental health status, this scale allows for objectively and conveniently assessing children's current mental health conditions. The PSI for Junior High School Students consists of 44 statements, and the time required to complete them is approximately 10 minutes.

<Stress responses> represent poor mental health conditions and measure stress states' physical/psychological responses. It consists of 4 subordinate subscales: <physical responses>, <depression/anxiety>, <irritability/anger>, and <helplessness>. Each statement is rated on a 4-point scale from <Very untrue of me (0)> to <Very true of me (3)>, and higher scores indicate stronger stress responses. The total score ranges from 0 to 48.

<Stressors> indicates the causes of stress and measures the frequency of experiencing events that are common in daily school life and often regarded as aversive. It consists of 3 subordinate subscales: <relationships with teachers>, <relationships with friends>, and <academic performance>. Each statement is rated on a 4-point scale from <Never (0)> to <Often (3)>, and higher scores indicate higher levels of stress. The total score ranges from 0 to 36.

<Social support> examines the availability of support from others when one is in a state of stress. Thus, it measures perceived support. It consists of 4 subordinate subscales: <father>, <mother>, <teacher in charge>, and <friends>. In the present study, this subscale was not used, as the principals of the cooperating schools and the Board of Education requested consideration for students without parents.

2.4.2. EQS_C

Emotional intelligence is defined as "a set of skills hypothesized to contribute to the accurate appraisal and expression of emotion in oneself and others, the effective regulation of emotion in oneself and others, and the use of feelings to motivate, plan, and achieve in one's life"⁷⁾¹¹⁾. EQS_C¹²⁾ consists of 38 statements, which are rated on a 5-point scale from <Very untrue of me (0)> to <Very true of me (4)>, and higher scores indicate higher levels of emotional intelligence. The time required to complete is approximately 10 minutes. The scale addresses 3 domains: intrapersonal intelligence (intrapersonal EQ), interpersonal intelligence (interpersonal EQ), and situational intelligence (situational EQ). Each domain consists of the following corresponding factors, intrapersonal: [self-awareness], [self-motivation], and [self-control]; interpersonal: [empathy], [altruism], and [interpersonal relationships]; situational:

[situational awareness], [leadership], and [flexibility]. The total score ranges from 0 to 152, and higher scores indicate higher levels of emotional intelligence. The scale was used in the present study with the developer's permission.

2.5. Analysis

Data were analyzed after encoding to prevent the identification of individuals. Scores from the 2 scales were calculated, following the EQS Manual¹³⁾ and PSI Manual¹⁴⁾. The relationships between the PSI subscales and the 3 domains of EQS ([intrapersonal EQ],[interpersonal EQ], and [situational EQ]) were analyzed using the Pearson correlation coefficient. Scores were also calculated for each sex to clarify sex differences.

Subsequently, the students were divided into 2 groups with high and low scores for each domain of EQS. The unpaired t-test was conducted to examine whether the PSI scores varied according to the level of emotional intelligence. The grouping based on emotional intelligence scores was performed as follows: The median for each EQS domain was calculated (intrapersonal EQ = 34 points, interpersonal EQ = 32 points, situational EQ = 26 points), and after conducting the Shapiro-Wilk test to confirm normality, students with scores higher (intrapersonal EQ: 35 or higher, interpersonal EQ: 33 or higher, and situational EQ: 27 or higher) and lower (33 or lower, 31 or lower, and 25 or lower) than these medians were classified as high and low score groups, respectively. As a result, 7 with an intrapersonal EQ score of 34, 6 with an interpersonal EQ score of 32, and 6 with a situational EQ of 26 were excluded. To confirm the validity of this grouping, the mean score for each domain was compared between the groups. An unpaired t-test revealed that the high-score group's score was higher in all domains ($p < 0.000$), confirming the sufficient validity of dividing students into 2 groups based on their scores for each domain of emotional intelligence.

SPSS Statistics 21.0 for Windows was used for statistical processing, with the significance level set at $p < 0.05$.

2.6. Ethical Considerations

As the participants were junior high school students as minors, we previously requested the Section of School Education, Board of Education of a city to deliberate on the questionnaires used and the participation of these students in the present study to ensure the absence of psychological inversion or negative effects, and asked the principals of the cooperating schools to confirm this. To obtain the parents' consent, we also asked the principals to distribute explanatory documents to them or perform the opt-out procedure when they visited the school on a parents' observation day or other occasions.

In addition to the study objective, methods, and procedure to collect responses, the following considerations were explained to the participants: Participation in the study should be based on free will; the questionnaires were anonymous to protect the participants' privacy; to prevent the identification of individuals, such as the names of the participants and schools, their data would be statistically, collectively processed; there might be no ethical problems leading to the identification of individuals, as only statistical results would be presented when reporting the results of the study, such as submitting research papers; there would be no influence on the junior high school lives or academic records of those who did participate in the study; collected questionnaire responses would not be viewed by third persons, such as teachers, friends, or parents; and there would be no disadvantageous treatment for those who did not cooperate with the study. Furthermore, a contact address for inquiries about the study was specified while guaranteeing the participants' right to obtain information about it and explaining that the researchers would promptly answer any questions.

The Research Ethics Committee approved the study of the institution the researcher belongs to (approval number: 269).

3. Results

The questionnaires were distributed to 206 students, and responses were obtained from 185 (response rate: 89.8%). Excluding 21 with no answer or missing data, 164 were included for analysis (valid response rate: 88.6%). The mean age was 13.45. The numbers of males and females were 60 (36.6%) and 102 (62.2%), respectively, with 2 (1.2%) not clarifying their sex. There were 53 first-, 58 second-, and 53 third-grade students. Considering that the developmental stage does not markedly vary according to the school year, we did not compare students in different grades but collectively analyzed them.

3.1. Sex differences in the PSI scores (Table 1)

Table 1 shows the collected stress responses and stressors. The unpaired t-test for each subscale to examine sex differences among the 162 (60 males and 102 females) students, excluding 2 who did not clarify their sexes, revealed significant differences in the scores for <stress responses> ($t(160)=2.59$, $p < 0.05$). Specifically, among its subordinate subscales, sex differences were observed in <physical responses> ($t(160)=3.03$, $p < 0.01$), <depression/anxiety> ($t(160)=3.05$, $p < 0.01$), and <irritability/anger> ($t(160)=2.06$, $p < 0.05$).

3.2. Sex differences in the EQS_C scores (Table 2)

The unpaired t-test to compare males' and females' scores for each EQS_C domain and its corresponding factors did not reveal significant sex differences in any domain.

Table 1. Mean PSI scores by gender

		Total (n=164)		Male (n=60)		Female (n=102)		P-value	
		Mean	(SD)	Mean	(SD)	Mean	(SD)		
Stress responses	Physical responses	3.08	2.80	2.27	2.56	3.62	2.80	0.003	**
	Depression/Anxiety	1.90	2.62	1.12	2.18	2.39	2.74	0.003	**
	Irritability/Anger	2.35	2.85	1.78	2.65	2.74	2.91	0.041	*
	Helplessness	2.87	2.48	2.78	2.31	2.95	2.57	0.681	
Stressors	Relationships with Teachers	1.61	2.13	1.70	2.04	1.59	2.18	0.750	
	Relationships with Friends	1.51	2.19	1.73	2.39	1.38	2.07	0.331	
	Academic performance	4.79	3.02	4.33	2.92	5.07	3.01	0.135	
	Stress responses	10.35	8.80	7.95	7.62	11.50	8.75	0.011	*
	Stressors	7.91	5.39	7.77	5.64	8.04	5.25	0.759	

unpaired Student's t test, *: P < 0.05 **: P < 0.01

Table 2. Comparison of Emotional Intelligence Scale between male and female students.

		Total (n=164)		Male (n=60)		Female (n=102)		P-value	
		Mean	(SD)	Mean	(SD)	Mean	(SD)		
Intrapersonal		32.77	(9.50)	33.97	(9.62)	31.92	(9.39)	0.190	
	Self-awareness	7.76	(2.84)	8.28	(2.70)	7.39	(2.88)	0.055	
	Self-motivation	8.54	(2.83)	8.78	(2.83)	8.34	(2.82)	0.344	
	Self-control	16.48	(4.76)	16.90	(4.82)	16.19	(4.74)	0.363	
Interpersonal		31.26	(9.49)	30.52	(10.12)	31.65	(9.13)	0.470	
	Empathy	8.99	(2.69)	8.37	(2.86)	9.36	(2.53)	0.023	*
	Altruism	9.07	(2.58)	8.58	(2.71)	9.37	(2.47)	0.063	
	Interpersonal relationship	13.20	(5.12)	13.57	(5.42)	12.91	(4.90)	0.435	
Situational		27.20	(10.39)	28.07	(11.23)	26.59	(9.84)	0.387	
	Awareness	14.48	(4.97)	14.92	(5.31)	14.16	(4.74)	0.352	
	Leadership	5.20	(3.29)	5.42	(3.52)	5.05	(3.15)	0.498	
	Flexibility	7.52	(2.94)	7.73	(3.08)	7.38	(2.86)	0.469	

unpaired Student's t test, *: p < 0.05

Still, there were such differences in [empathy] as a corresponding factor (t(160)=2.29, p<0.05). Among the subordinate factors, there were also sex differences in [optimism] (t(160)=2.06, p<0.05). There were no sex differences in the other items.

3.3. Relationship between emotional intelligence and stress (Table 3)

On calculating the correlation coefficients between the EQS_C and PSI and scores to clarify the relationship between emotional intelligence and stress, there were significant negative correlations between <stress responses> and [intrapersonal EQ] (r=-0.37, p<0.01), between <stress responses> and [interpersonal EQ] (r=-.24, p<0.01), and between <stress responses> and [interpersonal EQ] (r=-0.33, p<0.01). There was no significant correlation between <stressors> and any EQS_C domain.

3.4. Comparison between the high and low EQS_C score groups (Table 4)

The unpaired t-test to compare the PSI scores between 2 groups of students based on their scores for each EQS_C domain revealed significant differences between the high and low [intrapersonal EQ] score groups in all subordinate subscales of <stress responses> (p<0.01). There were significant differences between the high and low [interpersonal EQ] score groups in all subordinate subscales, except for <physical responses>, and between the high and low [situational EQ] score groups in all subordinate subscales, except for <physical responses> and <irritability/anger >. There were no significant differences between the 2 groups in any subordinate subscales of <stressors> (Table4).

4. Discussion

4.1. Sex differences in the PSI scores

According to some previous studies, female children's stress responses are significantly stronger than those of males¹⁵⁾, as stress sensitivity is promoted in the former

Table 3. Correlations between PSI scores and EQS_C domain scores

		Intrapersonal	Interpersonal	Situational
Stress responses		-.367**	-.239**	-.326**
	Physical responses	-.231**	-.130	-.189*
	Depression/Anxiety	-.257**	-.188*	-.269**
	Irritability/Anger	-.276**	-.136	-.211**
	Helplessness	-.427**	-3.22**	-3.76**
Stressors		-.113	-.043	-.079
	Relationships with Teachers	-.035	-.006	.021
	Relationships with Friends	-.098	-.069	-.104
	Academic performance	-.105	-.030	-.080

Pearson correlation coefficient, *: $p < 0.05$, **: $p < 0.01$

Table 4. Mean PSI in the groups with high and low scores in each domain of ECS_C

	Intrapersonal					Interpersonal					Situational				
	High (n=78)		Low (n=79)		P-value	High (n=81)		Low (n=77)		P-value	High (n=81)		Low (n=78)		P-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Stress responses	7.27	7.06	13.35	9.31	0.000*	8.51	8.37	12.25	9.02	0.011*	7.85	7.39	12.60	9.54	0.001**
Physical responses	2.49	2.51	3.68	2.80	0.000*	2.86	2.80	3.29	2.72	0.310	2.62	2.56	3.44	2.87	0.061
Depression/Anxiety	1.14	2.00	2.71	2.90	0.001*	1.41	2.27	2.44	2.90	0.011*	1.15	1.97	2.60	2.96	0.000**
Irritability/Anger	1.64	2.44	3.10	3.05	0.000*	1.94	2.75	2.81	2.95	0.049*	1.93	2.71	2.79	2.99	0.058
Helplessness	2.00	2.13	3.73	2.57	0.000*	2.17	2.37	3.71	2.44	0.000*	2.16	2.25	3.64	2.54	0.000**
Stressors	7.47	4.97	8.27	5.84	0.365	7.42	4.86	8.51	5.93	0.255	7.84	5.28	7.68	5.43	0.852
Relationships with Teachers	1.68	2.13	1.53	2.17	0.670	1.49	1.94	1.71	2.38	0.413	1.73	2.15	1.46	2.09	0.433
Relationships with Friends	1.32	1.79	1.71	2.56	0.276	1.26	1.69	1.83	2.64	0.078	1.31	2.03	1.59	2.31	0.419
Academic performance	4.47	3.18	5.03	2.89	0.260	4.67	3.25	4.96	2.80	0.563	4.80	3.11	4.63	2.90	0.717

Unpaired Student's t-tests. *: $P < 0.05$, **: $P < 0.01$.

around adolescence as the period of maturity¹⁶). Similarly, in the present study, female students' stress response scores were higher than those of males. Specifically, their scores for the subordinate subscales <physical responses>, <depression/anxiety>, and <irritability/anger> were higher. In adolescents, who are developmentally unskilled to verbalize their psychological stress, such stress is often manifested as physical responses, represented by abdominal pain, headaches, and sleep disorder, and various psychosocial factors, rather than physiological factors, are inducers in many cases¹⁷). Furthermore, adolescents are thought to suffer from strong self-conflicts and be squeezed between ideals and clinical reality, which causes anxiety and feelings of incompetence, leading to the development of <depression/anxiety>. The depressive mood during adolescence is observed in approximately 10%-25% of all

junior high school students in Japan¹⁸⁾¹⁹). Self-esteem has a strong relation to happiness. Low self-esteem is more likely than high to lead to depression under some circumstances²⁰). As depressive mood develops into depression in some cases²¹⁾²²), it is necessary to reduce symptoms through approaches to their psychological aspects, such as counseling.

4.2. Sex differences in the EQS_C scores

When considering their developmental stage, junior high school students are during a period with sex differences. Alvarado et al. reported that the degree of development is higher among female than male children, resulting in higher emotional intelligence scores in the former²³), and similar results were expected in the present study. However, there were no significant sex differences in the scores for the 3 domains of emotional intelligence. Differences were only observed in the score for the corresponding factor [empathy].

A higher score for empathy indicates a higher ability to understand one's own and others' feelings accurately and empathize with them. With regard to this, Alvarado et al. noted, "The cognitive development of female children is faster, and their ability to avoid bullies and change direction is higher than male children of the same age with slower cognitive development"²³). The results of the present study also suggest that female children can monitor their emotional conditions, accurately understand others' feelings, and adopt appropriate actions, which may also positively impact interpersonal relationship-building.

4.3. Relationship between emotional intelligence and stress

There was a negative correlation between the EQS_C and PSI scores, indicating that stress scores are low when the emotional intelligence scores are high. As emotional intelligence is the ability to monitor one's emotional conditions, accurately understand others' feelings, and adopt appropriate actions, those with high levels of emotional intelligence may be able to appropriately recognize their emotional conditions even in a state of stress, accurately understand their stress, and consequently adopt appropriate actions for situation management.

4.4. Comparison between the high and low EQS_C score groups

On comparing students with high and low scores for each EQS_C domain to examine differences in the PSI scores based on the emotional intelligence scores, the high score group's scores for <stress responses> were lower in all of the 3 domains. In this respect, those with high levels of emotional intelligence may also be characterized by a high-stress tolerance derived from their ability to control their own emotions and guide their thoughts toward positive directions to prevent the development of negative emotions. This fact is endorsed by different studies which suggest a strong association between stress and emotional intelligenc²⁴). Moreover, the appropriate management of stressful experiences may also lead to the inhibition of stress recognition. Thus, individuals with high levels of emotional intelligence may be able to overcome stress.

In the present study, there were significant differences between the high and low-score groups for [intrapersonal EQ] in all subordinate stress subscales. The domain [intrapersonal EQ] consists of 3 corresponding factors: [self-awareness], [self-motivation], [self-control], and it refers to "the ability to understand how one's mind works, and adopt supporting and effective behaviors". Higher scores for these factors indicate a higher ability to cover all emotional

processes within oneself and to lead a stable and secure life in self-related aspects¹³). MacCann et al. noted, "Among the performance measures of emotional intelligence, higher emotion management skill levels promote problem-focused coping"²⁵). Based on this, stress may be reduced by promoting [self-awareness] and [self-control], consequently improving stress-coping skills. As a developmental challenge for junior high school students, who have yet to establish their self-concept, the results of the present study suggest the necessity of learning to become able to face themselves, increase their self-efficacy, and further enhance their value to society.

5. Conclusion

This study examined Japanese junior high schoolstudents' levels of emotional intelligence and stress, sex differences in the 2 items, and the relationship between them using the Emotional Intelligence Scale for Children (EQS_C) and Public Health Research Foundation Type Stress Inventory for Junior High School Students (PSI).

- On comparing male and female students' stress scores, the latter's score for the superior subscale <stress responses> was higher. Among the subordinate subscales, their scores for <physical responses>, <depression/anxiety>, and < irritability/anger> were higher.
- On comparing male and female students' emotional intelligence scores, there were no sex differences in any domain, but female students' score for the corresponding factor [empathy] was higher.
- On analyzing the relationship between emotional intelligence and stress, a significant negative correlation was observed.
- On comparing stress scores between the high and low score groups for each domain of emotional intelligence, the low score group's score for <stress responses> was higher.

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