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## Relationship of athletic sports with sense of coherence and mood states in male senior high school students: comparing athletes from a school soccer club and J-League youth teams

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### SUMMARY

Both school and public sports clubs play an important role in the development of athletes in Japan. Although some studies have investigated the relationship of mental health and numerous factors, including level of athletic performance, and years of experience with sports, limited studies have examined the differences among athletic organizations for adolescents. Focusing on soccer, the most popular sport among Japanese adolescents, we conducted the present investigation with participants from a school soccer club and J-League youth teams. This study aimed to reveal the relationship of athletic sports with coping skills and psychological distress in male high school students, with special reference to differences among athletic organizations.

This study was conducted in a boys' senior high school and 4 J-League youth teams, from April to June 2017. The high school has a strong soccer club that has regularly won a national level tournament. We selected students who belonged to the school soccer club (n = 108) and those who did not belong to a school or public sports club (the do not belong to a sports club group, n = 333). Moreover, students who belonged to school soccer club were divided into 2 groups based on whether they had won a prize or not in a previous tournament larger than a prefecture level competition (school soccer club without a winning experience, n = 50; school soccer club with a winning experience, n = 58). For the J-League youth team, we used 51 students' data for the analysis.

To evaluate the participants' ability to cope with stress, we used the three-item sense of coherence (SOC) scale. For psychological distress, we used the Japanese version of the profile of mood states (POMS) short form, and we calculated the total mood disturbance (TMD) score. To compare SOC and TMD scores between the groups, we used the Kruskal-Wallis test and Bonferroni post hoc tests.

The analysis revealed significant group differences in the SOC score. Specifically, the school soccer club with a winning experience group and the J-League youth group had higher scores than those of the group that did not belong to a sports club. There was no significant difference between the scores of the school soccer club without a winning experience group and the other groups. Further, there were significant group differences in the TMD score, with the J-League youth group exhibiting lower score as compared to all other groups.

This study indicated that, regardless of athletic organization, male senior high school students who played soccer at a high level had higher scores related to coping skills as compared to students who did not belong to a sports club. Meanwhile, psychological distress scores differed across athletic organizations, with students in the J-League youth team exhibiting favorable mood states.

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Key words: extracurricular activities, exercise, psychological distress, mental health, adolescents, athletes.

## Introduction

A previous systematic review reported that sports activity is effective in maintaining mental health among adolescents, and that it facilitates their psychological development<sup>1)</sup>. Some studies based in Japan also reported a positive association between participation in sports activity and the ability to cope with stress<sup>2,21)</sup>, and found that senior high school students who belonged to a sports club had better mood states than those who did not belong to a sports club<sup>14)</sup>. Although sports activity comprises valuable experiences, a previous study cautioned that students' involvement in a sports activity may have negative experience such as pressurizing students to do something that they are unwilling to do, as compared to other activities such as performance and fine arts<sup>4)</sup>. Moreover, athletic sports have been found to induce specific stressors such as physical load caused by difficult training, performance anxiety, and so on. Previous data have indicated that athletes tend to have undesirable mood states as compared to those who are not involved in competitive sports<sup>16)</sup>. Therefore, it is important to enhance the coping skills and maintain mental health among adolescents who engage in athletic sports.

Considering the participation in athletic sports in Japan, school sports clubs have played an important role in the development of athletes since the Meiji era to around the 1960s. After the Tokyo Olympic Games was hosted in 1964, public sports clubs began to develop high level athletes independent from school activities. The appearance of public sports clubs provided the opportunity for school and public sports clubs to bridge into athletic organizations. School sports clubs provide students with an opportunity to play athletic sports apart from being engaged in educational activities, while public sports club aim to improve competitive skills separately from schools.

Although some studies have investigated the differences between school and public sports clubs from the sociological perspective<sup>9,12)</sup>, no study has focused on their relationship with psychological development or psychological distress.

Soccer is the most popular sport in Japan, as evidenced by the highest number of adolescent players<sup>15)</sup>. Moreover, in the past 3 decades, soccer has been gaining popularity as a professional sport in Japan, with an increase in the number of J-League professional teams since its establishment in 1991. For the most part, this increase has been at high level school soccer clubs or J-League youth teams, which are public sports clubs managed by J-League team<sup>8)</sup>. Considering that both school and public sports clubs play a role in the development of athletes, it is important to clarify the relationship of belonging to an athletic organization with psychological development and psychological distress. Currently, as both students and teachers are limited by time constraints in school sports clubs, it is entails that activities be efficient and effective<sup>6)</sup>. In contrast, as professional organizations manage J-League youth teams, they may provide efficient training and favorable support. Indeed, a previous study reported that the number of activity days are fewer in J-League youth teams than school sports club<sup>20)</sup>. With this background in mind, this study investigated the differences in the psychological development and psychological distress of adolescents between these 2 organizations considering various associated factors such as activity characteristics or activity related social support. This information may contribute to the creation of future pathways for the development of athletic sports in Japan. The purpose of the present study was to reveal the association between athletic sports, and sense of coherence and mood states in male senior high school students, focusing on the differences between a strong school

soccer club and J-League youth teams.

## Methods

### A. Participants and procedure

This study was conducted for all 1st grade students in a boys' senior high school and 4 J-League youth teams from April to June 2017. The flow of the participants' selection process has been shown in Figure 1. We conducted the investigation in a physical education class, using a self-reported questionnaire. The high school has a strong soccer club that has regularly won a prize at a national level tournament. We targeted all the 1st grade students (n = 928); of these, 22 students were absent from the class and 63 students had missing data. Therefore, we used 843 students' data for the analysis (valid response rate: 90.8%). In this survey, we investigated whether the student belonged to a school or public sports club. Specifically, we used data on students who did not belong to a school or public sports club (the do not belong to a sports club group, n = 333), and those who belonged to the school

soccer club (n = 108). Further, students who belonged to the school soccer club were divided into 2 groups based on whether they had won a prize or not in a previous tournament that was larger than or equal to a prefecture level competition (school soccer club without a winning experience, n = 50; school soccer club with a winning experience, n = 58).

For the J-League youth, we used same procedure as that for the high school investigation, and data were collected at a convenient time at each club house. For the survey, we requested the attendance of all 1st grade students in a senior high school in each team. As a result, 53 students from 4 teams (12 to 15 students in each team) took part in the survey. Since 2 of the 53 students had missing data, we used 51 students' data for the analysis. Both school and J-League youth surveys were conducted by a professor and researcher of sports science, supervised by a teacher or coach. Since the questionnaire included private content, participants were warned not to talk to other students while filling out the questionnaire. The questionnaires

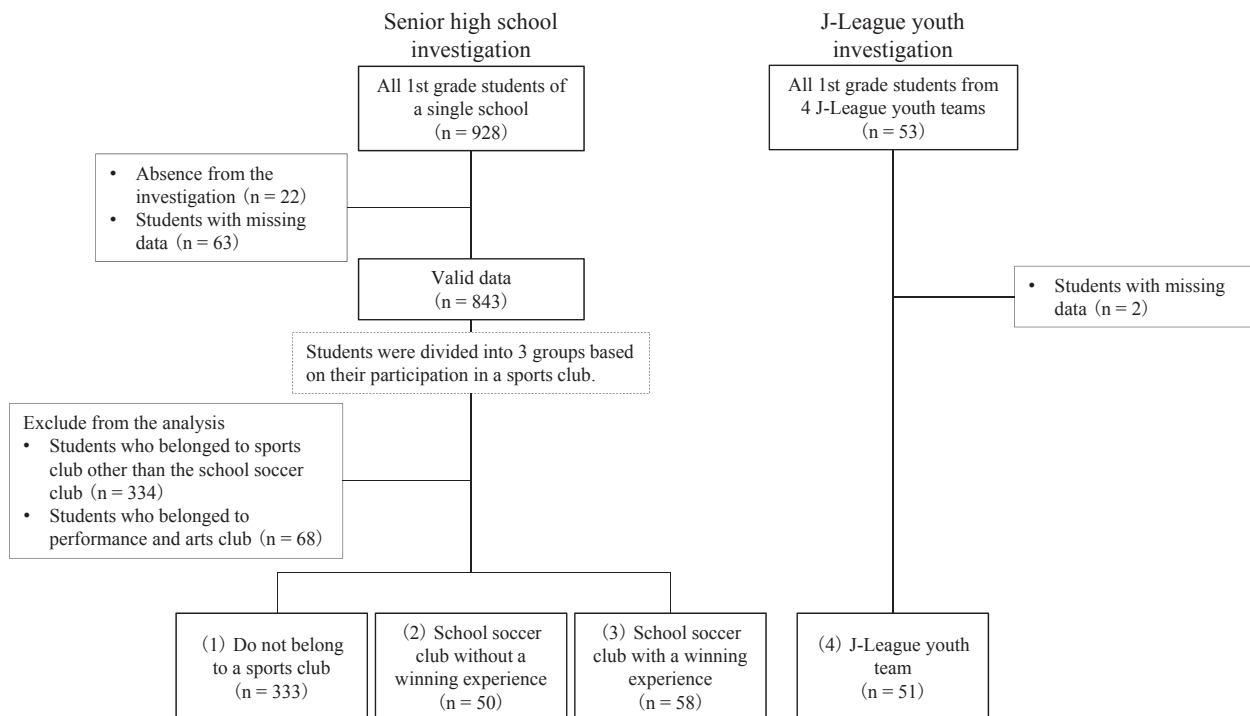


Figure 1. Flow of the process of selection of the study participants.

Winning experience indicates that students won a prize in a previous tournament that was bigger than a prefecture level competition.

were collected by survey the staff who were undergraduate or graduate school students majoring sports science.

## B. Measures

### 1. Sense of coherence

We assessed sense of coherence (SOC) using the three-item SOC scale (the University of Tokyo Health Sociology version of the SOC scale<sup>18)</sup>). This scale evaluates subordinate concepts of SOC (i.e., manageability, meaningfulness, and comprehensibility) using 3 questions with 7 response options. The scores on this tool range from 3 to 21, with higher scores indicating a higher ability to cope with stress. The scale had a good internal consistency reliability, and has confirmed convergent validity with the longer version of the SOC scale and criterion-related validity of self-rated health in Japanese individuals aged over 20 years<sup>17)</sup>.

### 2. Profile of mood state

We evaluated psychological distress using the profile of mood state (POMS)<sup>13)</sup> short form Japanese version<sup>23)</sup>. The scale comprises 30 items on participants' mood in the last 1 week. We used the total mood disturbance (TMD) score for the analysis, which is computed by subtracting the vigor score from the summed score on the other 5 subscales. The TMD score ranges from -20 to 76, with lower scores indicating lower psychological distress. The scale has confirmed convergent validity with the 65 items version POMS scale which was positively related to mood states evaluated by a psychiatrist<sup>24)</sup>. Five subscales of the POMS short form have good internal consistency reliability in Japanese individuals under 19 years old<sup>23)</sup>. For the TMD score, although the reliability and validity of the scale has not yet been confirmed, previous studies reported that it might be useful to detect clinical problems<sup>23)</sup> or overtraining in athletes<sup>5)</sup>.

### 3. Participants' characteristics

As SOC reflects past experiences<sup>22)</sup>, we investigated success and negative experience in junior high school

using the tool developed by Kimura et al.<sup>11)</sup>. The scale consists of 6 questions regarding studies, sports, art, club activities, and friendship experiences.

For participants who belonged to the school soccer club and the J-League youth team, we collected data on years of participation in soccer, number of activity days per week, and perceived physical exertion of daily practice. The perceived physical exertion of daily practice was assessed using 5 response options ranging from "nothing at all" to "extremely hard." Additionally, we used the athletic social support scale<sup>19)</sup> to assess participants' perceived social support related to sports activities.

## C. Statistical analysis

Descriptive statistics included the mean  $\pm$  standard deviation for the continuous variable, years of participation in soccer, and median and interquartile (IQR) for other ordinal variables. To compare SOC and TMD scores between the groups, we used the Kruskal-Wallis test and Bonferroni post hoc tests. We used the EZR on R commander 1.35<sup>7)</sup> for the analysis. The level of statistical significance was set at  $P < 0.05$ .

## D. Ethical considerations

For the high school investigation, we obtained consent from the principal of the school prior to the investigation. The participants were explained the purpose of the study and the usage of personal information, and we informed them that the investigation results would never affect their academic attainment. We asked participants to mark specific box if they did not consent to participate. For the J-League youth, after obtaining consent from the team coach or staff, we conducted the investigation following the same process as that used in the high school investigation. The ethics committee of Nippon Sport Science University approved this study (Approval number: 017-H003).

## Results

Characteristics of participants in each group have

been presented in Table 1. There was a significant group difference in the success and negative experiences in junior high school; the school soccer club with a winning experience and J-League youth team groups showed higher scores as compared to the group that did not belong to a sports club. In the analysis, except for the group that did not belong to a sports club, there was a significant difference in the years of participation in soccer among the other groups. Specifically, the school soccer club with a winning experience and J-League youth team groups had participated in soccer for longer than the school soccer club without a winning experience group. In addition, the frequency of activity days was lesser among those in the J-League youth team group, as compared to both school soccer club groups. There were no significant differences in the perceived physical exertion of daily practice and the sports activity related social support.

Figure 2 shows the findings on the comparison of SOC and TMD scores between the groups. There were significant group differences in SOC score; the school soccer club with a winning experience (median: 16.0, IQR: 4.0-21.0) and J-League youth team (15.0, 6.0-

21.0) groups had higher scores than the group that did not belong to a sports club (14.0, 3.0-21.0). However, there were no significant differences between the school soccer club without a winning experience group (15.0, 9.0-21.0) and the other groups.

Similarly, there were significant group differences in TMD score; the J-League youth group (10.0, -8.0-33.0) had a lower score than all other groups (do not belong to a sports club: 22.0, -16.0-77.0; school soccer club without a winning experience: 22.0, -2-57.0; and school soccer club with a winning experience: 17.5, -20.0-74.0). The subscale scores on the SOC and POMS are shown in Appendix 1.

### Discussion

We investigated the relationship of athletic sports with SOC and mood states in senior male high school students by comparing a strong school soccer club and 4 J-League youth teams. Findings revealed that, regardless of the athletic organization, male senior high school students who played soccer at a high level possessed higher SOC than did students who did not belong to a sports club. Meanwhile, J-League youth participants exhibited lower psychological distress

Table 1. Characteristics of participants in each group.

Variables	(1) Do not belong to a sports club (n = 333)	(2) School soccer club without a winning experience (n = 50)	(3) School soccer club with a winning experience (n = 58)	(4) J-League youth team (n = 51)	P value	Post-hoc test
Success and negative experience in junior high school (point), median (Q1, Q3)	17.0 (14.0, 19.0)	18.0 (17.0, 20.0)	19.0 (18.0, 21.0)	19.0 (18.0, 21.0)	< 0.001	1 < 3,4
Years of participating in soccer, mean ± standard deviation	Not applicable	6.2 ± 3.3	9.2 ± 2.1	10.3 ± 2.2	< 0.001	2 < 3,4
Activity days per week, median (Q1, Q3)		6.8 (6.0, 7.0)	7.0 (6.0, 7.0)	6.0 (6.0, 6.0)	< 0.001	4 < 2,3
Perceived physical exertion of daily practice (point), median (Q1, Q3)		5.0 (5.0, 6.0)	5.0 (5.0, 6.0)	5.0 (4.5, 6.0)	0.618	
Athlete social support (point), median (Q1, Q3)		19.0 (17.0, 20.0)	20.0 (18.0, 21.0)	20.0 (19.0, 21.0)	0.060	

Q1: Quartile 1; Q3: Quartile 3.

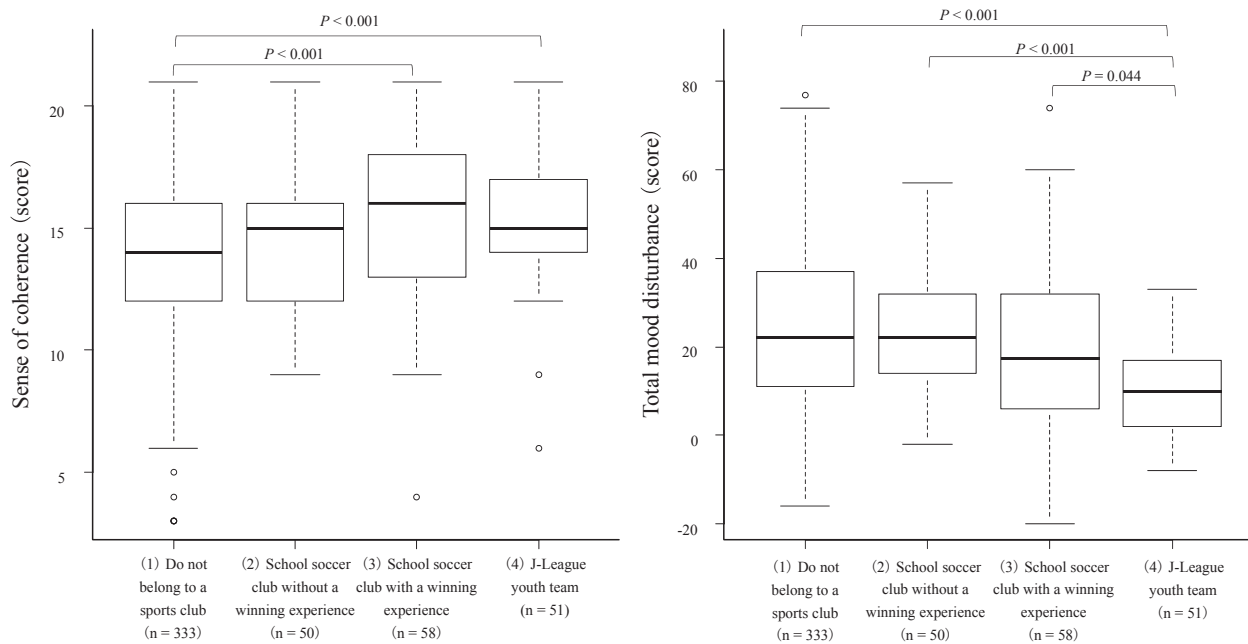


Figure 2. Comparison of sense of coherence and total mood disturbance scores between groups.

We used the Kruskal-Wallis test and Bonferroni post hoc tests to compare SOC and TMD scores between the groups.

compared to participants who belonged to a school soccer club and did not belong to a sports club.

With regard to sports activity characteristics, participants of the J-League youth team or the school soccer club with a winning experience had participated in soccer for longer than those who belonged to the school soccer club without a winning experience. This result indicated that longer experience of soccer may be related to winning a prize in a tournament. In addition, the activity days per week in the J-League youth team group were lower than the school soccer club groups.

Further, participants with high athletic levels tended to possess higher SOC than those who did not belong to a sports club. Similarly, the measures of success and negative experiences in junior high school showed the same tendency with SOC. Since SOC reflects past experiences, successful experiences related to engagement with sports at a high athletic level may contribute to the development of SOC. For example, they may be often involved in an important occasion which influences the result of a game. These experiences contribute to shape SOC in adolescence as “participa-

tion in shaping outcome.” Moreover, performance in these difficult situations may strengthen SOC as “successful tension management”<sup>22)</sup>. A previous study reported that high SOC is positively associated with high mental skills, which may relate to athletic performance among athletes<sup>3)</sup>. Another study reported that the number of years of experience with sports is positively associated with SOC in college students<sup>2)</sup>. Similarly, in the present study, the students belonging to the J-League youth team or the school soccer club with winning experience were found to have participated in sports for a longer period, such that they could derive valuable experiences that enhanced their SOC.

On the other hand, the TMD score of the J-League youth team group was better than that of the other 3 groups. These results are consistent with the prior reported systematic review that indicated the various psychological health benefits of sports activities<sup>1)</sup>. Indeed, this previous study supports the present result pertaining to the difference between the J-League youth team group and the group that did not belong to a sports club. The J-League youth team group also



showed favorable mood states as compared to those in the school soccer club groups. This may be related to the fewer activity days observed in the J-League youth team group than that in the school soccer club groups. From the result of the perceived physical exertion in the J-League youth team and the school soccer club, we can see the training load were comparable between organizations. However, the school soccer club groups engaged in the activity almost every day, which might cause psychological distress due to the lack of recovery time. Moreover, overall, the J-League youth team students possessed high SOC and longer experience of soccer, indicating that they may have been better at coping with the possible difficult situations they may face in athletic activities. On the other hand, it is known that Japanese school sports clubs involve a specific culture, such as being forced to behave politely in the activity. Since the present investigation was conducted in the early part of the high school year, the students in the school soccer club may have been affected by the cultural differences in the sports activity. As increased mood disturbance is a useful indicator to monitor over-training or under-recovery in athletes<sup>5,10</sup>, we need to be careful and mindful about the high TMD scores in the school soccer club groups which might relate to the aforementioned reasons.

Since this study revealed differences in SOC scores and mood states between high athletic level students participating in school and public sports clubs, we expect that this result will help with the implementation of effective athletic sports activities based on the characteristics of the students involved in these organizations. However, this study had several limitations. First, since this was a cross-sectional study, we could only grasp the characteristics of school soccer clubs and the J-League youth teams. Moreover, we made assumptions about the reason for the differences between the two organizations in terms of activity days, years of experience with sports, and past

successful experiences. Future studies should take into account other confounders, and longitudinal studies should reveal the causal relationships of these factors in terms of psychological development and psychological distress. To further differentiate the overall influence of the school sports club and J-League youth teams, measures of student socioeconomic status, cost of activities, and number of members in a single team should be included as related factors. In addition, since the present study was conducted only in 1 boys' high school and 4 J-League youth teams, it is unclear if the results could be generalized to other populations. Therefore, it is necessary to investigate the differences between school and public sports clubs in various single-sex and co-educational schools or to focusing on other sports, in order to generate more generalizable knowledge about adolescent participation in athletic sports.

## Conclusions

This study indicated that, regardless of the athletic organization, male senior high school students who played soccer at a high level possess higher SOC than students who did not belong to a sports club. Meanwhile, we observed differences in measures of psychological distress by athletic organizations, such that students in the J-League youth team had favorable mood states. In contrast, since less rest was one of the possible reasons for the comparably bad reported mood states in the school sports club, a review of the number of activity days in school sports club might be needed in order to alleviate the psychological distress in senior high school students. Further longitudinal investigations will reveal the causal relationship of athletic organizations with psychological development and psychological distress in adolescents.

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Appendix 1.

Subscale scores on sense of coherence and profile of mood states.

Variables	(1) Do not belong to a sports club (n = 333)	(2) School soccer club without a winning experience (n = 50)	(3) School soccer club with a winning experience (n = 58)	(4) J-League youth team (n = 51)	P value	Post-hoc test
<b>SOC subscale, median (Q1, Q3)</b>						
Maneageability	4.0(1.0, 7.0)	5.0(3.0, 7.0)	5.0(1.0, 7.0)	5.0(2.0, 7.0)	0.006	1 < 4
Meaningfulness	5.0(1.0, 7.0)	5.0(3.0, 7.0)	5.5(2.0, 7.0)	6.0(2.0, 7.0)	< 0.001	1 < 3,4; 2 < 4
Comprehensibility	4.0(1.0, 8.0)	5.0(2.0, 7.0)	5.0(1.0, 7.0)	5.0(2.0, 7.0)	< 0.001	1 < 3
<b>POMS subscale, median (Q1, Q3)</b>						
Tension-Anxiety	6.0(0.0, 20.0)	6.0(0.0, 14.0)	5.0(0.0, 17.0)	4.0(0.0, 15.0)	0.023	4 < 1
Depression	4.0(0.0, 20.0)	3.0(0.0, 16.0)	2.0(0.0, 14.0)	2.0(0.0, 9.0)	0.002	4 < 1,2
Anger-Hostility	3.0(0.0, 18.0)	3.0(0.0, 17.0)	2.5(0.0, 17.0)	1.0(0.0, 9.0)	0.001	4 < 1,2
Vigor	6.0(0.0, 20.0)	7.0(0.0, 19.0)	8.0(0.0, 20.0)	10.0(0.0, 18.0)	0.003	1 < 4
Fatigue	8.0(0.0, 20.0)	10.0(0.0, 20.0)	18.5(0.0, 20.0)	4.0(0.0, 15.0)	< 0.001	4 < 1,2,3
Confusion	7.0(-1.0, 19.0)	6.0(2.0, 18.0)	5.5(0.0, 19.0)	5.0(1.0, 12.0)	< 0.001	4 < 1,2

SOC; sense of coherence, POMS; profile of mood states, Q1; Quartile 1, Q3; Quartile 3.