



Association of Athlete Burnout with Depression Among Japanese University Athletes

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Objective: To establish a Japanese version of the Athlete Burnout Questionnaire (ABQ) – an internationally renowned standard assessment tool for athlete burnout (Study 1) – and to determine the association of athlete burnout with depressive states using this questionnaire (Study 2).

Methods: Participants in Study 1 were 516 Japanese university athletes (M=19.9, SD=1.29) who played 13 different sports. We verified the test–retest reliability, internal consistency, and construct validity of the Athlete Burnout Questionnaire–Japanese version (ABQ–J). We also assessed its concurrent validity in comparison with the Athlete Burnout Inventory (ABI), which is based on a psychopathological model of depression within Japanese culture. Participants in Study 2 were 373 different Japanese university athletes (M=20.01, SD=1.27) from 21 sports. Severity of participants' depressive states was measured using the Zung Self–Rating Depression Scale.

Results: In Study 1, no items exhibited a floor or ceiling effect. The ABQ–J showed high internal consistency and a three–factor structure, similar to the original questionnaire. A confirmatory factor analysis indicated that the ABQ–J had a good model fit and the test–retest reliability coefficients were satisfactory. In Study 2, a positive correlation was found between athlete burnout and depressive states. Individuals with severe athlete burnout faced 3–4 times the risk of moderate–to–severe depressive states than individuals without severe athlete burnout.

Conclusions: The ABQ–J effectively measures burnout among Japanese university athletes. Cross–sectional evidence suggests a positive association between athlete burnout and severity of depressive states or depressive disorder.

Key words: Athlete burnout, depression, mental health, university athletes, Japan

Introduction

Japanese university students have obtained considerable achievements in competitive sports. In the 2016 Olympic Games, 245 of Japan's 338 athletes (approx. 72.5%) were university graduates (n=201) or current university students (n=44). Students involved in this study participated in 12 events and obtained 14 medals in the 2016 Olympic Games. Despite these successes, university athletes may be vulnerable to mental health issues; there-

fore, researchers have given increased attention to athletes' mental health.¹⁾ Understanding the relationship between sports psychological issues and mental health issues can help shape more effective programs to prevent, detect, and treat mental illnesses, including depressive disorder, among Japan's university athletes.

Depressive disorder is one of the most prevalent and serious mental illnesses in Japan and across the world. Approximately 17.7% of people will face a depressive disorder at some point during their life.²⁾

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However, some epidemiological studies indicate that depressive disorder among athletes occurs at rates equal to or greater than those of the general population.^{1) 3)} Specifically, previous global studies have suggested that rates of depression (including depressive disorder and depressive states) among university athletes range from 15.6% to 21%. These studies met the diagnostic criteria of self-reported depressive states,^{3) 4)} and the findings suggest that female athletes generally experience higher levels of depressive states than male athletes.^{3) 5) 6)} In addition, studies have shown that rates of depressive disorder among young adults have increased in recent years,⁷⁾ and that university students experience substantially higher rates of depressive disorder and depressive states than the general population.^{8) 9)} Based on these reports, it follows that about one in five university athletes in Japan may face depressive disorder. Given the recent increase in depressive disorder among adolescents and young adults,⁷⁾ it is important that coaches and team staff recognize the early signs of depression in university athletes.¹⁰⁾

Depression can be difficult to identify in athletes because they often hesitate to express depressive feelings or symptoms associated with mental health issues.¹¹⁾ Furthermore, coaches and team members are often unfamiliar with the diagnostic signs and symptoms of depressive disorder or depressive states. However, athletes and coaches may be more familiar with the concept, symptoms, and progression of athlete burnout. The term “burnout” was originally coined in occupational health research to refer to severe exhaustion found among human service providers, and was later expanded to include additional defining features such as cynicism and a reduced sense of accomplishment.¹²⁾ The construct of athlete burnout is conceptually similar – it refers to a psychological syndrome characterized by emotional/physical exhaustion, sport devaluation, and a reduced sense of accomplishment.¹³⁾ The concept of burnout has become accepted in mental health research, including sports psychology and sports psychiatry, where it is presently considered an important psychological problem among university athletes.¹⁴⁾⁻²⁰⁾

A substantial amount of research has examined the relationship between burnout and depression across different occupational fields.²¹⁾⁻³³⁾ Some

authors have interpreted burnout as an analogue or component of depressive disorder. However, there is currently insufficient evidence to support this assertion.^{30) 33)} Specific to sport, other researchers have suggested that burnout may be an antecedent of depressive disorder in athletes.³⁴⁾ Although athlete burnout and depression may be related, few epidemiological studies have examined the association between athlete burnout and depression.

Addressing this issue requires research which accurately defines and measures athlete-specific burnout and examines the relationship between burnout and the severity of athletes’ depression. In Japan, well-established measures of depression, including depressive disorder, exist, and researchers have made efforts to define athlete burnout and develop a related burnout inventory for athletes: the Athletic Burnout Inventory (ABI).³⁵⁾ The ABI is conceptually based on a psychopathological theory of developing endogenous depression (*i.e.* the “psychological-clinical model of endogenous depression”) which includes the following factors: premorbid personality, situation of onset, and symptoms observed in patients with endogenous depression.^{16) 17) 35)} This psychopathological model facilitates an understanding of Japanese athletes’ attitudes and mental states regarding burnout; however, it precludes objective evaluation of the relationship between burnout and depression because it includes the clinical features of depression (encompassing depressive disorder and depressive states).

On the other hand, American researchers have also developed a burnout assessment tool that defines burnout as a psychological syndrome of emotional/physical exhaustion, sport devaluation, and reduced sense of accomplishment. The ABQ has substantial validity and reliability evidence supporting its use and its theoretical assumptions have been supported internationally.³⁶⁾⁻³⁸⁾ This inventory is useful for symptomatically detecting and preventing athlete burnout and for understanding athlete burnout’s relationship with other variables, including depression.

In the present study, we adapted the Athlete Burnout Questionnaire (ABQ)^{37) 38)} to facilitate an international-standard assessment of athlete burnout in Japan. The ABQ was developed in the United States based on the above-mentioned concept and

is today the most popular scale for measuring athlete burnout worldwide; it has been translated from English into Spanish,^{39) 40)} Portuguese,⁴¹⁾ French,⁴²⁾ Chinese,⁴³⁾ German, Norwegian, Swedish, and Arabic.⁴⁴⁾ Although specific to the sport setting, the ABQ is also conceptually similar to the Maslach Burnout Inventory,⁴⁵⁾ which is the most common burnout measure worldwide for assessing burnout in workplace settings.

Our aims were as follows: to establish a Japanese version of the ABQ (ABQ-J; Study 1) and subsequently use it to examine athlete burnout's relationship with depression (Study 2). Establishing the ABQ-J and examining athlete burnout's relationship with depressive states may promote and improve early detection of athlete burnout and depressive disorder among Japanese university athletes. Furthermore, in Japan, the system for supporting university sporting events, similar to the National Collegiate Athletic Association (NCAA) in America, is not yet fully functional. National Collegiate Athletic Association (NCAA), organization in the United States that administers intercollegiate athletics, and the NCAA functions as a general legislative and administrative authority for men's and women's intercollegiate athletics. It formulates and enforces the rules of play for various sports and the eligibility criteria for athletes. In the NCAA, about 1,200 registered universities are grouped into three divisions (I/II/III), each representing a different level of competition, where Division I is at the high-competitive level of universities. In Japan, indicators of athletes' competitive levels differ between sports organizations, with no classification system in common to all sporting codes. Thus, in this study, we focused on university athletes who 1) train at least nine months per year, and 2) belong to a university team that places in the top eight in the national All Japan Championship (including non-regular players).

Study 1

1. Methods

1) Participants

Athletes from four Japanese universities agreed to participate in the study ($N=516$, $M_{age}=19.9$, $SD=1.29$, 335 men and 181 women from 13 sports). All participants were from high-performing teams participating in national inter-university games in

Japan. Testing took place between 2012 and 2014.

2) Measures

(1) Japanese version of the Athlete Burnout Questionnaire (ABQ-J)

The English version of the ABQ includes the following factors: emotional/physical exhaustion (5 items), devaluation (5 items), and reduced sense of accomplishment (5 items). It has shown acceptable validity and reliability evidence surrounding its use as a measure of athlete burnout.³⁷⁾

The process of creating the ABQ-J was as follows. First, we obtained permission from the original author to translate the ABQ into Japanese and then did so using back-translation. An American researcher with good Japanese language skills and no knowledge of the original version back-translated the measure. We compared the back-translated English and original English versions and corrected inappropriate translations with the original author's help. This translation procedure was repeated until the original author approved all the back-translated questionnaire items.

(2) Athletic Burnout Inventory

The ABI³⁵⁾ measures athletic burnout using a Japanese theoretical background of psychopathology, namely the psychological-clinical model of endogenous depression, which includes pre-morbid personality, situation at onset, and symptoms observed in patients. This measure includes 19 items in the following subscales: emotional exhaustion (8 items), reduced sense of accomplishment (5 items), lack of communication (3 items), and self-investment (3 items). It has shown acceptable validity and reliability for Japanese athletes. Responses to items were scored on a 7-point scale (0 = never, 6 = almost every day); higher summed scores indicated more severe athlete burnout.

3) Data analysis

Prior to analysis, the data were cleaned; participants with missing values were deleted. The total number of valid responses was 473 (306 males and 167 females; response rate = 91.7%; Table-1). For participants with complete data, the mean age was 20.0 years ($SD=1.30$) and the mean number of years competing in the chosen sport was 10.1 ($SD=4.09$). Analysis used IBM SPSS and Amos 21.0 for

Table-1 Demographic characteristics of participants in Study 1 (n=473)

Attribution	Categories	n (%) or mean \pm SD	
Sex	Male	306	(64.69%)
	Female	167	(35.31%)
Age (years)	18-26	19.95	\pm 1.30
Years of experience in playing competitive sports	<5	55	(11.63%)
	5-9	132	(27.91%)
	\geq 10	286	(60.47%)
Experience of competition	No experience of a national game	281	(59.41%)
	Experience of a national game	192	(40.59%)
Sport	Soccer	94	(19.87%)
	Track and field	80	(16.91%)
	Rhythmic gymnastics	66	(13.95%)
	Baseball	56	(11.84%)
	Handball	33	(6.98%)
	Judo	27	(5.71%)
	Volleyball	26	(5.50%)
	Gymnastics	19	(4.02%)
	Softball	19	(4.02%)
	Weight lifting	16	(3.38%)
	Swimming	15	(3.17%)
	Tennis	12	(2.54%)
	Badminton	10	(2.11%)

Windows.

(1) Validity testing

We assessed content and factorial validity. Regarding content validity, we calculated the skewness and kurtosis of each item's response distribution. A psychiatrist and a sports psychologist subsequently confirmed that item sentences' manner of expression used suitable Japanese. We confirmed the sample's suitability for factor analysis using Kaiser-Meyer-Olkin (KMO) values and Bartlett's test before conducting factor analysis. Exploratory and confirmatory factor analysis examined the ABQ-J's factorial validity; the former used the maximum-likelihood method with promax rotation to extract factors, the latter confirmed the three-factor model's fit to the data. The following fit indices were used: χ^2/df , goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Finally, concurrent validity was assessed using Pearson's product-moment correlation coefficients calculated between the ABQ-J and ABI's total and subscale scores.

(2) Reliability testing

Reliability testing involved confirmation of the measure's internal consistency and test-retest reliability. Cronbach's α was used to examine internal consistency; test-retest reliability was examined in a sample of 30 athletes after an interval of approximately 3 weeks. Interclass correlation coefficients were calculated between test scores.

2. Results

(1) Content validity

The psychiatrist and sport psychologist confirmed content validity evidence for all items. Skewness and kurtosis values were both <1 , indicating that item responses were distributed normally. Extreme distributional bias was not found. All items were therefore included in subsequent statistical analysis.

(2) Factorial validity

The obtained KMO value was 0.83; the result of Bartlett's test was significant ($\chi^2=1889.33$, $df=36$, $p<0.001$). We therefore considered the sample suitable for factor analysis. Table-2

Table-2 Descriptive statistics of ABQ-J item scores and factor loadings

Factor (Cronbach's α)	No.	Item	M	SD	Factor loadings			
					F1	F2	F3	
Emotional/ physical exhaustion ($\alpha=.90$)	2	I am so tired from practice that I don't feel like doing other things.	2.52	1.09	.86	-.13	-.05	
	8	I am completely exhausted from ().	2.42	1.12	.85	-.07	-.06	
	10	I feel physically worn out from ().	2.70	1.11	.83	-.12	.01	
	4	I'm too tired because of my involvement in ().	2.13	1.04	.82	.08	-.02	
	12	I feel exhausted from the mental and physical demands of ().	2.26	1.12	.74	.13	-.01	
Devaluation ($\alpha=.86$)	11	I'm not as concerned about success in () as I use to be.	2.25	1.26	-.13	.93	-.05	
	6	I'm not as concerned about my performance as I used to be.	2.37	1.22	-.12	.85	-.12	
	9	I am not as enthusiastic about () as I used to be.	2.42	1.28	-.02	.84	-.06	
	3	It would be better to spend the effort I put into () on other things.	1.95	1.05	.24	.56	.06	
	15	I have negative feelings toward ().	1.89	1.09	.32	.38	.11	
Reduced sense of accom- plishment ($\alpha=.73$)	14	I feel that I am succeeding in ().	3.55	1.19	-.16	-.16	.80	
	5	I don't have enough feeling of achievement in ().	3.16	1.22	.03	-.12	.75	
	7	I'm not performing as well as I used to in ().	2.58	1.15	.02	.33	.47	
	1	I am able to accomplish many worthwhile things in ().	2.64	1.08	.01	.03	.43	
	13	It seems that no matter what I do, I can't perform as well as I should.	2.27	1.18	.16	.24	.38	
					F1	F2	F3	
Factor correlations					F1	—	0.60	0.39
					F2		—	0.46
					F3			—

ABQ-J, Japanese version of the Athlete Burnout Questionnaire; M=mean; SD=standard deviation. (): inserts chosen sport.

presents statistics describing ABQ-J items and items' factor loadings. Factor analysis indicated a three-factor model corresponding to that of the original ABQ: the eigenvalues of factors 1–3 were ≥ 1 . Confirmatory factor analysis also supported this factor model (Figure-1). The obtained scaled χ^2 value was significant ($\chi^2=944.494$, $df=174$, $p < 0.001$); nonetheless, the model showed acceptable data fit (GFI=0.880, AGFI=0.835, CFI=0.897, RMSEA=0.066). Values of standardized path coefficients for all items were >0.4 and significant.

(3) Concurrent validity

Table-3 presents the matrix of correlations between the ABQ-J and ABI scores. ABQ-J subscale scores were significantly correlated with total ABI scores, including overall and subscale scores, on emotional exhaustion, reduced sense of accomplishment, self-investment, and lack of communication ($ps < 0.001$). Values of Pearson's product-moment correlation coefficients ranged from 0.24 to 0.77. The ABQ-J's concurrent validity was thus supported.

(4) Reliability

Values of Cronbach's α for factors 1, 2 and 3 were 0.90, 0.86, and 0.73, respectively (Table-2). Values of interclass correlation coefficients between mean scores at the first and second instance of assessment were 0.80, 0.89, and 0.84 for emotional/physical exhaustion, devaluation, and reduced sense of accomplishment ($ps < 0.001$), respectively.

Study 2

1. Methods

1) Participants

Study 2 examined the relation between athlete burnout and depression using the ABQ-J. Participants were 373 Japanese university athletes (273 males, 100 females; mean age=20.01 years, SD=1.27) affiliated with a national-level team from 21 competitive sports, and who agreed to participate. Data were collected between 2012 and 2014.

2) Measures

We recorded athletes' demographic profiles (sex, age, university year, sport, experience of competition, and team role) and administered the ABQ-J

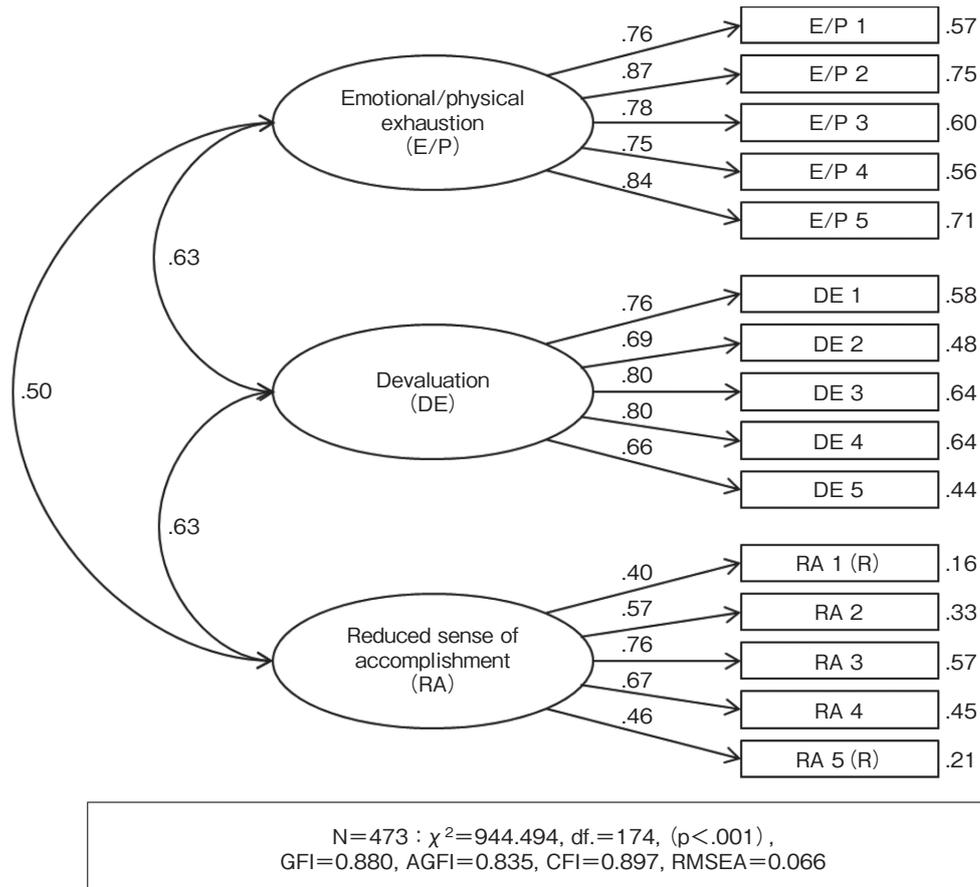


Figure-1 Factor structure of the ABQ-J

ABQ-J, Japanese version of the Athlete Burnout Questionnaire, GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation.

Table-3 Matrix of correlations between ABQ-J and ABI scores

	ABQ-J			
	Emotional/physical exhaustion	Reduced sense of accomplishment	Devaluation	ABQ-J total
ABI				
Emotional exhaustion	0.59***	0.45***	0.70***	0.74***
Reduced sense of accomplishment	0.26***	0.42***	0.27***	0.40***
Self-investment	0.24***	0.37***	0.36***	0.41***
Lack of communication	0.39***	0.33***	0.38***	0.47***
ABI total	0.58***	0.56***	0.67***	0.77***

ABQ-J, Japanese version of the Athlete Burnout Questionnaire; ABI, Athlete Burnout Inventory; ***p <.001

and the Zung Self-Rating Depression Scale (SDS).^{46) 47)}

The SDS^{46) 47)} was used to measure depressive state severity. This scale has a one-factor structure and includes 20 items which described symptoms often seen under depressive state. Responses to items used a 4-point Likert scale (1=rarely or

never, 4=most of the time or always). The SDS's total score is calculated by summing the item scores. We categorized participants according to their SDS score as follows: no or insignificant depression level (scores of 20–39; normal range); mild depression level, (40–47 points; mildly depressed); moderate depression level (48–55

points; moderately depressed); and severe depression level (≥ 56 points; severely depressed).⁴⁸⁾

3) Data analysis

We assessed the relationship between participants' ABQ-J and SDS scores using Pearson's product-moment correlation coefficient. We assessed athlete burnout's association with depression levels using binomial logistic regression analysis. Before conducting this analysis, we examined demographic factors that might affect the severity of depressive state and depressive disorder (*i.e.* confounding factors), using a chi-square test. We converted ABQ-J and SDS scores into categorical variables to permit logistic regression: SDS scores were converted into a dichotomous variable using a standardized cutoff (*i.e.*, ≥ 48 ; we considered scores higher than this value to suggest moderate-to-severe depression, depressive state, or depressive disorder, requiring clinical intervention⁴⁸⁾); ABQ-J scores were converted into "low" and "high" using the 75th percentile as a cutoff. We calculated adjusted odds ratios (ORs) using these categorical variables.

2. Results

Mean scores and SDs were calculated for the ABQ-J and SDS. Regarding the ABQ-J's subscales, these values were as follows: emotional/physical exhaustion, devaluation, and reduced sense of accomplishment were 2.37 (0.89), 2.16 (0.89), and 2.84 (0.66), respectively. The mean SDS score was 40.09 (7.08). Correlational analysis indicated significant correlations ($p < 0.001$) between scores on the ABQ's subscales and SDS scores (emotional/physical exhaustion, $r = 0.40$, reduced sense of

accomplishment, $r = 0.40$; devaluation, $r = 0.35$; $p < 0.001$). The 75th percentile values as a cutoff of ABQ-J were as follows: emotional/physical exhaustion, devaluation, and reduced sense of accomplishment were 3.00, 2.80, and 3.20. Additionally, 16.89% ($N = 63$) were classified as having moderate to severe depression, depressive state, or depressive disorder. Only sex was a confounding variable ($\chi^2 = 4.92$, $df = 1$, $p = 0.027$; Table-4), and more of our female participants displayed moderate-to-severe depression than male participants. We therefore adjusted for sex in the logistic regression analysis. Table-5 presents the results of the

Table-4 Examination of confounding factors (χ^2 test)

Attribution	Categories	SDS		χ^2
		<cut-off	\geq cut-off	
Sex	Male	234	39	*
	Female	76	24	
Age (years)	18	31	8	n.s.
	19	95	19	
	20	77	14	
	21	62	13	
	22-26	45	9	
Year	1	99	21	n.s.
	2	80	16	
	3	69	15	
	4	62	11	
Competitive record	No experience of national games	121	18	n.s.
	Experience of national games	189	45	

SDS, Zung Self-Rating Depression Scale; n.s.: not significant, * $p < 0.05$

Table-5 Logistic regression analysis of the ABQ-J's prediction of depression

Variables	Unadjusted			Adjusted			
	OR	95% CI	p	OR	95% CI	p	
ABQ	Emotional/physical exhaustion	3.739	2.136 - 6.546	***	3.708	2.109 - 6.517	***
	Reduced sense of accomplishment	2.865	1.647 - 4.983	***	2.750	1.575 - 4.802	***
	Devaluation	3.060	1.746 - 5.362	***	3.027	1.720 - 5.325	***
		Male			Female		
		OR	95% CI	p	OR	95% CI	p
ABQ	Emotional/physical exhaustion	4.314	2.137 - 8.706	***	2.800	1.084 - 7.234	*
	Reduced sense of accomplishment	2.378	1.189 - 4.756	*	3.611	1.386 - 9.408	**
	Devaluation	3.777	1.875 - 7.609	***	2.000	0.767 - 5.217	n.s.

n.s.: not significant, * $p < 0.05$, ** $p < 0.010$, *** $p < 0.001$

regression analysis including unadjusted ORs. The adjusted analysis' results indicated that athlete burnout was associated with elevated risk of moderate-to-severe depression (emotional/physical exhaustion: adjusted OR: 3.71, 95% CI: 2.109–6.517; reduced sense of accomplishment: adjusted OR: 2.75, 95% CI: 1.575–4.802; devaluation: adjusted OR: 3.03, 95% CI: 1.720–5.325). Unadjusted ORs by sex indicated that, in males, athlete burnout was associated with an elevated risk of moderate-to-severe depression (emotional/physical exhaustion: OR: 4.31, 95% CI: 2.137–8.706; reduced sense of accomplishment: OR: 2.38, 95% CI: 1.189–4.756; devaluation: OR: 3.78, 95% CI: 1.875–7.609). In females, aspects of athlete burnout of emotional/physical exhaustion and reduced sense of accomplishment were associated with elevated risk of moderate-to-severe depression (emotional/physical exhaustion: OR: 2.80, 95% CI: 1.084–7.234; reduced sense of accomplishment: OR: 3.61, 95% CI: 1.386–9.408). However, since the female sample size was small, it is necessary to exercise caution when interpreting those results.

General discussion

Our primary aims were to develop a Japanese scale for evaluating athlete burnout (Study 1) and to examine the association of athlete burnout with depression in university athletes in Japan (Study 2). Results of these studies highlight two major findings. First, the ABQ-J developed in Study 1 was based on an internationally recognized conceptualization of athlete burnout, which included a combination of characteristic psychological symptoms reflecting emotional/physical exhaustion, devaluation, and reduced sense of accomplishment in sports. Study 1's results indicate that the ABQ-J has good internal consistency and test-retest reliability and displays a three-factor structure. This is congruent with the original concept of athlete burnout and provides validity evidence for the use of the ABQ-J. The ABQ-J therefore permits measurement of burnout among Japanese athletes according to the internationally standardized concept of athlete burnout. By establishing the ABQ-J, we have not only made it possible to research the relationships between burnout and depression (including depressive states or depressive disorder) in Japanese athletes – we have

facilitated comparative study of the features of university athletes' burnout across different national contexts.

However, the ABQ-J is not without its limitations. Future research will need to address some cultural issues (including translation issues) with the scale. In addition, the values of Cronbach's α obtained in the present research were generally acceptable; however, they were somewhat low regarding the reduced sense of accomplishment subscale. The low factor loading for items 7 and 13 of the reduced sense of accomplishment subscale may reflect cross-loading with devaluation. Additionally, according to the mean score and standard deviation of ABQ-J's each factor shown in study 2, Japanese athletes' burnout as measured by the ABQ-J is of a higher degree than shown in other ABQ studies.^{37)–44)} Specifically, the reduced sense of accomplishment (RA) score is 2.84 (SD=0.66) in this study, and in the original ABQ study the RA score was 2.30–2.37.³⁷⁾ One interpretation of this result is that it shows the effects of culture; Japanese people tend to search for their weaknesses and short comings in an apparent effort to correct them.⁴⁹⁾ Heine (2000) mentions that the type of self-enhancing motivations routinely found within North American research are elusive in a Japanese context – *i.e.* North Americans are motivated to self-discover and articulate positive attributes of themselves, and Japanese people appear more motivated to self-discover and articulate negative attributes of themselves.⁴⁹⁾ Moreover, exploratory factor analysis loadings for certain items in devaluation (item 15) subscales did not satisfy the acceptability criterion ($\geq .40$). Low load on item 15 in the devaluation subscale may reflect cross-loading with emotional/physical exhaustion. In the future, a more refined translation which considers the cultural background of participants might increase the factor loadings and Cronbach's alpha values in ABQ-J.

In Study 2, scores on the ABQ-J and SDS were closely correlated. This supports previous occupational health research.^{21) 27) 30)–33)} The present study also confirmed that Japanese university athletes with severe burnout faced 3–4 times the risk of moderate-to-severe depression than athletes without severe burnout, and athletes suffering from burnout-related exhaustion faced a considerably

higher risk of serious depression (depressive states or depressive disorder), especially in the case of male athletes. These results strongly confirm the epidemiological relationship between burnout and depression (including depressive states and depressive disorder) in university athletes in Japan.

Results of ABQ-J's concurrent validity using ABI, as well as correlation between ABQ-J and SDS, account for the similarity in psychopathological phenomena between athlete burnout and depressive disorder. The ABQ-J's total score and subscale scores were all correlated with subscale scores on the ABI. The ABQ-J's conceptualization of burnout thus does not substantially deviate from the ABI's psychopathological conceptualization, which was developed specifically for Japanese athletes. The ABI considers athlete burnout in terms of a process: burnout begins with personality vulnerability and symptoms emerge in response to stressful situations in accordance with the psychopathological model (psychological-clinical model).^{15) 16)} This model assumes that athletes with a "melancholic" personality – which is psychopathologically identified as one of a premorbid personality for endogenous depression⁵⁰⁾ – face an elevated risk of burnout.¹⁵⁾⁻¹⁷⁾ "Melancholic" personality was proposed as a premorbid personality of depression by Tellenbach (1976).⁵⁰⁾ It has a fundamental feature of a marked adherence to orders that is accompanied by high norm consciousness across a wide range of the individual's life. Japanese people have historically tended to believe that people with "melancholic" personalities are more virtuous – indeed, this personality trait is considered closely connected with Japanese culture⁴⁹⁾ – and Japanese athletes often have this personality.¹⁷⁾ This shows us that burnout in Japanese university athlete with melancholic personalities is symptomatically and psychopathologically similar to that of endogenous depression. Additionally, many athlete burnout researchers assume that perfectionism, honesty, tenacity, or type A personality, which are common features of "melancholic" personality, are factors of athlete burnout. Yamada¹⁷⁾ also reported that "melancholic" personality is typical among Japanese university athletes, and that "melancholic" personality features determine some characteristics of the burnout process.¹⁷⁾ This indicates that, in the case of

athletes exhibiting burnout signs, coaches and/or other staff members should suspect that they are suffering from a depressive state or depression disorder.

Early symptoms of athlete burnout offer an insight into the process of depressive states and depressive disorder. As mentioned above, Japanese university athletes often have "melancholic" personalities. Those who have this personality generally hesitate to express their depressed mood and other symptoms of depression or depressive states.⁵¹⁾ Given that athletes are often vulnerable to help-seeking behavior,¹¹⁾ it is difficult for coaches and other team members to detect depression (including depressive states and depressive disorder) in athletes. Based on the symptomatic and psychopathological similarity between burnout and depressive disorder,⁵²⁾ coaches and other team members should seek signs in their peers who clearly exhibit the characteristics of athlete burnout in order to detect depression (both depressive states and depressive disorder) as early as possible. Previous research examining the burnout process among Japanese athletes has presumed that burnout progresses through the following stages: greater "enthusiasm" for practice, "stagnation" in performance, "clinging" to practice, and ultimately "exhaustion."¹⁶⁾ Meanwhile, some studies have attempted to understand the overlap between burnout and depression and/or the relationships between them.^{21) 24)-31) 53) 54)} Several studies have assumed a bidirectional relationship between burnout and depression (including depressive states and depressive disorder) – *e.g.* cases of transition from burnout to depression, or cases of transition from depression to burnout.^{21) 27) 53)} Others have suggested that burnout may be an antecedent of depression.⁵⁵⁾ Additionally, it has been reported that exhaustion deriving from burnout is strongly related to depression.⁵⁶⁾ Currently, the conceptual distinction between burnout and depression is not well understood,⁵⁴⁾ making it unclear whether the final stage of burnout is in fact depressive disorder. That is, although burnout may not parallel depressive disorder, the detection of severe athlete burnout can still facilitate the prevention and early treatment of depression – especially in the case of athletes with melancholic personalities. Therefore, coaches, staff, and other team members should pay

close attention to expressions of “devaluation” and/or a “reduced sense of accomplishment” in sport in order to spot early symptoms of athlete burnout and hopefully prevent depressive disorder. Of course, in order to protect against depression among university athletes, coaches or other team staff might first expand their knowledge of mental health.

Conclusions

The ABQ-J showed acceptable reliability and validity; therefore, researchers may use it to measure Japanese university athletes' burnout according to international standards and the Japanese psychological-clinical model. Athlete burnout and depressive symptoms are closely correlated, and athletes with severe burnout face a significantly higher risk of moderate-to-severe depression (including depressive states and depressive disorder).

Limitations and future research

This study has the following limitations. First, the sample included only university athletes; this limits researchers' ability to generalize the present results. Future research should examine burnout in other types of athletes. While the sex ratio of our samples might be similar to the sex ratio of the overall university athlete population, we were not able to recruit a sufficient number of female participants; future studies should increase the size of their female samples. Additionally, odds ratios were used to quantify athletes' risk of depression; research using a longitudinal cohort would yield a more detailed understanding of the clinical risk of depressive disorder and depressive states among athletes with burnout. Finally, the cut-off points used to categorize participants based on their ABQ-J score were defined solely on the ABQ-J score ranges observed in the present sample and may not reflect the general athlete population. Research should aim to develop more representative cut-off values in order to extend the usefulness of the ABQ-J.

Ethical considerations

Ethical approval was obtained for both studies from the research ethics committee of Juntendo University (approval numbers 24-32 and 27-92).

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Author contributions

TR and YK provided their perspectives of sports psychology. MH provided knowledge of psychiatry. AK conceived the original research idea and drafted the manuscript.

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