

# Relationship between Hardiness and Exercise Habits in Japanese Undergraduates

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## Abstract

This study examined the relationship between hardiness and exercise habits. 468 undergraduates participated. They answered questionnaires measured by the Hardiness Scale. We asked participants whether they exercised daily, their exercise time and frequency, and whether they belong to an athletic club activity or exercise circle. Participants were then divided into groups according to their answers about exercise habits. The results indicate that the Exercise group has significantly higher scores on the three general components of hardiness (Commitment, Control, and Challenge) than the Non-Exercise group. The Athletic Club Activity group has a significantly higher score on Commitment than the Exercise Circle and Non-Exercise groups, and a significantly higher score on Control than the Non-Exercise group. There was no significant correlation between hardiness and amount of exercise. The Athletic Club Activity group tended toward higher scores on Commitment than the Exercise Circle group in participants who exercised for the same amount of time per week. These results lead to the conclusion that the Commitment score component of hardiness is associated not with differences in exercise time, but by differences in belonging.

## 1. Introduction

Athletes are under considerable stress because of various reasons such as expectation and pressure from others and competitive records, [1] which negatively effects their performance. Some athletes show psychological and physical symptoms (e.g., depression, gastric ulcers) under stress; however, others experience similar stress without such symptoms. The difference is considered to involve various personal factors, including personality. Kobasa (1979) proposed that “hardiness” is a constellation of personality characteristics that function as a resistance resource when an individual encounters stressful life events

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[2]. The personality dispositions of hardiness are commitment, control, and challenge. The commitment disposition is expressed as a tendency to involve oneself in (rather than experience alienation from) whatever one is doing or encounters. The control disposition is expressed as a tendency to feel and act as if one is influential (rather than helpless) in the face of the varied contingencies of life. The challenge disposition is expressed as a belief that change rather than stability is normal in life and that the anticipation of changes are interesting incentives to growth rather than threats to security [3].

Previous studies on hardiness have revealed that participants with high hardiness have stronger resistance to stress [4, 5]. Furthermore, other studies show that they select more positive stress coping techniques than participants with low hardiness [6]. Furthermore, it has been reported that participants with high hardiness experience less work stress, have better psychological conditioning, and as a specific example, pre-school teachers have high efficacy [7, 8]. These reports show that persons with high hardiness are mentally sharp and stay positive.

Many studies have reported the effect of exercise on reducing stress [9-12]. As described above, although a large number of studies have been made on the relationship between hardiness and stress, little is known about the relationship between hardiness and exercise. Previous studies' participants who exercised frequently during the week experienced less stress [13]. Therefore, those who exercise daily are thought to have higher hardiness than those who do not. It is possible that persons who belong to an athletic club activity and exercise circle or who exercise for enjoyment were present in persons who exercise daily as undergraduates. Exercising as part of an athletic club activity or exercise circle and exercising for enjoyment are expected to differ in exercise time, frequency and the purpose of belonging. The purpose of this paper discloses the relationship between hardiness and exercise habits, focusing particularly on the effects of daily exercise, differences in exercise time and frequency, and belonging to an athletic club activity or belonging to an exercise circle.

## 2. Methods

### 2.1. Participants

In May 2012, 468 undergraduate freshmen participated in this study (males=180; females=288; mean age=18.2; SD=0.8 years). At the outset, we explained the purpose of the survey to all participants, and obtained their consent.

### 2.2. Measurement of hardiness

Hardiness was measured using the Hardiness Scale for undergraduates, comprising three subscales (i.e., Commitment, Control, and Challenge) [5].

### 2.3. Measurement of exercise habits

We asked participants whether they exercised daily, their exercise time, their exercise frequency, and whether or not they belonged to or had membership in an athletic club activity or exercise circle.

To clarify the relationship between hardiness and exercise, we divided participants into groups on the basis of whether they exercised daily or not: (a) the Exercise group (n=234) and (b) the Non-Exercise group (n=234). We further divided the Exercise group into two groups to compare the relationship between hardiness and exercise according to differences in exercise time and frequency: (a-1) the Athletic Club Activity group (n=101) and (a-2) the Exercise Circle group (n=133).

Furthermore, we divided participants to clarify the relationship between hardiness and amount of exercise (the Exercise group: n=234). We divided participants in the Athletic Club Activity group and the Exercise Circle group who exercise the same amount of time per week (exercise time per day  $\times$  exercise frequency per week) in order to clarify the relationship between hardiness and belonging to an athletic club or exercise circle (the Athletic Club Activity group: n=18 and the Exercise Circle group: n=11).

### 3. Results

#### 3. 1. Relationship between hardiness and presence or absence of exercise

To clarify the relationship between hardiness and presence or absence of exercise, we compared the scores of the three general components of hardiness in the Exercise and Non-Exercise groups (Fig. 1). Independent t-test analysis indicated that the Exercise Group has significantly higher scores on Commitment ( $t(466)=4.865$ ,  $p < .001$ ), Control ( $t(466)=3.593$ ,  $p < .001$ ), and Challenge ( $t(466)=2.391$ ,  $p < .05$ ) than the Non-Exercise group.

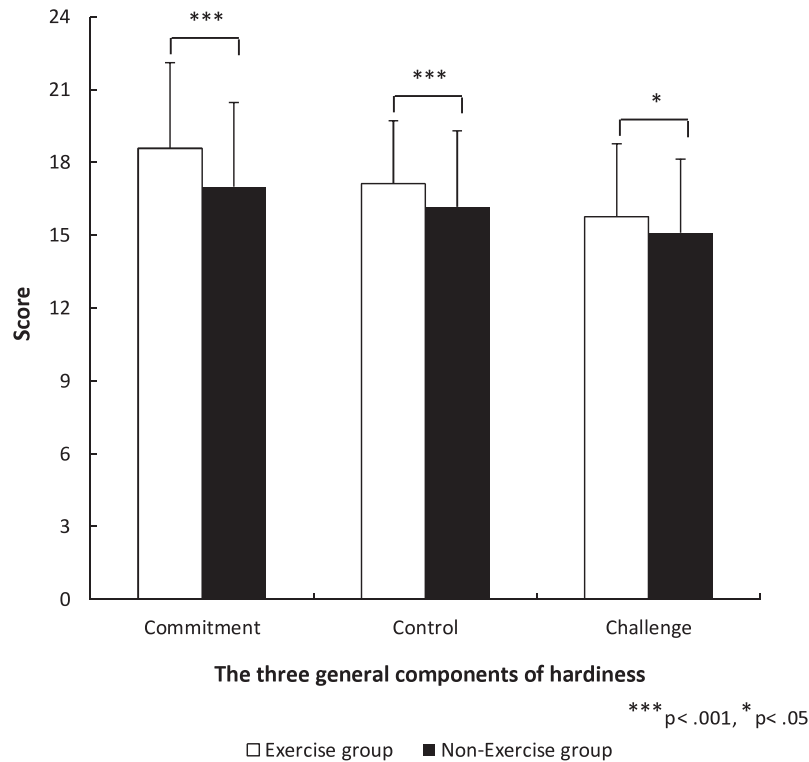


Fig. 1 Comparison of the average score of the three general components of hardiness in the Exercise and Non-Exercise groups

#### 3. 2. Relationship between hardiness and differences in exercise time and frequency

Participants who belong to an athletic club or exercise circle or who exercise for enjoyment were included in the Exercise group. It is thought that they differ in their hardiness because of the difference of exercise time and frequency. We need to examine the subdivided Exercise group to clarify the relationship between hardiness and exercise. Accordingly, to clarify the relationship between hardiness and differences in exercise time and frequency, we compared the scores of the three general components of hardiness in the Athletic Club Activity, the Exercise Circle, and the Non-Exercise groups (Fig. 2). One-way ANOVA indicated that a main effect for Commitment and Control scores was found ( $F(2,465)=18.993$ ,  $p < .001$ ;  $F(2,465)=8.071$ ,  $p < .001$ ). A main effect for the Challenge score was not observed, although there was a tendency toward Challenge score differences ( $F(2,465)=2.932$ ,  $p < .10$ ). According to Tukey's multiple comparison method, the Athletic Club Activity group has a significantly higher score on Commitment than the Exercise Circle and the Non-Exercise groups, and a significantly higher score on Control than the Non-Exercise group. The Exercise Circle group tends toward higher scores on the three general components of hardiness than the Non-Exercise group.

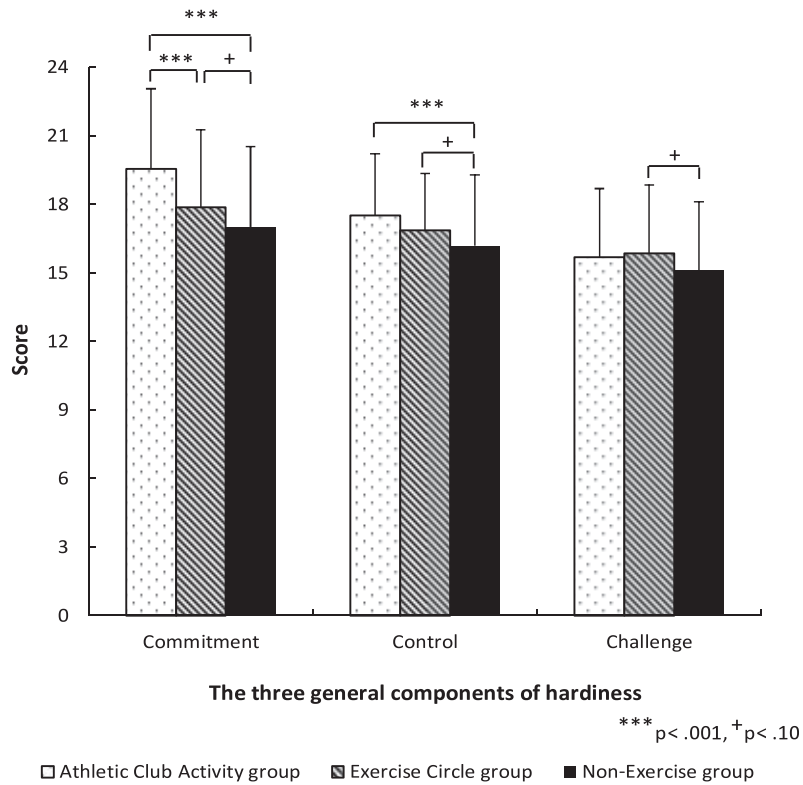


Fig. 2 Comparison of the average score of the three general components of hardiness in the Athletic Club Activity, Exercise Circle, and Non-Exercise groups

3. 3. Relationship between hardiness and amount of exercise and belonging

These results lead to the conclusion that the Athletic Club Activity and Exercise Circle groups have personalities strong to stress. However, this result is considered to be influenced by the two effects of exercise and belonging. For example, Joh (2010) reports that experience of extracurricular activity leads to an increase in hardiness [6]. Therefore we analyzed the relationship between hardiness and amount of exercise and belonging.

Figure 3 presents a histogram of exercise time per week in the Athletic Club Activity and Exercise Circle groups. The highest number of participants with the same exercise time was six hours per week in the Athletic Club Activity and the Exercise Circle groups.

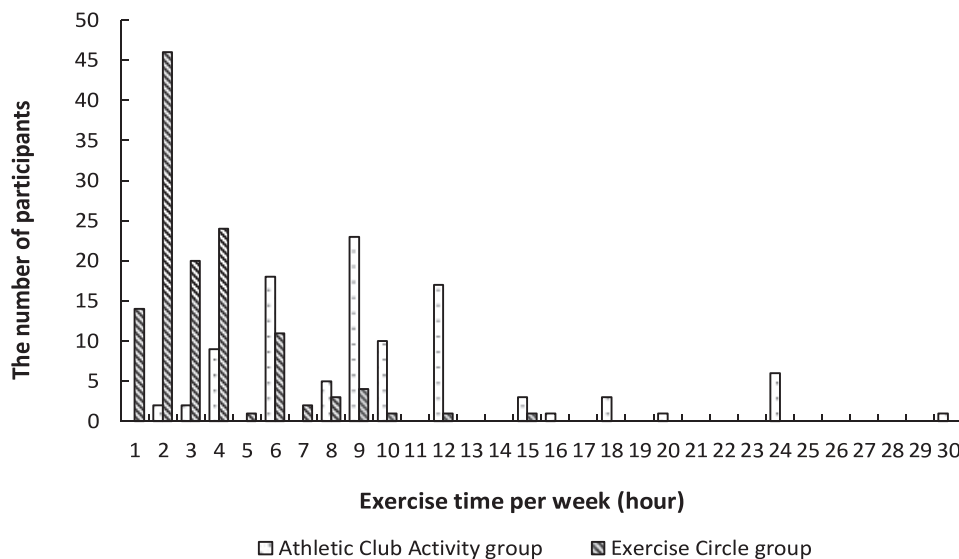


Fig. 3 Histogram of exercise time per week in the Athletic Club Activity and Exercise Circle groups

To clarify the relationship between hardiness and belonging (thus eliminating the influence of exercise time), we compared the scores of the three general components of hardiness in the Athletic Club Activity and Exercise Circle groups (Fig. 4). Independent t-test analysis indicated that although there is no significant differences, the Athletic Club Activity group tends toward a higher score on Commitment than the Exercise Circle group ( $t(27)=1.791, p < .10$ ).

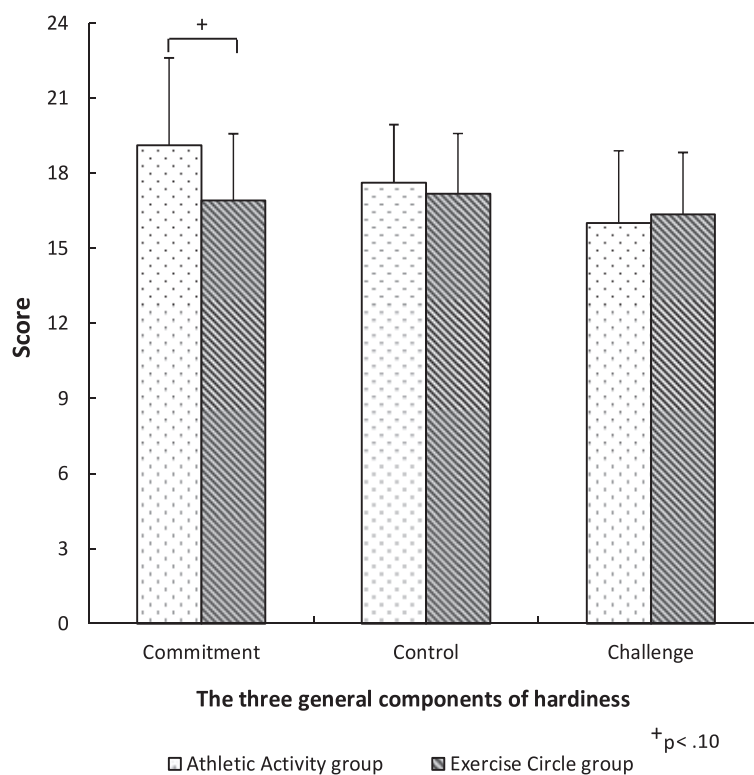


Fig. 4 Comparison of the average score of the three general components of hardiness in the Athletic Club Activity and Exercise Circle groups who exercise the same amount of time per week

Second, to clarify the relationship between hardiness and exercise time (thus eliminating the influence of belonging), intercorrelations between the scores of the three general components of hardiness and exercise time per week in the Exercise, Athletic Club Activity, and Exercise Circle groups are presented in Table 1. There was no significant correlation between the scores of each of the three general components of hardiness and exercise time per week in these groups.

Table 1 Correlations between the scores of the three general components of hardiness in the Athletic Club Activity, Exercise Circle, and Non-Exercise groups who exercise the same amount of time per week

	Exercise time per week		
	Exercise group (n=234)	Athletic Club Activity group (n=101)	Exercise Circle group (n=133)
Commitment	.187	.142	-.106
Control	.138	.134	.044
Challenge	-.022	-.085	.015

#### 4. Discussion

The present study examined the relationship between hardiness and exercise habits. To begin with, we addressed the relationship between hardiness and presence or absence of exercise. The Exercise group has significantly higher scores on the three general components of hardiness than the Non-Exercise group. This result suggests that the Exercise group has personalities strongly resistant to stress compared to the Non-Exercise group. As mentioned above, because it has been reported that participants with a high frequency of exercise on average per week experience less stress [10], those who exercise daily are thought to have higher hardiness than those who do not.

Then, we subdivided the Exercise group into the Athletic Club Activity and Exercise Circle groups, and addressed the relationship between hardiness and exercise. The results indicated that the Athletic Club Activity group has a significantly higher score on Commitment than the Exercise Circle and Non-Exercise groups, and a significantly higher score on Control than the Non-Exercise group. This result suggests that the Athletic Club Activity group has positiveness and is confident in solving problems individually. Exercise that aims to improve game power or technique and those that aim for enjoyment, maintenance, and improvement of health differs in their approach. It is possible that the Athletic Club Activity group was more aggressive than the Exercise Circle and Non-Exercise groups. It is also possible that the Athletic Club Activity group can solve problems individually more readily than the Non-Exercise group. The Exercise Circle group tends toward higher scores on the three general components of hardiness than the Non-Exercise group. This result raises the possibility that the participants of the Athletic Club Activity group have personalities more strongly resistant to stress compared to the Exercise Circle group. However, even the Exercise Circle group, which differs from the Athletic Club Activity group in amount and purpose of exercise, scores higher on hardiness than participants who do not exercise.

Finally, there is a difference between the Commitment score of the Athletic Club Activity group and that of the Exercise Circle group. To clarify this difference, we addressed the relationship between hardiness and amount of exercise and belonging. Results showed no significant correlation between hardiness and amount of exercise; this suggests a weak relationship between hardiness and amount of exercise. Meanwhile, participants in the Athletic Club Activity group tend toward higher scores on Commitment than participants in the Exercise Circle group who exercise the same amount of time per week. This result suggested that it is possible that differences in the purpose of the exercise are an association with the Commitment score. The Athletic Club Activity group exercises to improve game power and technique. However, the Exercise Circle group aims to enjoy the exercise, and maintain and improve their health. Differences in the purpose of the exercise are associated with commitment. However, we were unable to clarify the causal relationship of hardiness and exercise. We hypothesize that exercise serves to obtain personalities strongly resistant to stress, and belonging to an athletic club leads to an increase in commitment and is known to give a positive effect both mentally and physically. When the causal relationship of hardiness and exercise became clear, there was then an expectation that exercise would not only affect stress reduction but also affect improvement in thinking negatively about stress. To clarify the causal relationship of hardiness and exercise is an important problem for study on hardiness in the future.

#### 5. Conclusion

These results lead to the conclusion that participants who exercise daily have higher hardiness than those who do not. In addition, results revealed that differences in belonging (but not differences in amount of exercise) are involved in differences of commitment between those who belong to an athletic club activity and those who belong to exercise circle groups.

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