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# Comprehensive Assessment of the Psychological Burden for Students in Physical Education Classes in Chinese Universities

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Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
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**Background:** Physical education (PE) is part of the curriculum in Chinese universities. The psychological burden, or anxiety levels, for students in PE classes, can result from several factors, including teaching content, teaching environment, and the organization of the teaching methods. The aim of this study was to assess the psychological burden on students in PE classes in Chinese universities.

**Material/Methods:** The study included 400 students (200 men and 200 women) from a Chinese university, who participated in PE classes. The distribution of the levels of psychological burden associated with PE was assessed using subjective measurements and a fuzzy comprehensive evaluation method that to provide an integrated framework combining the results of judgments made at multiple stages of the evaluation process.

**Results:** Of the 400 study participants who attended PE classes, 61.5% of male students and 47.5% of female students coped well or very well when dealing with the perceived psychological burden; 33.5% of male students and 42.5% of female students reported a medium level of psychological burden. Few students reported a high level of psychological burden associated with PE classes. The average psychological burden in female students was greater than for male students who participated in PE classes.

**Conclusions:** The combination of subjective measurement of the psychological burden associated with PE classes by university students in China, combined with a fuzzy comprehensive evaluation method showed that female university students might require more support than male students to overcome any psychological burden associated with PE classes.

**MeSH Keywords:** **Academic Medical Centers • Physical Education and Training • Stress, Psychological • Students, Health Occupations**

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## Background

Physical education (PE) is an important component of the curriculum in Chinese universities. Current PE teaching in Chinese universities is a complicated process that consists of five components: main sports skills, sports participation, physical health, mental health, and social adaptation. Comprehensive analysis and assessment of student performance at PE classes are part of the current educational curriculum. However, the assessment of students in PE classes is often limited to physical or physiological indices, while the psychological burden, including anxiety levels, which students carry in doing sports are ignored [1]. As a result, psychological factors, including anxiety regarding PE, which may lead to reduced motivation to undertake PE, have been poorly studied.

In Chinese universities, it is currently recommended that students should develop overall health, but physiological health can be neglected [1]. It is known that students can be affected by several factors in different levels in PE classes, including subjective and objective factors, including environmental factors, teaching factors as well as the individual psychological characteristics of the students. The main methods used to measure the psychological burden, or levels of anxiety, in students doing PE are subjective measurement methods [2], and include the fuzzy comprehensive evaluation method that provides an integrated framework combining the results of judgments made at multiple stages of the evaluation process [3], task measurement methods [4], and physiological measurement methods [5].

The Likert questionnaire, using 7-point or 9-point scales, can be used as a subjective measurement method, but there are also different indicators that can be used as measurement methods for the evaluation of psychological burden, or levels of anxiety, in students [6–8]. The advantages of using subjective measurement methods are the convenience of use, the ease of comparison between task results, and relatively high validity. However, the disadvantages of using subjective measurement methods are that the credibility of the measurement results may be questionable. The advantage of using the fuzzy comprehensive evaluation method is that ambiguous evaluation or data can be evaluated through precise computational methods, resulting in quantitative evaluations that are more scientifically based, and have a practical use for ambiguous or subjective information [3]. The disadvantages of the use of the fuzzy comprehensive evaluation method are that the computation may be complicated and the confirmation of the index weight vectors is relatively subjective [3]. The strength of task measurement is that it can guarantee the accuracy of measurement by conducting direct and objective measurement on psychological burden in the process of individual learning or completing tasks, but the weakness of task measurement is that

it is not convenient for horizontal comparison because the results are related to the nature of the tasks being evaluated [9].

The strengths of physiological measurements during PE are their strong objectivity and low external interference, but their limitations are that the method requires high standards of the hardware and test procedures, and also requires specialist analysis of complex data [10]. Also, there is an indirect relationship between the psychological burden of PE and physiological indices, and so tasks of different nature are difficult to compare with each other [10].

Rather than using traditional single evaluation methods for the evaluation of the psychological burden on university students in PE classes in China, and with the aim of determining the varied factors that influenced psychological stress, the aim of this study was to evaluate the combination of both psychological and physiological factors, using a combination of both subjective and objective factors that affect psychological burden on university students in PE classes in China with the aim of providing guidance for an evidence-based approach to reducing this psychological burden in the future and to improve the physical and mental health of his population.

## Material and Methods

### Study participants

The study included 400 university students who were selected as the research subjects, including 200 men and 200 women. Written informed consent was obtained from all participants. The study was approved by the local Ethics Committee. Ten senior teachers were included in the study assessment team.

### The comprehensive evaluation method

In this study, the subjective measurement method and the fuzzy comprehensive evaluation method were combined to measure the level of psychological burden for university students in PE classes.

Objective indicators were evaluated by a subjective measurement method. These objective indicators included teaching conditions, interpersonal relationships, and the environment. Subjective indicators, which affect psychological burden, including attention, emotion, and willpower were evaluated by the fuzzy comprehensive evaluation method.

The level of psychological burden was obtained from the weighted average test results from the two methods, subjective measurement method and the fuzzy comprehensive evaluation method. Table 1 shows the components of the evaluation on

**Table 1.** Comprehensive evaluation indicator system used to evaluate the psychological burden of university students undertaking physical education (PE) classes in China.

1 <sup>st</sup> Class Index	Weight	2 <sup>nd</sup> Class Index	Index Connotation	Weight
Teaching factors	0.33	Content fitness	Adaptability to learning content.	0.13
		Burden tolerance	Psychological endurance of the amount and strength of exercise	0.15
		Teaching satisfaction	Satisfaction level of teacher teaching method and means	0.16
Environmental factors	0.32	Environmental fitness	Psychological adaptation level to playground and facilities	0.08
		Interpersonal compatibility	Compatibility bet ween students and teachers, between students and students	0.16
Psychological factors	0.35	Attention concentration	Concentration or dispersion of attention	0.14
		Emotional activity	Emotional activity or depression	0.13
		Will effort	Conscious adjustment of behavior to overcome difficulties	0.11

**Table 2.** Direct measurement score of the psychological burden during a physical education (PE) class of one of the university students in the study.

Index	Content fitness	Burden tolerance	Teaching satisfaction	Environmental adaptability	Interpersonal compatibility
Score	$x_1$	$x_2$	$x_3$	$y_1$	$y_2$

the psychological burden on university students in PE classes and the corresponding weighted values. Table 2 shows the direct measurement score of the psychological burden of a typical student, or the evaluation results.

The theory of the comprehensive assessment method is explained as follows. Firstly, the five indicators included in the teaching factors and environmental factors that affected the psychological burden of the students in PE classes were evaluated by subjective measurement method.

X is the final score by subjective evaluation after the test results were weighted. The following equation was used:

$$X=(x_1 \times 0.13+x_2 \times 0.15+x_3 \times 0.16) \times 0.35+(y_1 \times 0.08+y_2 \times 0.16) \times 0.32 \quad (1)$$

For the same study objective, the psychological factors that influence the psychological burden of the university students were evaluated by fuzzy comprehensive evaluation and included attention, concentration, emotional activity, and willpower.

Ten senior teachers were asked to evaluate the attention, concentration, emotional activity, and willpower of the students during PE classes as excellent, good, average, relatively poor,

and poor. The grading given for each component of the evaluation was on a scale of 0 to 10, with the results of the evaluation shown in Table 3.

From the results shown in Table 3, it was possible to draw a fuzzy subset of grades of rating of the university students regarding attention, concentration, emotional activity, and willpower, or the degree of each index. A matrix was then established, and fuzzy operations were performed. Finally, a comprehensive evaluation score was obtained. The following equation was used:

$$Y = W \times R \times C = (0.14, 0.13, 0.11) \times \begin{Bmatrix} h_1, h_2, h_3, h_4, h_5 \\ i_1, i_2, i_3, i_4, i_5 \\ j_1, j_2, j_3, j_4, j_5 \end{Bmatrix} \times \begin{Bmatrix} 20 \\ 40 \\ 60 \\ 80 \\ 100 \end{Bmatrix} \quad (2)$$

$$Z = X + Y \times 35 \quad (3)$$

In the above equation, W is the weight of subjective factors, R is the matrix, Y is the fuzzy comprehensive evaluation score, X is the subjective evaluation score (teaching and environmental factors), Y is the psychological factors, and Z is the comprehensive evaluation score.

**Table 3.** Assessment form for the psychological burden during a physical education (PE) class.

Index No.	Weight	Excellent	Good	Average	Relatively poor	Poor
		Voting ratio (%)	Voting ratio (%)	Voting ratio (%)	Voting ratio (%)	Voting ratio (%)
1	0.14	$h_1$	$h_2$	$h_3$	$h_4$	$h_5$
2	0.13	$i_1$	$i_2$	$i_3$	$i_4$	$i_5$
3	0.11	$j_1$	$j_2$	$j_3$	$j_4$	$j_5$

**Table 4.** Comprehensive test results of the psychological burden of the physical education (PE) class for all students.

Variable		Mean	SD	Minimum	Maximum
X (subjective measurement)	Male	9.22	0.35	5.12	55.32
	Female	9.89	0.37	5.34	57.74
Y (fuzzy comprehensive evaluation)	Male	42.31	0.38	10.74	80.14
	Female	48.84	0.38	11.51	88.13
Z (comprehensive assessment)	Male	24.03	0.36	9.31	81.12
	Female	26.98	0.37	15.36	83.97

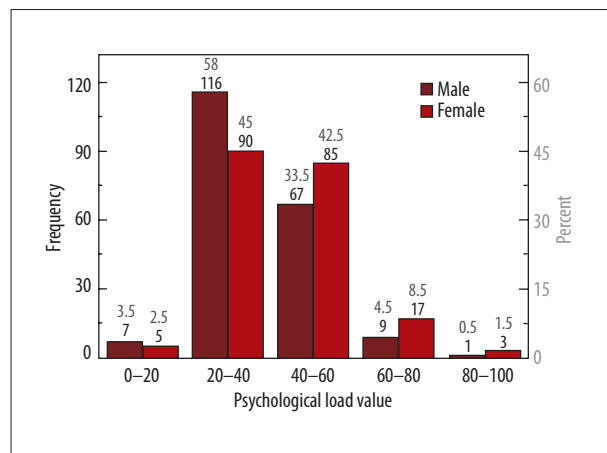
For the comprehensive evaluation of psychological burden, reverse scoring was adopted. The higher the score, the lower the level of psychological burden, and the lower the score, the higher the level of psychological burden. In this study the comprehensive scores of psychological burden were divided into five levels (low to high) that included 20 points: 0–20; 20–40; 40–60; 60–80; and 80–100.

**Results**

The 400 university students from China who participated in physical education (PE) classes, included 200 men and 200 women. Table 4 shows the comprehensive test results of the psychological burden of PE on all the participating students.

For men, the average scores of X (teaching and environmental factors), Y (psychological factors) and Z (comprehensive evaluation) are all slightly lower compared with those of women. This finding indicated that the average psychological burden of men attending university in China who participated in PE was lower than that of women.

Figure 1 is a histogram that shows the distribution of the distribution of grades of the psychological burden of all the participants in PE classes. For both male and female university students, most students were in the range of low psychological burden, 20–40, including 116 (58%) men and 90 (45%) women. In the range of relatively high psychological burden (60–80) and high psychological burden (80–100), the number of female



**Figure 1.** Histogram showing the distribution map of the levels university student's psychological burden associated with physical education (PE) in China.

students was higher compared with male students. This finding indicated that the level of psychological burden for female students attending university in China who participated in PE classes was higher than for male students. Therefore, female students might require extra care and support to benefit from PE while in university when compared with male students.

Also, as shown in the histogram in Figure 1, the range of high psychological burden associated with PE classes, representing an unhealthy psychological response (60–100), included 5.0% of male university students and 10.0% of female university students. However, physical exercise is necessary to

develop overall health, both physiological health and psychological health.

## Discussion

The aim of this study was to assess the psychological burden on students in physical education (PE classes in Chinese universities). Of the 400 study participants who attended PE classes, 61.5% of male students and 47.5% of female students coped well or very well when dealing with the perceived psychological burden; 33.5% of male students and 42.5% of female students reported a medium level of psychological burden, and few students reported a high level of psychological burden. The average psychological burden in female students was greater than for male students.

Psychological burden, or psychological stress and anxiety, can occur during exercise or due to external stimulants, can be associated with the underlying psychological or neurological state of the individual, or may reflect the difference between mental resource capacity and mental resource requirements. A fundamental property in the evaluation of psychological responses is the psychological burden per unit of time, which can be evaluated by the fuzzy indicators of human emotion, willpower, and attention.

The factors that affect individual psychological burden are complicated. These factors include subjective factors, such as

emotional state, and the strength of willpower. Objective factors that can affect individual psychological burden include stimulation from the external environment. Therefore, when measuring the psychological burden in PE classes in this study, subjective factors were measured by a subjective measurement method and objective factors were evaluated by a fuzzy comprehensive evaluation method. The use of this comprehensive evaluation method allowed the study purpose of the evaluation of psychological burden associated with PE classes in university students in China to be achieved more accurately.

## Conclusions

The findings of this study have shown that the use of a combination of a subjective measurement method and a fuzzy comprehensive evaluation method could be applied to the analysis of psychological burden in a population of university students participating in physical education (PE) classes in China. The combined analysis provided an accurate evaluation method that showed that female students had a higher average psychological burden compared with male students. These findings indicate that female university students in China may require more care and attention from teachers involved in sports training.

### Conflict of interest:

None.

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