

Research on the Impact of Tree Climbing Sports Courses on University Students' Psychological Resilience

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There is currently limited research on the impact of tree-climbing physical education courses on college students' mental health. Therefore, this study takes the tree-climbing physical education course offered at Xiamen University as a platform to conduct a more in-depth investigation into psychological resilience among university students. Using experimental and data analysis methods, the study measures students' psychological resilience before and after participation using the CD-RISC Resilience Scale, analyzing the specific effects of the tree-climbing physical education course on students' psychological resilience.

Keywords: tree-climbing physical education course, psychological resilience, college students

Concept of Psychological Resilience

The term “resilience” originates from physics, referring to an object's ability to deform under external force and then return to its original size and shape once the force is removed. It was introduced into psychology in the 1970s. Subsequently, different scholars have translated it variously as psychological toughness, adversity quotient, or psychological recovery capacity based on their own interpretations. This study adopts the translation “psychological resilience,” as it better captures the essence of “resilience.”

Research on psychological resilience generally falls into three perspectives. The first, represented by Masten (1995), is the outcome-oriented view, which defines resilience as individuals' ability to adapt well or develop positively even in adverse environments—essentially, resilience as a favorable adaptation resulting from overcoming adversity. The second, represented by Connor and Davidson (2003), is the trait-oriented perspective, viewing resilience as an individual's capacity or characteristic demonstrated when coping with stress or negative events; specifically, the ability to endure high levels of disruptive change or recover from emergencies while exhibiting fewer maladaptive behaviors and strong environmental adaptation. The third, represented by Kathleen, is the process-oriented view, regarding resilience as a dynamic and evolving process emphasizing individuals' active adjustment and adaptive responses during times of setbacks (Tusaie & Dyer, 2004). Although these three perspectives differ, they all share two common elements: first, individuals experience adversity and hardship; second, they overcome adversity and adapt positively to their environment.

In this study, we primarily adopt the trait-based perspective of psychological resilience as proposed by Connor and Davidson (2003)—that is, resilience refers to an individual's capacity or trait in dealing with stress

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and other negative events, enabling them to withstand significant disruptive changes or recover from crises, while demonstrating fewer maladaptive behaviors and strong environmental adaptation.

Measurement of Psychological Resilience

Currently, several scales are commonly used to measure psychological resilience:

Bartone et al. (1989) developed the Ego Resilience Scale, consisting of 45 items across three dimensions: control, execution, and challenge, primarily designed to assess psychological tolerance.

Wagnild and Young (1993) jointly developed the Resilience Scale, comprising 25 items divided into two subscales: personal competence and self-acceptance. The scale includes five dimensions and uses a 7-point scoring system.

Friborg et al. (2003) developed the Resilience Scale for Adults (RSA), containing 33 items and employing a 7-point rating scale. The scale consists of five dimensions: personal competence, social resource support, family harmony, attitude toward the future, and organizational style. The Connor-Davidson Resilience Scale (CD-RISC), developed by Connor and Davidson (2003), comprises 25 items scored on a 5-point scale and is divided into five dimensions: competence, tolerance of negative emotions, acceptance of change, control, and spiritual support. In 2007, Chinese scholars Yu Xiaonan and Zhang Jianxin revised the scale to better suit the psychological resilience assessment of Chinese individuals, taking into account cultural differences between East and West. Although the revised version retained the same number of items and scoring method as the original, it reduced the number of dimensions from five to three—resilience, optimism, and self-reliance. This revised scale has been widely used in subsequent studies, effectively assessing multiple subject groups and suitable for college students, demonstrating good reliability and validity. Therefore, this study adopts the Chinese revised version of this scale, which has an internal consistency reliability of 0.89 and test-retest reliability of 0.87.

While learning from foreign research, domestic scholars have also developed their own scales. For example, Yang Yi (2005) developed the “College Students’ Resilience Scale,” consisting of 31 items and six dimensions. Hu Yueqin and Gan Yiqun (2008) developed the “Adolescent Psychological Resilience Scale,” comprising 27 items and five dimensions.

Research on Physical Education Courses and Psychological Resilience

In studies examining rock climbing courses and psychological resilience, Zhang (2019) found that rock climbing significantly influences the willpower development of middle school students, with longer participation associated with stronger effects. It was recommended that prolonged practice of rock climbing could significantly enhance students’ willpower. Zhao (2015) concluded that rock climbing positively and significantly improves college students’ ability to cope with setbacks. Regarding wilderness survival courses, Hu (2019) demonstrated that wilderness survival training significantly enhances university students’ willpower, particularly in the dimensions of independence, decisiveness, and perseverance, showing significant differences before and after the intervention. Bao Junchao (2011) found that participation in team sports positively affects college students’ psychological resilience. Chen and Bao (2014) reported a moderate correlation between college students’ psychological resilience and variables such as duration of sports participation and choice of sport. Hai (2012) indicated that physical exercise has a positive predictive effect on college students’ psychological resilience. These findings suggest promising implications for enhancing psychological resilience among college students through sports participation.

This experiment involved 35 college students enrolled in the tree-climbing course at Xiamen University and 30 non-athletic undergraduate students. A total of 130 questionnaires were distributed, with 126 valid responses collected, resulting in a valid response rate of 96.92%.

Experimental Method

Students enrolled in the tree-climbing physical education course at Xiamen University formed the experimental group, while the 30 non-athletic undergraduates constituted the control group. First, prior to the experiment, all participants were assessed using the CD-RISC Psychological Resilience Scale, followed by data analysis and homogeneity testing. Second, 12 weeks later, the same scale was administered again to assess changes and collect new data. Finally, all data were analyzed using SPSS statistical software to examine the impact of tree-climbing physical education courses on college students' psychological resilience.

Comparison of Psychological Resilience Levels Before and After the Tree-Climbing Course

Table 1

Comparison of Psychological Resilience Levels Before and After the Tree-Climbing Course

	Mean	Standard Deviation	Standard Error of Mean	<i>t</i>	df	<i>p</i>
Resilience (Pretest–Posttest)	-3.28	6.28	1.09	-3.26	38	0.002
Optimism (Pretest–Posttest)	-1.35	4.01	0.64	-2.11	38	0.041
Self-efficacy (Pretest–Posttest)	-0.28	2.42	0.38	-0.72	38	0.472
Psychological Resilience (Pretest–Posttest)	-5.02	10.09	1.61	-3.10	38	0.004

Refer to the descriptive statistics for the tested variables. The table presents scores for psychological resilience and its three sub-dimensions before and after the tree-climbing course, along with sample size, mean, standard deviation, and standard error of the mean. The sample size for the tree-climbing course was 39. The average psychological resilience score before the experiment was 83.30, with a standard deviation of 10.40 and a standard error of the mean of 1.66. The correlation coefficient between pretest and posttest scores was 0.477 ($p = 0.002 < 0.05$), indicating a significant relationship between the two variables.

Furthermore, as shown in Table 1, paired-samples *t*-tests were conducted to compare psychological resilience scores before and after the tree-climbing course. Statistical analysis revealed that the mean total psychological resilience score after the intervention (88.33) was significantly higher than before (83.30) ($p = 0.004 < 0.05$), indicating a significant difference in overall psychological resilience between pre- and post-intervention in the experimental group. Detailed descriptions of the sample size, means, standard deviations, and standard errors of the mean for the three sub-dimensions—resilience, optimism, and self-efficacy—are not provided here. Regarding the resilience dimension, the mean score after the intervention (45.07) was significantly higher than before (41.79) ($p = 0.002 < 0.05$), suggesting a notable improvement in this dimension. For the optimism dimension, the mean score after the intervention (29.07) showed only a slight increase compared to the pretest score (27.71), but the difference was marginally significant ($p = 0.041 < 0.05$). In contrast, the self-efficacy dimension showed no significant change, as the mean score after the intervention (14.07) was slightly higher than before (13.79), but the difference was not statistically significant ($p = 0.472 > 0.05$).

The results of testing “changes in psychological resilience levels among college students before and after specialized physical education courses” indicate that the test statistic $t = -3.10$, $p = 0.004 < 0.05$. This suggests a

significant difference in psychological resilience levels before and after participation in the tree-climbing course, demonstrating that the course had a positive and promoting effect on students' psychological resilience.

Comparison of Psychological Resilience Levels in the Control Group Before and After the Experiment

Table 2

Comparison of Psychological Resilience Levels in the Control Group Before and After the Experiment

	Mean	Standard Deviation	Standard Error of Mean	<i>t</i>	df	<i>p</i>
Resilience (Pretest–Posttest)	-1.33	10.80	1.97	-0.67	29	0.504
Optimism (Pretest–Posttest)	-1.23	5.81	1.06	-1.16	29	0.255
Self-efficacy (Pretest–Posttest)	-1.24	4.53	0.82	-0.24	29	0.664
Psychological Resilience (Pretest–Posttest)	0.14	2.83	0.51	0.19	29	0.848

As shown in Table 2, paired-sample *t*-tests were conducted on the resilience scores of the control group before and after the experiment. Statistical analysis revealed no significant differences in total resilience scores or in the three dimensions—resilience, optimism, and self-efficacy ($p > 0.05$). This indicates that there was no change in the psychological resilience levels of college students in the control group before and after the experiment, suggesting no difference in their resilience levels over time.

Conclusion

The 12-week tree-climbing physical education course had a significantly positive effect on college students' psychological resilience. The results indicate that this course effectively improved and enhanced students' psychological resilience.

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