

The Effect of Athletic Trainer Support on Mental Status in Student Athletes: A Randomized Controlled Trial

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Abstract

Objective: The effects of athletic trainer's supports on physical status are well established but that on mental status is unknown. This study examined the effects of trainer's supports on mental status among athlete students. **Methods:** This study was a randomized controlled trial with 2-arms. Intervention was a 3-month athletic trainer's supports. The main outcome was State-Trait Anxiety Inventory-State (STAI-S) and -Trait (STAI-T). **Results:** A total of 46 participants in the intervention (n = 31) and control arms (n = 15) were analyzed. Significant difference in change between arms was detected (-4.3, $p = 0.044$ for STAI-S, -5.6, $p = 0.001$ for STAI-T). **Conclusion:** An athletic trainer's supports were effective for anxiety improvement among athlete students.

Keywords

Athletic Trainer, STAI, Students, RCT, Japan

1. Introduction

There is no national qualification for athletic trainers in Japan, although the National Athletic Trainers' Association (NATA) certified athletic trainer (NATA-ATC) is recognized as an allied healthcare profession in most states in the USA (Grace, 1999). Thus, individuals with varied kinds of national medical certification generally engage as athletic trainers in Japan (Japan Sport Association, 2018). According to the Japan Sports Association (JSPO), the proportion of athletic trainers qualified as acupuncturists, physical therapists, and judo therapists is 33%, 23%, and 18%, respectively (Japan Sport Association, 2018).

Recently, athletic trainers have attracted attention because they could possibly be the solution to some issues arising in Japanese schools. The revised School Health and Safety Law made musculoskeletal examinations mandatory in Japanese schools in 2016. Although it is effective for early detection of musculoskeletal disorder, clarity is needed regarding who should provide continuous support to students after detection. Athletic trainers are expected to play this role. In addition, students who participate in extracurricular sports activities have high demands from athletic trainers. About a quarter of extracurricular activity advisers are not physical education teachers and have no experience of the sport that they provide training in (Japan Sport Association, 2021). Therefore, many students do not receive professional support for sports and need athletic trainers to support them in extracurricular sports activities.

Notably, an athletic trainer support develops good physical status. Popular support, such as early detection of overuse syndrome, appropriate endurance training, first aid treatment, and rehabilitation lead to better physical status. Athletes are often exposed to high stressful situations throughout their career. However, the effects of athletic trainer support on mental status lack clarity. If an athletic trainer support helped develop good physical status, we hypothesized that it also had a positive effect on mental status. Determining the effect of athletic trainer support on mental status contributes to finding a new pathway for mental health improvement in athletes. It also contributes to the enhancement of athletic trainer employment in Japanese schools. This study examined the effects athletic trainer support on the mental status in student athletes.

2. Methods

2.1. Participants

This trial was conducted at Hamamatsu University School of Medicine, Japan. The university had approximately 1000 students enrolled, consisting of the medical department (6 years) and nursing department (4 years). The eligibility criteria were university students participating in extracurricular sports activities. Exclusion criteria were extracurricular sports activities where consent could not be obtained from all members. Recruitment was conducted using a poster on campus bulletin board in September 2016. Participants attended a briefing session and heard an explanation of the aim of study.

2.2. Instrumentation

The primary measure employed in this study was the State-Trait Anxiety Inventory (STAI) (Nakazato, 1982; Spielberger et al., 1971). The STAI assesses the two dimensions of state anxiety (STAI-S) and trait anxiety (STAI-T). It is a self-administered questionnaire consisting of 40 questions answered on a 4-point Likert scale. Total scores on both the STAI-S and STAI-T range from 20 to 80, with higher scores indicating higher levels of anxiety. Additionally, data on sex, age, grade, and sports history were obtained using a self-administered questionnaire.

2.3. Tasks

Popular athletic trainer support was provided for 3 months from October 2016. An athletic trainer who was qualified as a Judo therapist, JSPO certified Athletic Trainer (JSPO-AT), National Strength and Conditioning Association's Certified Strength and Conditioning Specialist and Certified Personal Trainer, and who had over five years of experience as an athletic trainer participated in the study. The athletic trainer provided popular support. All participants were instructed to stretch their lumbar spine, shoulder, and hip joints. Endurance training in the form of front planks for trunk stabilization, squats, and bench presses for strength improvement were conducted. First aid treatment involved icing and high-voltage electrical stimulation for acute sprains. Elastic and non-elastic taping was used on a student with a history of anterior cruciate ligament rupture and some students with ankle sprain histories, respectively. The frequency of extracurricular sports activity was approximately 2 - 3 hours/time and 3 times/week. The same support was provided to the control arms after the intervention period.

2.4. Procedures

This study was a 2-armed parallel cluster randomized controlled trial (RCT). The allocation ratio between the intervention and control arms was 1:1. An extracurricular sports activity was regarded as a cluster unit. A block randomization method with a block size of 2 (two possible sequences: intervention-control and control-intervention) was used. Block sequences were determined using random computer-generated numbers.

Data were obtained at baseline and after 3 months of intervention.

This trial was approved by the Institutional Review Board of Hamamatsu University School of Medicine (16-108) with the University Hospital Medical Information Network (trial ID 000023893). Informed consent was obtained from all the participants.

2.5. Statistical Analysis

The Shapiro-Wilk test and Levene's test were used to determine the normality of the distribution and homogeneity of variance, respectively. If normality was assumed, comparisons were performed using Student's t-test for homogeneity and Welch's t-test for heterogeneity. The Mann-Whitney t-test was used for assumed non-normality. Additionally, Cohen's d was calculated as a measure of effect size. Effect sizes of 0.2, 0.5, and 0.8 were generally regarded as small, medium, and large, respectively (Cohen, 1988). Statistical significance was determined by a two-sided alpha level of 0.05, and beta was set at 0.20 for a power of 0.80. Statistical analyses were performed using SPSS version 27.

3. Results

A flowchart of this trial is shown in **Figure 1**. A total of four extracurricular

sports activities (tennis, kendo, handball, and athletics clubs; $n = 93$) were involved in this trial. Two activities were randomly allocated to either the intervention (tennis and kendo clubs; $n = 59$) or control arm (handball and athletics clubs; $n = 34$). One student belonged to extracurricular sports activities in both the intervention and control arms and was thus excluded from the control arm. Baseline data were obtained from 50 and 24 participants from the intervention and control arms respectively; each of the nine participants had already retired from extracurricular sports activities. After the intervention, there were 31 and 15 participants in the intervention and control arms, respectively; 19 and 9 participants, respectively, did not provide complete data.

The baseline characteristics are summarized in **Table 1**. Mean age (standard deviation (SD)) was 20.5 (1.4) and 20.7 (1.4), and the number of male participants was 18 (58.1%) and 12 (80.0%) among the intervention and control arms, respectively.

The STAI scores are listed in **Table 2**. The mean score (SD) of the STAI-S decreased by 1.2 (5.1) in the intervention arm, although it increased by 3.1 (8.9) in the control arm. The mean score (SD) of the STAI-T decreased by 2.0 (4.8) in the intervention arm, although it increased by 3.6 (5.8) in the control arm. Significant differences were observed in the changes between the arms ($p = 0.044$ for STAI-S, $p = 0.001$ for STAI-T). Cohen's d was 0.653 and 1.096 for the STAI-S and STAI-T, respectively.

4. Discussion

Three months of athletic trainer support decreased the STAI-S and STAI-T scores among athlete students. The effect sizes were medium to large for the STAI-S, and large for the STAI-T.

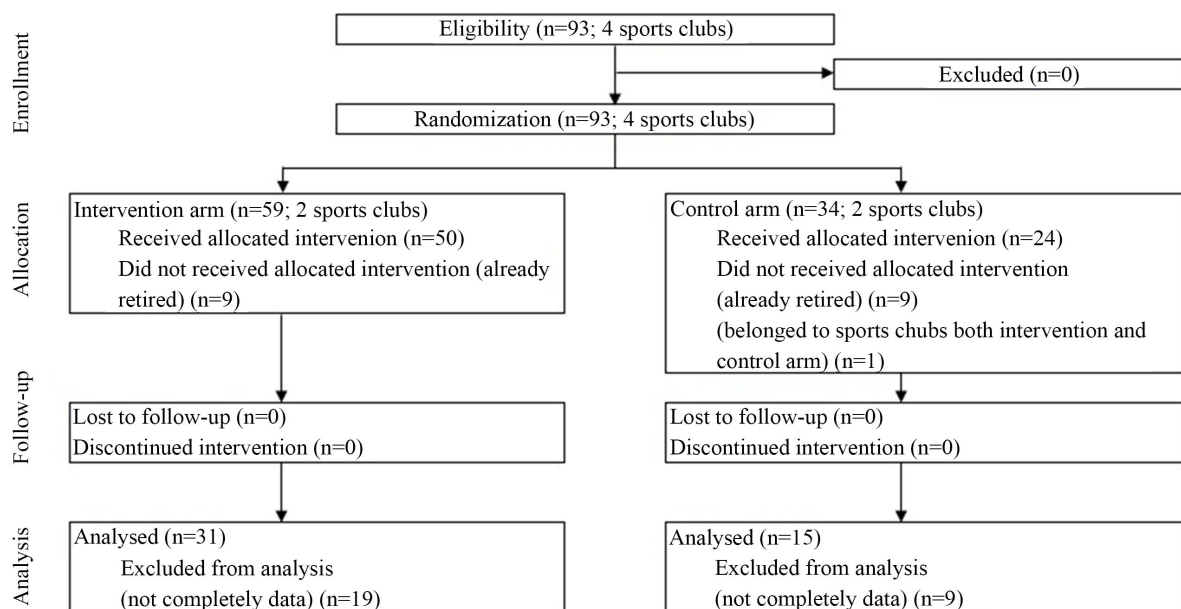


Figure 1. Flowchart.

Table 1. Characteristics.

		Intervention arm (n = 31)		Control arm (n = 15)	
		N (%) or Mean SD		N (%) or Mean SD	
Club	Tennis	17	(54.8%)	0	(0%)
	Kendo	14	(45.2%)	0	(0%)
	Handball	0	(0%)	9	(60.0%)
	Athletics	0	(0%)	6	(40.0%)
Male		18	(58.1%)	12	(80.0%)
Age (years)		20.5	1.4	20.7	1.4
Grade	1st	9	(29.0%)	7	(46.7%)
	2nd	6	(19.4%)	1	(6.7%)
	3rd	10	(32.3%)	2	(13.3%)
	4th	4	(12.9%)	5	(33.3%)
	5th	2	(6.5%)	0	(0%)
	6th	0	(0%)	0	(0%)
Sports history	Same kind of club (years)	5.0	4.6	3.3	3.1
	Including other kinds (years)	9.7	4.8	7.1	5.5

SD, standard deviation.

Table 2. STAI scores by arms.

		Intervention arm (n = 31)		Control arm (n = 15)		Change within Arms				Difference in change between arms		
						Intervention arm		Control arm				
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	<i>p</i> -value	Cohen's <i>d</i>
STAI-S	Baseline	40.4	6.8	38.3	10.6							
	3 month	39.1	8.3	41.3	11.0	-1.2	5.1	3.1	8.9	-4.3	0.044	0.653
STAI-T	Baseline	45.2	8.1	41.7	10.4							
	3 month	43.2	8.4	45.3	11.1	-2.0	4.8	3.6	5.8	-5.6	0.001	1.096

STAI, State-Trait Anxiety Inventory; SD, standard deviation; STAI-S, State-Trait Anxiety Inventory-State; STAI-T, State-Trait Anxiety Inventory-Trait.

Two mechanisms are thought to have reduced anxiety. First, anxiety was reduced by support content. Previous studies have reported that anxiety was reduced by training programs such as endurance training (Bibeau et al., 2010), aerobic training and combined training (Aşçı, 2003; Herbert et al., 2020). Meta-analyses have shown that exercise reduces anxiety (Asmundson et al., 2013; Biddle & Asare, 2011; Strickland & Smith, 2014). Conditioning programs, such as massage and stretching (Leivadi et al., 1999; Zhang et al., 2021), also reduce anxiety. Additionally, athletic rehabilitation reduces anxiety (Yang et al., 2014). Our results are consistent with those of the previous studies. Second, the pres-

ence of a trainer reduced anxiety. An athlete could receive appropriate first-aid treatment when they were injured. Athletes could ask about and engage in conditioning methods such as stretching and endurance training anytime. They could also play sports with relief.

The strength of this study is that it used an RCT design. It was difficult to randomly allocate participants in extracurricular sports activities because sports activities were generally conducted in groups. Therefore, we regarded extracurricular sports activity as a cluster and allocated it randomly.

However, our study has some limitations. This study only targeted four extracurricular sports activities and only one university. Furthermore, these results were restricted to Japan. Studies involving several regions and countries, sports categories, generations, and athlete levels are necessary for further elaboration. Thus, our results do not have high population validity. Another limitation is that the skill level of the athletic trainer was not assessed. Athletic trainer systems differ by country, as mentioned earlier. The JSPO is a formal affiliate organization of the NATA. Thus, JSPO-AT is at a level similar to NATA-ATC.

5. Conclusion

We conducted an RCT to examine the effect athletic trainer support had on the mental status of student athletes. Although this trial was restricted to a Japanese university, it showed that athletic trainer support reduced anxiety. This study has implications for athletic trainer support as an effective approach for mental improvement in athletes. This study provides a practical suggestion to improve the mental status of athlete by athletic trainer's supports.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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