

Differences in Mental Health Characteristics of Japanese Athletes in Outpatient Clinics Pre- and Post-Covid-19: A Repeated Cross-Sectional Observational Study

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Purpose: To investigate the differences in characteristics between Japanese athletes who visited mental health outpatient clinics before and after the COVID-19 pandemic.

Patients and Methods: Athletes who visited various healthcare facilities between 2018 and 2022 were considered. The independent variable was the timing of outpatient mental health clinic visits—either before or after COVID-19. The primary outcome was the F classification based on the International Statistical Classification of Diseases and Related Health Problems 10th Revision. We collected data on clinical psychiatric diagnoses, age, sex, referral pathway, and sports-related information such as the type of sport, level of contact, individual/team sport, involvement duration, and athletic competition level. Between-group comparisons were performed among the pre- and post-COVID-19 groups using the *t*-test, Mann–Whitney test, and chi-square test.

Results: Eighty-six athletes (37 before COVID-19 and 49 after COVID-19) were deemed eligible for the study. No significant differences were detected between the pre- and post-COVID-19 groups. However, subgroup analyses revealed a significant increase in anxiety-related disorders among female athletes and in participation in individual sports among male athletes in the post-COVID-19 group compared with the pre-COVID-19 group.

Conclusion: The increased anxiety among female athletes and the increased participation in individual sports among male athletes suggest that these groups should be a high-priority target for early intervention and prevention strategies. This study contributes to our understanding of how COVID-19 has affected the mental health of athletes seeking medical treatment in Japan, and it highlights which segments of the Japanese athlete population may be more vulnerable to mental health issues in the post-COVID-19 era. Although the sample size is small, this study also provides valuable insights for practitioners on how to target specific segments of the athlete population for the implementation of interventions aimed at mitigating the development of mental health issues after COVID-19.

Keywords: Japanese athletes, mental health problems, medical facilities, individual sports, female athletes, anxiety

Introduction

Mental health disorders and symptoms in athletes have received increasing attention in recent decades. In 2018, the International Olympic Committee (IOC) published a consensus statement on mental health issues.^{1,2} The prevalence of depressive symptoms and generalized anxiety in elite athletes ranges from 4% to 68% and from 6% to 14.6%, respectively, comparable to that of the general population.^{1,2} Prolonged depressive and anxiety symptoms can lead to suicide; 15.6% of active elite Swedish athletes (track and field) have reported suicidal thoughts.³ Similarly, in Japan, mental health problems seem to be prevalent among elite athletes, such as college football players.⁴ The coronavirus disease 2019 (COVID-19) pandemic has brought additional attention to mental health among athletes. The pandemic has

intensified psychological stress, in addition to the sports-specific and daily psychological stress that athletes already experience. Consequently, athletes were challenged to cope with new psychological stresses from the pandemic.⁵

Against this background of increasing mental health problem in athletes, the role of psychological professionals, particularly psychiatrists, has become crucial. In the sporting context, psychiatrists are required to provide medical treatment to athletes at medical institutions and accompany athletes to the sports field.⁶ In response to the needs of sports, specialized outpatient clinic for athletes' mental health was established in 2016 at the Keio University Hospital, where the author is affiliated in Japan.

Although several studies on athletes' mental health clinic visits have been conducted in other countries,^{7,8} no study has been conducted on this topic in Japan. In this study, we summarized the characteristics and trends of patients who visited athlete mental health outpatient clinics and investigated whether there were changes or differences between the groups in the two years before and after the COVID-19 pandemic. We hypothesized that compared with the period before the COVID-19 pandemic, the number of athletes who visited mental health outpatient clinics increased, and clinical psychiatric diagnoses and patient characteristics may change after the pandemic.

Materials and Methods

Design and Setting

This retrospective observational study utilized multi-institutional clinical data from one general hospital and three mental health clinics between April 2018 and March 2022. Keio University Hospital is a general hospital with a sports medicine center that provides outpatient care and includes an athlete mental health outpatient clinic. There are also three other mental health clinics affiliated with Keio University Hospital that provide specialist outpatient care for athletes as part of their general psychiatric services. This study followed the REporting of studies Conducted using Observational Routinely collected health Data reporting guidelines for observational studies.⁹

Participants

Participants were patients who visited the mental health outpatient clinic for athletes at the Keio University Hospital Sports Medicine Center or the mental health clinics of collaborating institutions, consulted for a main complaint related to mental health, and met all of following the selection criteria.

The inclusion criteria were patients who visited the outpatient clinic of the study provider during the registration period from April 2018 to March 2022, agreed to participate in the study (with the option to opt out), and sought outpatient care for mental health support at our sports medicine center or a collaborating institution. Our selection criteria were patients who presented with a primary complaint related to mental health symptoms/problems and sports-specific psychological support—specifically, overtraining syndrome, exercise addictions, and eating disorders seen in endurance sports. Furthermore, performance anxiety, such as the yips, is seen in record and scoring sports, such as golf and shooting. We adopted the definition of athletes provided by MacMahon et al^{10,11} Specifically, in addition to the intent to compete and without considering constant exercise time or metabolic equivalents, we defined the following four conditions: actively engaged in sports training, where the main motivation or goal is to improve sports-specific skills, performance, or results (technical, physical, or tactical) for competition; actively engaged in sports competitions unless injured or during competition breaks; formally registered with a local, regional, or national sports federation; and sports training and competition as their main physical activities or focused on personal interest, devoting several hours per week or more, depending on the phase of the season/competition. Athletes aged 13 or older, but below the age of majority, could partake in the study but were required to be accompanied by a parent or caregiver. The rationale for this inclusion criterion was that in the past, we had only patients who were old enough to make their own decisions about participating in the study and who were accompanied by a guardian; therefore, we set the lower age limit as 13 years.

The exclusion criteria were patients who had insufficient medical information, refused to participate, or were deemed unsuitable by the investigator to participate in the study after obtaining medical data from the hospital or collaborating institutions. The rationale for the exclusion criteria was to allow us to accurately assess the effectiveness of the

professional support provided to participants. We did not define any comorbidities, injuries, or chronic diseases that would amount to exclusion criteria.

Data Collection and Measurement

The data obtained from the medical records included the variables of age at first visit, sex, duration and number of visits, and referral pathway (spontaneous visit; visit at the recommendation of others, such as a family member or paramedic; referral visit from a doctor in another department).

Two sports psychiatrists, both specialists certified by the Japanese Society of Neuropsychiatry and sports doctors certified by the Japan Sports Association, performed diagnoses based on the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition; medical records were also reviewed. Previous studies on clinical diagnosis conducted in Sweden have also been based on the ICD-10 criteria.⁷ We collected data on principal diagnoses and comorbidities from medical records. Regarding data on sports competitions, the following variables were extracted: type of sport, contact level (collision/non-contact), individual or team sport, sport duration, and athletic competition level (international, professional, national, or regional competitions).

Exposures

We set our exposure period as early April 2020, when the first pandemic emergency was declared in Japan. This “emergency” measure was equivalent to a lockdown, during which Japanese people were restricted from engaging in daily activities outside of their homes.^{4,12} We used the period for group assignment; outpatients from April 2018 to March 2020 were assigned to the pre-COVID-19 group and those from April 2020 to March 2022 to the post-COVID-19 group. The primary outcome was the F classification based on the ICD-10 mental disorder categories. The secondary outcomes were individual or team sports and athletic competition level.

Statistical Analysis

Participants’ characteristics were described using means and standard deviations for continuous variables and numbers and percentages (%) for categorical variables. For continuous variables, *t*-tests or Mann–Whitney *U*-tests were performed, while chi-square tests were used for categorical variables in the pre- and post-COVID-19 groups. A subgroup analysis was conducted by sex and mental disorder (according to the ICD-10 F categories) to assess heterogeneity. All statistical analyses were performed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA). Statistical significance was defined as $P < 0.05$ in the two-tailed tests.

Results

Overall, 88 participants visited the outpatient clinic between April 2018 and March 2022. One patient with higher brain dysfunction whose primary complaint was assessment of motor function who was not an athlete and one 12-year-old child were excluded, resulting in 86 valid datasets.

Participants Characteristics

Table 1 shows the descriptive statistics of all athletes. In the two years before the COVID-19 pandemic, 37 athletes (17 female and 20 male participants) were observed, while in the two years after the COVID-19 pandemic, 49 athletes (20 female and 29 male participants) were observed. The participants were aged 13–57 years (mean 22.9, SD 8.7), with no significant sex differences or differences between sports types. The comparison of the distribution of psychiatric diagnoses between the pre- and post-COVID-19 groups showed no statistically significant differences.

Table 2 shows the psychiatric diagnoses of the participating athletes, with the highest number of athletes diagnosed in the anxiety disorder category (F4). The F3 mood disorder category was the next most common diagnosis, followed by F5 (ie, eating or sleep-related disorders) and F9 (ie, attention-deficit hyperactivity disorder).

Table I Participant Demographics Based on Psychiatric Diagnosis Category, Hospital Attendance, Sex, and Competition Characteristics

	All Participants	Before COVID-19	After COVID-19	P value
	N = 86	n = 37	n = 49	
ICD categories				0.188
F2	1 (1.2%)	1 (2.7%)	0 (0.0%)	
F3	17 (20.0%)	10 (27.0%)	7 (14.3%)	
F4	43 (50.0%)	15 (40.5%)	28 (57.1%)	
F5	16 (18.6%)	9 (24.3%)	7 (14.3%)	
F9	7 (8.1%)	2 (5.4%)	5 (10.2%)	
None or intact	2 (2.3%)	0 (0.0%)	2 (4.1%)	
Number of visits	6.1±7.4	8.2±9.3	4.5±4.9	0.012
Duration of visit (months)	5.0±7.5	7.6±10.0	3.1±4.1	0.033
Age	22.9±8.7	21.8±8.4	23.7±9.0	0.205
Sex				0.634
Female	37 (43.0%)	17 (45.9%)	20 (40.8%)	
Male	49 (57.0%)	20 (54.1%)	29 (59.2%)	
With/without body contact				0.416
Non-contact sports	62 (72.1%)	25 (67.6%)	37 (75.5%)	
Collision sports	24 (27.9%)	12 (32.4%)	12 (24.5%)	
Individual or team sports				0.112
Individual sports	59 (68.6%)	22 (59.5%)	37 (75.5%)	
Team sports	27 (31.4%)	15 (40.5%)	12 (24.5%)	
Level of competition				0.24
International	11 (12.8%)	4 (10.8%)	7 (14.3%)	
Professional	19 (22.1%)	8 (21.6%)	11 (22.4%)	
National	37 (43.0%)	20 (54.1%)	17 (34.7%)	
Regional	19 (22.1%)	5 (13.5%)	14 (28.6%)	
Duration of sports (years)	11.2±7.0	11.9±7.9	10.7±6.2	0.625
Pathway of referral				0.943
Paramedical staff	17 (19.8%)	7 (18.9%)	10 (20.4%)	
Medical doctors	35 (40.7%)	15 (40.5%)	20 (40.8%)	
Family	6 (7.0%)	2 (5.4%)	4 (8.2%)	
Athletes themselves	28 (32.6)	13 (35.1%)	15 (30.6%)	

Abbreviations: COVID-19, coronavirus disease 2019; ICD, International Statistical Classification of Diseases and Related Health Problems.

Table 2 Prevalence of Psychiatric Disorders Among Athletes in the Hospital and Clinics Between April 2018 and March 2022

	All Participants		Before COVID-19		After COVID-19		P value
	N = 86		n = 37		N = 49		
ICD categories:	Female	Male	Female	Male	Female	Male	0.188
F2: Schizophrenia spectrum (n = 1)	1						
Delusional disorder (F22)	1		1				
F3: Mood (Affective) disorders (n = 17)	5	12	4	6	1	6	
Bipolar disorder II (F31)		1				1	
Major depressive disorder, single episode or recurrent (F32, F33)	4	10	3	6	1	4	
Persistent or neurotic affective disorders (F34)	1	1	1			1	
F4: Anxiety disorders (n = 43)	19	24	5	10	14	14	
Any anxiety disorder							
Phobic anxiety disorders (F40)	6	12	2	3	4	9	
Other anxiety disorders (F41)	4	7		5	4	2	
Obsessive-compulsive disorder (F42)	1				1		
Reaction to severe stress and adjustment disorders (F43)	8	4	3	2	5	2	
Dissociative disorder (F44)		1				1	
F5: Eating disorders and nonorganic sleep disorders (n = 16)	8	8	6	3	2	5	
Any eating disorder (F50)	1	1	1			1	
Anorexia nervosa (F50.0)	2		2				
Bulimia nervosa (F50.2)	3		2		1		
Binge-eating disorder (F50.8)							
Insomnia disorder (F51.0)	2	7	1	3	1	4	
F9: Neurodevelopmental disorder (n = 7)	4	3	1	1	3	2	
Attention-deficit/hyperactivity disorder (F90)	4	3	1	1	3	2	
None or intact		2				2	

Abbreviations: COVID-19, coronavirus disease 2019; ICD, International Statistical Classification of Diseases and Related Health Problems.

Subgroup Analysis

The results of the subgroup analysis comparing the pre- and post-COVID-19 groups diagnosed in the F4 category (ie, the most common in the sample) are shown in [Table 3](#).

No categorical variables indicated statistically significant differences in the composition of athletes who visited the outpatient clinic. However, when comparing the number of outpatients by sex, a significant increase was observed in the number of female athletes diagnosed in the F4 category in the post-COVID-19 group compared with the pre-COVID-19 group ([Table 4](#)). Meanwhile, when comparing the number of male athletes between groups, no statistically significant difference was observed in the number of diagnosed cases ([Table 5](#)). However, statistically significant differences were observed between sports types, as the number of male athletes in individual sports increased in the post-COVID-19 group.

Table 3 Demographics of Athletes Diagnosed with ICD-10 Category F4

ICD-10 F4 Participants	Before COVID-19	After COVID-19	P value
	n = 15	n = 28	
Number of visits	7.6 ± 8.3	3.7 ± 4.4	0.111
Duration of visit (months)	8.5 ± 12.1	2.3 ± 3.3	0.18
Age	24.0 ± 11.4	24.1 ± 10.2	0.909
Sex			0.294
Female	5 (33.3%)	14 (50.0%)	
Male	10 (66.7%)	14 (50.0%)	
With/without body contact			0.863
Non-contact sports	12 (80.0%)	23 (82.1%)	
Collision sports	3 (20.0%)	5 (17.9%)	
Individual or team sports			0.235
Individual sports	8 (53.3%)	20 (71.4%)	
Team sports	7 (46.7%)	8 (28.6%)	
Level of competition			0.29
International	1 (6.7%)	5 (17.9%)	
Professional	5 (33.3%)	7 (25.0%)	
National	7 (46.7%)	8 (28.6%)	
Regional	2 (13.3%)	8 (28.6%)	
Duration of sports (years)	12.7±10.1	10.7±5.8	0.838
Pathway of referral			0.997
Paramedical staff	3 (20.0%)	5 (17.9%)	
Medical doctors	5 (33.3%)	9 (32.1%)	
Family	1 (6.7%)	2 (7.1%)	
Athletes themselves	6 (40.0%)	12 (42.9%)	

Abbreviations: COVID-19, coronavirus disease 2019; ICD-10, International Statistical Classification of Diseases and Related Health Problems 10th Revision.

Discussion

Our results indicated increased rates with respect to the number of athletes diagnosed with F4, participation in individual sports, and involvement in regional-level competitions in the post-COVID-19 group. Although not statistically significant, these findings may reflect an increase in anxiety because of the effects of COVID-19. With decreased physical activity, the mental health of the general population was affected by the lockdown, leading to reduced psychological well-being and increased depression, anxiety, and insomnia.^{13,14} A study conducted six months after the lockdown revealed that student athletes were less affected by COVID-19 compared with general students, reporting higher mental health scores on the Psychological General Well-Being Index-Short version.¹⁵ Additionally, athletes competing at higher levels of competition were less anxious and more adaptive than athletes competing at lower levels regarding changes in psychiatric symptoms just after the pandemic. However, studies after the lockdown showed that athletes in the general

Table 4 Psychiatric and Athletic Characteristics of Female Athletes

Female athletes	Before COVID-19	After COVID-19	P value
	n = 17	n = 20	
ICD categories			0.042
F2	1 (5.9%)	0 (0.0%)	
F3	4 (23.5%)	1 (5.0%)	
F4	5 (29.4%)	14 (70.0%)	< 0.05
F5	6 (35.3%)	2 (10.0%)	
F9	1 (5.9%)	3 (15.0%)	
None or intact	0 (0.0%)	0 (0.0%)	-
Number of visits	10.3 ± 12.6	4.6 ± 5.5	0.099
Duration of visit (months)	8.1 ± 11.2	3.0 ± 3.9	0.09
Age	20.5 ± 4.6	23.2 ± 9.1	0.271
With/without body contact			0.863
Non-contact sports	15 (88.2%)	18 (90.0%)	
Collision sports	2 (11.8%)	2 (10.0%)	
Individual or team sports			0.826
Individual sports	14 (82.4%)	17 (85.0%)	
Team sports	3 (17.6%)	3 (15.0%)	
Level of competition			0.206
International	4 (23.5%)	5 (25.0%)	
Professional	3 (17.6%)	4 (20.0%)	
National	10 (58.8%)	7 (35.0%)	
Regional	0 (0.0%)	4 (20.0%)	
Duration of sports (years)	12.4±6.3	10.6±5.8	0.732
Pathway of referral			0.367
Paramedical staff	6 (35.3%)	5 (25.0%)	
Medical doctors	7 (41.2%)	8 (40.0%)	
Family	1 (5.9%)	2 (10.0%)	
Athletes themselves	3 (17.6%)	5 (25.0%)	

Abbreviations: COVID-19, coronavirus disease 2019; ICD, International Statistical Classification of Diseases and Related Health Problems.

population who reduced their training intensity and physical activity experienced higher depression and anxiety compared with athletes who maintained their training load.¹⁶ Regarding competition level, recreational athletes who tried to maintain their training volume and intensity had higher anxiety scores than those who reduced their training, although elite athletes did not show significant differences in anxiety and training.¹⁶ Other reports have demonstrated an increase in the number of athletes with depressive symptoms and anxiety following lockdown, irrespective of training

Table 5 Psychiatric and Athletic Characteristics of Male Athletes

Male Athletes	Before COVID-19	After COVID-19	P value
	n = 20	n = 29	
ICD categories			0.752
F2	0 (0.0%)	0 (0.0%)	-
F3	6 (30.0%)	6 (20.7%)	
F4	10 (50.0%)	14 (48.3%)	
F5	3 (15.0%)	5 (17.2%)	
F9	1 (5.0%)	2 (6.9%)	
None or intact	0 (0.0%)	2 (6.9%)	
Number of visits	6.5 ± 4.9	4.4 ± 4.6	0.136
Duration of visit (months)	7.2 ± 9.0	3.1 ± 4.4	0.074
Age	23.0 ± 10.6	24.1 ± 9.0	0.693
With/without body contact			0.277
Non-contact sports	10 (50.0%)	19 (65.5%)	
Collision sports	10 (50.0%)	10 (34.5%)	
Individual or team sports			0.044
Individual sports	8 (40.0%)	20 (69.0%)	< 0.05
Team sports	12 (60.0%)	9 (31.0%)	< 0.05
Level of competition			0.488
International	0 (0.0%)	2 (6.9%)	
Professional	5 (25.0%)	7 (24.1%)	
National	10 (50.0%)	10 (34.5%)	
Regional	5 (25.0%)	10 (34.5%)	
Duration of sports (years)	11.5±9.2	10.7±6.6	0.732
Pathway of referral			0.528
Paramedical staff	1 (5.0%)	5 (17.2%)	
Medical doctors	8 (40.0%)	12 (41.4%)	
Family	1 (5.0%)	2 (6.9%)	
Athletes themselves	10 (50.0%)	10 (34.5%)	

Abbreviations: COVID-19, coronavirus disease 2019; ICD, International Statistical Classification of Diseases and Related Health Problems.

volume or intensity.^{17–19} In summary, our results may reflect an increase in the number of patients among regional or recreational athletes, and suggest that the proportion of athletes with increased anxiety because of the stresses imposed by COVID-19 is similar to the proportion reported in previous studies.

To our knowledge, this is the first study to show the characteristics of Japanese athletes who visited a medical institution, employing a research methodology beyond typical questionnaire surveys administered in a sports field setting.

The study demonstrates that athletes face various barriers when consulting psychological professionals.^{20,21} Further, several reports have revealed that Japanese athletes have a low likelihood of consulting a psychological professional, with 45% answering that they have no one they can consult.^{22,23} We believe that our findings are valuable in light of the current situation of mental health problems among athletes in Japan.

Psychological and Mental Health Characteristics of Female Athletes

Among female athletes, our finding that more athletes in the post-COVID-19 group were diagnosed with F4 may indicate that COVID-19 has increased stressors specific to female athletes, resulting in more of them experiencing anxiety. Even before COVID-19, female athletes were known to have higher rates of anxiety and depression compared with male athletes.^{24–26} Previous studies on the impact of COVID-19 on the mental health of female athletes reported higher levels of depression, anxiety, and psychological distress scores in this group, compared with male athletes, with these outcomes correlating with their training volume and intensity.^{27–29} In particular, female athletes training more than 14 h per week tend to develop mental health problems.³⁰ Psychological and mental health problems in female athletes are associated with the female athlete triad—low energy availability, secondary amenorrhea, and osteoporosis—which are more likely to manifest in this demographic.^{31,32} However, female athletes with actual depressive symptoms reported lower intention and propensity to seek psychological support from relevant institutions, such as university counseling and mental health services, compared with female non-athletes with depressive symptoms.³³ This suggests the possibility that the increase in F4—which is in the anxiety-related disorder category—in our findings is because athletes with depression are more reluctant to seek counseling. Female athletes feel particularly strongly about interpersonal conflict, financial hardship, and discrimination,³⁴ stressors considered specific to them, and are also more likely to report anxiety than are male athletes. Likewise, in the context of Japan, our results suggest that COVID-19 has led to an increase in the number of female athletes consulting sports psychiatrists with anxiety as their main complaint.

Psychological and Mental Health Characteristics of Male Athletes

Among males, our findings of more individual sports athletes in the post-COVID-19 group than in the pre-COVID-19 group may reflect higher levels of athletic identity and the extent of perceived social support. Athletes in individual sports are more likely to experience depressive and anxiety symptoms than those in team sports.^{35,36} The reason may be that individual sports athletes tend to have negative attributions after failure, face the interpretations and consequences of failure alone, and have higher goal-oriented thinking related to their sport.³⁶ Further, team sport athletes usually have a low level of confusion about environmental changes and stress because of their connections with others.³⁷ With the stress of the COVID-19 pandemic, student athletes who received more social support and reported greater connectedness with teammates reported less dissolution of their athletic identity and maintained mental health.³⁸ Research among Japanese male student athletes has also reported significant correlations between athletic identity and awareness/perception of social support, and mental health scores of depression and sports helplessness using the Stress Response Scale for Athletes.¹² Another study showed that high athletic identity and categories such as individual or team sport predicted psychological distress under COVID-19 lockdown, and scores on the Kessler Psychological Distress Scale were significantly higher in individual sport than in team sport athletes.³⁹ Hence, this study's finding that the number of Japanese male athletes competing in individual sports increased in the post-COVID-19 group may indicate that athletes with high athletic identity and less perceived social support experience high psychological stress.

Clinical Implications

Two implications emerge from this study. First, we identified the characteristics of athletes in Japan that make them prone to psychological and mental health problems. Clinical psychiatrists can use this information to predict the needs of these athletes seeking mental healthcare. The characteristics of the athletes who visited the mental health outpatient departments were similar to those of athletes reported in previous studies.⁷ Additionally, the impact of mental health that we found on athletes after the COVID-19 pandemic was largely consistent with that reported in previous studies.⁴⁰ Medical professionals can use this information to identify athletes with conditions they are likely to treat. Second, our study provides predictive evidence regarding which athletes should be targeted for the early intervention and prevention of

mental health problems. Most previous studies involved online surveys or focused on sports-related mental health problems, whereas our results helped identify the characteristics of athletes who may need to visit medical institutions. Mental health literacy programs have been effective in the prevention of and early intervention in mental health problems among athletes.^{41,42} These programs, including those conducted in general psychiatric practice, may also be implemented for female athletes or male athletes in individual sports with effectively as subjects.

Limitations

Our study has several limitations. First, the diagnoses were performed by a clinical psychiatrist who is a qualified sports doctor, and not all participants were administered questionnaires to receive a diagnosis. However, two doctors double-checked the diagnoses to minimize diagnostic errors. In this regard, the implementation of psychological tests proposed by the Sport Mental Health Assessment Tool 1, Sport Mental Health Recognition Tool 1, and Sport Mental Health Recognition Tool 1 may be considered in future research.⁴³

Second, the sample size was small. This observational study was conducted during normal practice at a medical institution. Therefore, the results were based on active consultations with athletes. An abovementioned study on elite athletes in Sweden also disaggregated the number of patients consulted in two publicly funded medical centers in two cities.⁷ Future researchers are urged to conduct their studies in outpatient mental health clinics in medical institutions that can consolidate athletes who wish to be seen.

Third, this study did not consider sequelae after COVID-19 infection. Psychiatric symptoms after COVID-19 or in long-term COVID-19 include insomnia, anxiety, and depression.^{44,45} Psychiatric symptoms that result from post-infection sequelae in athletes in the post-COVID-19 group cannot be ruled out. However, the most common psychiatric symptoms several months after COVID-19 infection are cognitive impairments such as memory problems.⁴⁶ None of the athletes in this study showed cognitive impairment. The results suggest that the COVID-19 pandemic is an environmental stressor.

Conclusion

We analyzed the characteristics of athletes who visited Japanese medical institutions before and during the COVID-19 pandemic using data from outpatient mental health clinics. In subgroup analyses, we found an increase in the number of female athletes diagnosed with anxiety (F4) and an increase in the number of male athletes in individual sports. Further research should confirm the effectiveness of early intervention and prevention in a larger number of athletes.

Data Sharing Statement

The datasets analyzed during the current study are not publicly available owing to the use of personal medical information but are available from the corresponding author on reasonable request.

Ethics Approval and Informed Consent

The study protocol was approved by the Ethics Committee of Keio University School of Medicine (institutional review board no. 20221019). The need for informed consent was waived by the Ethics Committee of Keio University School of Medicine because of the retrospective nature of the study. To ensure the confidentiality of the data, the patient information was anonymised and de-identified prior to analysis. All study procedures were carried out in accordance with the Declaration of Helsinki and the Good Clinical Practice guidelines.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work. The results of the study are presented clearly, honestly, and without fabrication, falsification, or inappropriate data manipulation.

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