

## Differences in mental health, psychosocial factors, and its relationships in Japanese collegiate athletes before and during the first and second years of the COVID-19 pandemic

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### Abstract

The sudden outbreak and prolonged duration of the COVID-19 pandemic had resulted in profound changes and adaptations for collegiate athletes. To our knowledge, however, no comparative studies have examined the differences in mental health and psychosocial factors in collegiate athletes before and during the first and second years of the pandemic. This study thus compared the mental health and psychosocial factors such as competitive stressors, sense of coherence (SOC), and social support of Japanese collegiate athletes before and during the first and second years of the pandemic. In addition, it identified the psychosocial factors related to mental health at each of the three time points. Participants were recruited from various athletic teams in the same grade at multiple universities (458 in 2016, 471 in 2020, and 341 in 2021). Their mental health was better during than before the pandemic; no differences were found between 2020 and 2021. All competitive stressors were highest before the pandemic and lowest in 2020. SOC did not differ between before the pandemic and 2020 but was higher in 2021. Social support received from athletic team coaches, family, and friends outside of the athletic team was higher during than before the pandemic. Common to the three time points, athletic achievements stressor and SOC were related to mental health. In addition, social support from friends outside of the athletic team in 2020 and social support from family and friends outside of the athletic team in 2021 were associated with mental health.

**Keywords:** Psychological distress, Competitive stressors, Sense of coherence, Social support, COVID-19

### 1 Introduction

Owing to the sudden outbreak and prolonged duration of the coronavirus disease 2019 (COVID-19) pandemic, collegiate athletes engaged in competition-based

activities were compelled to suspend their sports activities, restrict their use of training facilities, and postpone or cancel games in the initial pandemic period in 2020<sup>6,20</sup>. Since then, daily practice and competitions

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have resumed, with consideration of the COVID-19 pandemic, vaccination status, and various infectious control measures in 2021<sup>15,16</sup>). These situations resulted in profound changes and adaptations for collegiate athletes and were reported to have a stronger impact on their mental rather than physical well-being<sup>17</sup>).

Although several previous studies have comparatively examined the mental health of collegiate athletes in the first pandemic year with the pre-pandemic year, their findings have been inconsistent. Some studies showed that the mental health of collegiate athletes was poor in the first year of the COVID-19 pandemic than in the year before. For example, survey among American collegiate athletes from across the United States in a wide range of sports and competitive levels reported that the rates of those who had mental health concerns (e.g., sadness, loneliness, hopelessness, anxiety, anger, depression) were twice or more in spring 2020 compared to the pre-pandemic years (from 2015 to 2017)<sup>14</sup>). However, in that survey, the response items of mental health were not the same in the pre- and under pandemic periods; furthermore, the pre-pandemic data were disparate from 2015 to 2017. A longitudinal study also reported that Spanish collegiate athletes had less vitality during the lockdown period in the spring of 2020 than they had before the pandemic in 2019<sup>12</sup>). However, the study's sample size was small and the study participants were limited to athletes who belonged to a few team sports in two universities and competed in the championship of university sports. Another longitudinal study showed that Irish Gaelic games collegiate athletes reported no difference in burnout or stress between the summer of 2020 and before the pandemic<sup>22</sup>); however, the study population was small and included only athletes from one sporting discipline.

In addition, few studies have examined the mental health of collegiate athletes in the first pandemic year compared to the second pandemic year. Only one study reported that Japanese male collegiate athletes experienced depression more in spring 2021 than in spring 2020<sup>10</sup>). However, participants in that study were only male students engaging in specific athletic activities and belonging to different grades and universities in 2020 and 2021. Therefore, hitherto, no comparative studies have examined how the mental health of collegiate athletes differed between before the pandemic, the first pandemic year, and the second pandemic year, using data of relatively large, homogeneous populations.

Furthermore, it is known that the mental health of collegiate athletes is associated with psychosocial factors, such as competitive stressors<sup>4</sup>), sense of coherence (SOC)<sup>4</sup>), and social support<sup>3</sup>). It is conceivable that the status of such psychosocial factors differed between the pre- and under pandemic periods. However, few studies have examined psychosocial factors related to mental health during the COVID-19 pandemic; only one study reported that social support from athletic teammates decreased depressive symptoms in American collegiate athletes<sup>9</sup>).

Based on the aforementioned, we aimed to clarify the differences in mental health and psychosocial factors, such as competitive stressors, SOC, and social support before and during the first and second years of the pandemic, by using data from Japanese collegiate athletes of various athletic teams in the same grade at multiple universities. Additionally, we aimed to identify the psychosocial factors related to mental health at each of the three time points.

## 2 Methods

### 2.1 Materials

In this study, individuals who belonged to a university athletic club were taken to be "collegiate athletes."

The study used data from anonymous, self-administered surveys conducted from April to November 2016 and in May 2020 and June 2021 on collegiate students affiliated with five physical education universities in Japan. The 2016 survey was administered to 1,875 freshmen and sophomores with 1,738 complete responses (valid response rate: 92.7%). The 2020 survey was administered to 2,202 sophomores and juniors with 1,293 complete responses (valid response rate: 58.7%). Further, the 2021 survey was administered to 1,503 sophomores and juniors with 819 complete responses (valid response rate: 54.5%). Of these respondents, those who belonged to an athletic club and were sophomores (the grade common to the three-survey data), 458 in 2016, 471 in 2020, and 341 in 2021, were included in the analysis. The types of athletic clubs to which the respondents belonged were 33, 25, and 28 in 2016, 2020, and 2021, respectively, and in all years, track and field, soccer, and basketball accounted for nearly 50% of the club activities to which the respondents belonged.

This study was approved by the ethics committee of the Institute of Health and Sport Sciences of the University of Tsukuba (Reference No.: Tai 28-5). All

respondents of this study provided with informed consent.

## 2.2 Measures

### 2.2.1 Attributes and athletic activity time

The collegiate athletes were asked to their gender and state of the hours they spent per week on athletic activities.

### 2.2.2 Mental health

The Japanese version of the Kessler Psychological Distress Scale (K6)<sup>7</sup> was used. Each of the six items was rated on a 5-point scale from “never” to “always,” and a score of 0 to 4 was assigned to each item. The total score ranged from 0 to 24 points. A higher total score indicated poorer mental health. Poor mental health was defined as a K6 score  $\geq 5$ , which is one of the optimal cut-off points indicating psychological distress and has been adopted for Japanese adults<sup>19)</sup> and collegiate students<sup>8)</sup>. Cronbach’s alpha in this study was .87–.92.

### 2.2.3 Competitive stressors

The competitive stressors scale developed by Asanuma et al.<sup>4)</sup> was used. A five-factor structure was identified: personal relationships (eight items), athletic achievements (three items), appraisal by others (five items), expectations and pressures from others (five items), and loss of motivation (seven items). Each of the 28 items was rated on a 4-point scale from “never” to “always,” and a score of 0 to 3 was assigned to each item. The higher the score, the higher the stressor. Cronbach’s alpha in this study was as follows: personal relationships (.85–.88), athletic achievements (.87–.90), appraisal by others (.78–.83), expectations and pressures from others (.79–.88), and loss of motivation (.83–.87).

### 2.2.4 Sense of coherence (SOC)

The Japanese version of the SOC scale<sup>2)</sup> was used. Each of the 13 items was rated on a 7-point scale, and a score of 1 to 7 was assigned to each item. A higher total score indicated higher SOC. Cronbach’s alpha in this study was .77–.81.

### 2.2.5 Social support

We modified the social support scale of Shimada<sup>21)</sup> and inquired about sources of athletic teammates, athletic team coaches, family, and friends outside of the athletic team. The five items for each source were rated on a 4-point scale from “no” to “yes,” and a score of 1 to 4

was assigned to each item. The higher the score, the higher the perceived social support. Cronbach’s alpha in this study was as follows: athletic teammates (.92–.94), athletic team coaches (.92–.94), family (.90–.95), and friends outside of the athletic team (.91–.96).

## 2.3 Data analysis

Gender, athletic activity time, K6 score, prevalence of poor mental health, competitive stressors score, SOC score, and social support score among the three time points were compared. The chi-square test, one-way analysis of variance (Bonferroni method for multiple comparisons), and Kruskal-Wallis test (Bonferroni-adjusted Mann-Whitney U test for multiple comparisons) were used.

Next, hierarchical multiple regression analysis was conducted for each of the three time points, with the K6 score as the dependent variable, score of competitive stressors, SOC, and social support as independent variables, and gender as an adjustment variable. In the analysis, competitive stressors were entered in Step 1, and SOC and social support were entered in Step 2. Before the analysis, multicollinearity among the independent variables was checked at each time point. IBM SPSS Statistics version 23 was used for the statistical analysis. Statistical significance was set at  $p < .05$ .

## 3 Results

Table 1 shows the statistics for all variables at the three time points. Gender composition did not differ among the three time points. Weekly athletic activity hours were significantly shorter in 2020 ( $6.7 \pm 5.2$  h) than in 2016 ( $18.3 \pm 7.2$  h) and 2021 ( $17.0 \pm 8.7$  h) ( $p < .001$ ).

The K6 score was significantly higher in 2016 ( $3.4 \pm 4.4$ ) than in 2020 ( $2.5 \pm 3.6$ ) and 2021 ( $2.9 \pm 4.5$ ) ( $p < .001$ ). The prevalence of poor mental health was significantly higher in 2016 (29.5%) than in 2020 (19.5%) and 2021 (21.1%) ( $p < .001$ ). All competitive stressors scores were significantly higher in 2016, 2021, and 2020 ( $p < .001$ ). The SOC score was significantly higher in 2021 ( $61.2 \pm 11.8$ ) than in 2016 ( $58.2 \pm 10.6$ ) ( $p < .001$ ). Social support scores were significantly higher in both 2020 and 2021 than in 2016 except for “athletic teammates” ( $p < .001$ ).

The results of hierarchical multiple regression analysis at the three time points are shown in Tables 2 to 4. Table 2 shows the results for 2016. In Step 1, the competitive

stressors of “personal relationships ( $\beta = .235, p < .01$ ),” “athletic achievements ( $\beta = .130, p < .01$ ),” and “loss of motivation ( $\beta = .153, p < .01$ )” were positively related to psychological distress. In Step 2, SOC was negatively

related to psychological distress ( $\beta = -.519, p < .01$ ), and the relationship between the competitive stressor of “loss of motivation” and psychological distress disappeared.

Table 1. Gender, athletic activity time, mental health, and psychosocial factors of participants at three time points

	2016 (i)	2020 (ii)	2021 (iii)	<i>p</i>	Multiple comparison
	( <i>n</i> =458)	( <i>n</i> =471)	( <i>n</i> =341)		
	<i>n</i> (%) or <i>M</i> ( <i>SD</i> )				
Gender					
Men	314 (68.6)	313 (66.5)	238 (69.8)	.582 <sup>a</sup>	
Women	144 (31.4)	158 (33.5)	103 (30.2)		
Athletic activity time (hours/week)	18.3 ± 7.2	6.7 ± 5.2	17.0 ± 8.7	<.001 <sup>b</sup>	i>ii, iii>ii
Psychological distress (K6 score)	3.4 ± 4.4	2.5 ± 3.6	2.9 ± 4.5	<.001 <sup>b</sup>	i>ii, i>iii
Prevalence of poor mental health	135 (29.5)	92 (19.5)	72 (21.1)	<.001 <sup>a</sup>	i>ii, i>iii
Competitive stressors score					
Personal relationships	6.5 ± 4.8	2.0 ± 3.5	3.7 ± 4.3	<.001 <sup>b</sup>	i>iii>ii
Athletic achievements	5.3 ± 2.6	3.0 ± 3.0	4.2 ± 2.8	<.001 <sup>b</sup>	i>iii>ii
Appraisal by others	5.5 ± 3.9	3.6 ± 3.8	4.3 ± 3.6	<.001 <sup>b</sup>	i>iii>ii
Expectations and pressures from others	4.5 ± 3.4	2.9 ± 3.5	3.4 ± 3.2	<.001 <sup>b</sup>	i>iii>ii
Loss of motivation	6.9 ± 5.1	4.2 ± 4.6	5.0 ± 4.8	<.001 <sup>b</sup>	i>iii>ii
Sense of coherence score	58.2 ± 10.6	59.6 ± 11.5	61.2 ± 11.8	<.001 <sup>c</sup>	iii>i
Social support score					
Athletic teammates	15.5 ± 3.4	15.6 ± 3.8	16.0 ± 3.4	.169 <sup>c</sup>	
Athletic team coaches	12.4 ± 4.1	14.0 ± 4.0	14.6 ± 3.9	<.001 <sup>c</sup>	ii>i, iii>i
Family	16.1 ± 3.4	17.6 ± 3.3	17.7 ± 3.2	<.001 <sup>c</sup>	ii>i, iii>i
Friends outside of the athletic team	15.4 ± 3.4	16.7 ± 3.4	16.2 ± 3.5	<.001 <sup>c</sup>	ii>i, iii>i

M = mean, SD = standard deviation, The prevalence of psychological distress was calculated as the prevalence of a K6 score of 5 or higher. a Chi-square test, b Kruskal-Wallis test, c One-way analysis of variance

Table 2. Hierarchical multiple regression with psychological distress (2016)

	Step 1	Step 2
	$\beta$	$\beta$
Competitive stressors		
Personal relationships	.235 **	.096 *
Athletic achievements	.130 **	.138 *
Appraisal by others	.028	-.008
Expectations and pressures from others	.007	.014
Loss of motivation	.153 **	-.009
Sense of coherence		-.519 **
Social support		
Athletic teammates		-.060
Athletic team coaches		-.001
Family		.019
Friends outside of the athletic team		.004
	<i>R</i> <sup>2</sup>	
	.175	.378

Adjustment variable: gender, \* $p < .05$ , \*\* $p < .01$

Table 3 shows the results for 2020. In Step 1, the competitive stressors of “personal relationships ( $\beta = .157, p < .01$ )” and “athletic achievements ( $\beta = .226, p < .01$ )” were positively related to psychological distress. In Step 2, SOC was negatively related to psychological distress ( $\beta = -.396, p < .01$ ), and social support from “friends outside of the athletic team” was positively related to psychological distress ( $\beta = .097, p < .05$ ).

Table 4 shows the results for 2021. In Step 1, the competitive stressors of “athletic achievements ( $\beta = .195, p < .01$ )” and “loss of motivation ( $\beta = .296, p < .01$ )” were positively related to psychological distress. In Step 2, SOC ( $\beta = -.331, p < .01$ ) was negatively related to psychological distress, social support from “friends outside of the athletic team” ( $\beta = .174, p < .01$ ) was

positively related to psychological distress, and social support from “family” ( $\beta = -.132, p < .05$ ) was negatively related to psychological distress. The relationship between the competitive stressor of “loss of motivation” and psychological distress disappeared.

#### 4 Discussion

We first compared Japanese collegiate athletes’ mental health, competitive stressors, SOC, and social support before the COVID-19 pandemic, in the first year of the COVID-19 pandemic, and in the second year of the COVID-19 pandemic. We then examined the relationship between mental health and psychosocial factors at each time point.

Table 3. Hierarchical multiple regression with psychological distress (2020)

	Step 1	Step 2
	$\beta$	$\beta$
Competitive stressors		
Personal relationships	.157 **	.102 *
Athletic achievements	.226 **	.225 **
Appraisal by others	.047	-.056
Expectations and pressures from others	.048	.000
Loss of motivation	.114	.029
Sense of coherence		-.396 **
Social support		
Athletic teammates		.025
Athletic team coaches		-.019
Family		-.045
Friends outside of the athletic team		.097 *
	$R^2$	
	.183	.310

Adjustment variable: gender, \* $p < .05$ , \*\* $p < .01$

Table 4. Hierarchical multiple regression with psychological distress (2021)

	Step 1	Step 2
	$\beta$	$\beta$
Competitive stressors		
Personal relationships	.078	.039
Athletic achievements	.195 **	.200 **
Appraisal by others	.035	-.037
Expectations and pressures from others	.011	-.002
Loss of motivation	.296 **	.128
Sense of coherence		-.331 **
Social support		
Athletic teammates		.006
Athletic team coaches		-.059
Family		-.132 *
Friends outside of the athletic team		.174 **
	$R^2$	
	.238	.351

Adjustment variable: gender, \* $p < .05$ , \*\* $p < .01$

#### 4.1 Differences in mental health, competitive stressors, SOC, and social support between the three time points

The mean K6 score was higher in 2016 ( $3.4 \pm 4.4$ ) than in 2020 ( $2.5 \pm 3.6$ ) and 2021 ( $2.9 \pm 4.5$ ). Furthermore, the prevalence of poor mental health was higher in 2016 (29.5%) than in 2020 (19.5%) and 2021 (21.1%). This suggests that the mental health status of Japanese collegiate athletes was better during than before the COVID-19 pandemic; this was not different in the first year of the pandemic, when athletic activities ceased, and in the second year of the pandemic, when athletic activities resumed.

Our finding is not consistent with those of previous studies comparing collegiate athletes' mental health (e.g., it was poorer in 2020 than in the pre-pandemic period<sup>12,14</sup>), nor there was no difference between pre-pandemic and 2020<sup>22</sup>), and it was poorer in 2021 than in 2020<sup>10</sup>). These previous studies either compared data for collegiate athletes of different grades, universities, and athletic activities, different response items, or the study population including collegiate athletes of a specific sport. In contrast, this study compared data of the same items in 2016, 2020, and 2021 for collegiate athletes in the same universities, in the same grade, and who engaged in various common athletic activities. Our results are consistent with those of a prior study comparing data using the K6 in the same population of elite Japanese rugby athletes in 2019 and 2020 that showed poorer mental health before the pandemic than in 2020<sup>18</sup>). These findings suggest that in Japan, both collegiate and elite athletes may have had a better mental health status in the first year of the pandemic than before the pandemic. This may link the fact that athletic activity time was shortest in 2020 among three time points in this study. Because a previous study suggested that the pandemic increased athletes' self-management time, which may have helped them recover from mental and physical fatigue, leading to improved mental health in 2020<sup>18</sup>).

Second, all competitive stressors were highest in 2016, the year before the pandemic, and lowest in 2020, the first year of the pandemic. This may be linked to the fact that athletic activity time was noticeably shorter in 2020 than in 2016 and 2021. In Japan, athletic activities at universities and domestic competitions could not be conducted because of the declaration of a state of emergency during the initial pandemic period in 2020<sup>20</sup>. In turn, athletic activities at the university resumed<sup>13</sup>) and

athletic competitions were held according to the guidelines for preventing the spread of infections in 2021<sup>11</sup>).

Additionally, SOC did not differ between 2016 and 2020 but was higher in 2021. SOC is the sense of being confronted with stressful events and situations and seeing them as a source of growth<sup>1</sup>). Since the prolonged COVID-19 pandemic resulted in a variety of changes in academic plans, athletic activities, and life circumstances for collegiate athletes, SOC of collegiate athletes may have improved by confronting and responding to those situations.

In addition, social support received from athletic team coaches, family, and friends outside of the athletic team was higher in both 2020 and 2021 than in 2016. These results in terms of support from families are similar to those of a previous study in which Australian athletes aged 15–18 years gained more family support in 2020 than pre-pandemic<sup>5</sup>). As for support from friends outside of the athletic team, the decrease in athletic activity time during the pandemic may have resulted in more contact with them.

#### 4.2 Relationship between mental health and psychosocial factors

First, the results of Step 1 of the hierarchical multiple regression analysis showed that competitive stressors related to psychological distress were “personal relationships,” “athletic achievements,” and “loss of motivation” in 2016; however, of these, “loss of motivation” and “personal relationships” disappeared in 2020 and 2021, respectively. A reason for the lack of association between “loss of motivation” stressor and psychological distress in 2020 may be that the athletic activity time was extremely short for this year. In other words, cessation or reduction of athletic activity may have resulted in a low level of stress on motivation for athletic activity and no effect on mental health in 2020. Our finding is similar to that of a previous study that reported that stress over canceled or postponed competitions had no association with mental health in collegiate athletes in the first year of the pandemic<sup>23</sup>). On the other hand, “personal relationships” stressor had no association with mental health in 2021, which could be because the prolonged COVID-19 pandemic may have changed the nature of personal relationships.

Furthermore, the results of Step 2 showed that “loss of motivation” stressor in 2016 and 2021 was buffered by

SOC and social support, and only “athletic achievements” stressor had an independent relation to psychological distress at all time points. This suggests that athletic achievements was the primary competitive stressor related to the poor mental health of collegiate athletes, regardless of the COVID-19 pandemic. Therefore, it may be important to reduce the stressor of athletic achievements to improve mental health in collegiate athletes.

Second, SOC was found to have the strongest negative relationship with psychological distress independently at all time points. Our finding is consistent with previous studies that higher SOC was associated with better mental health in collegiate athletes before the pandemic<sup>4)</sup> and that those among collegiate athletes who viewed stress as unmanageable had a higher risk of poor mental health during the pandemic<sup>23)</sup>. These results suggest that SOC, a sense of trying to deal with stressors in a positive way<sup>1)</sup>, is most important for improving the mental health of collegiate athletes, irrespective of the pandemic.

Third, social support from friends outside of the athletic team in 2020 and from friends outside of the athletic team as well as from family in 2021 was related to psychological distress. However, support from friends outside of the athletic team had a negative association; conversely, support from family had a positive association with mental health. These results suggested that support from friends outside of the athletic team instead of athletic teammates during the COVID-19 pandemic and support from family during the prolonged pandemic may be involved in the mental health of Japanese collegiate athletes. Our finding was not consistent with that of a previous study that found that social support from athletic teammates decreased depressive symptoms of collegiate athletes during the COVID-19 pandemic<sup>9)</sup>. This might be because the said study targeted elite American collegiate athletes; furthermore, it did not examine social support from friends outside the athletic team or family.

#### 4.3 Strengths and limitations

This is the first study to identify the differences in mental health and psychosocial factors of Japanese collegiate athletes before the COVID-19 pandemic and during the first and second years of the pandemic. The strength of this study is that it revealed that psychological distress was less during the pandemic than before the pandemic and that there was no difference between the

first and second years of the pandemic. Additionally, it revealed that, common to before and during the pandemic, athletic achievements stressor and SOC were associated with mental health, and social support from friends outside of the athletic team during the pandemic and from family in the second year of the pandemic was associated with mental health. These findings contribute to the examination of measures to improve mental health among collegiate athletes during prolonged pandemics.

This study has the following limitations. First, since this is a cross-sectional study, the data collected before and during the COVID-19 pandemic might have contained bias due to cohort differences. Especially, the pre-COVID-19 pandemic survey period was four years before the pandemic, which may have created a generational difference between the target population under the pandemic. Second, there are differences in survey methodology and collection rates depending on the time point of the survey. While the response rate for the collective questionnaire survey conducted in 2016 was high at over 90%, the response rate for the web surveys conducted in 2020 and 2021 was below 60%. Web-based surveys were conducted to prevent COVID-19 infections, but it is possible that only the participants who were more interested and willing to participate completed the survey compared to the participants in 2016.

#### 5 Conclusions

This study clarified differences in the mental health and psychosocial factors of Japanese collegiate athletes between 2016 (before the pandemic), 2020 (the first pandemic year), and 2021 (the second pandemic year) and identified psychosocial factors related to mental health at each of these three time points. Mental health status was better in 2020 and 2021 than in 2016 and did not differ between 2020 and 2021. All competitive stressors were highest before the pandemic and lowest in 2020. SOC did not differ between before the pandemic and 2020 but was higher in 2021. Social support received from athletic team coaches, family, and friends outside of the athletic team was higher during than before the pandemic. Common to all time points, the competitive stressor of athletic achievements and SOC were related to mental health. Social support from friends outside of the athletic team in 2020 and social support from family as well as friends outside of the athletic team in 2021 were related to mental health.

## Declarations

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## Conflicts of interest

The authors declare that they have no conflicts of interest.

## Data availability

The data are not available due to privacy and ethical restrictions.

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