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Analysis of the Role of Mental Health Education Courses in Higher Education in Enhancing College Students' Sense of Social Responsibility

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SUMMARY: *Current mental health education programs in higher education still face several obstacles in fostering young people's social responsibility, especially the insufficient recognition of students' individual needs and the limited opportunities provided for handling conflicts related to undergraduates' sense of responsibility. In response to these issues, this study develops a methodological framework to assess how mental health education influences young people's social responsibility, and the questionnaire is organized into three sections: basic information, the mental health education course evaluation scale, and the student social responsibility evaluation scale. After establishing validity and reliability of the questionnaire, it was distributed through online platforms and paper media. Descriptive statistics and multiple regression analysis in SPSS 17.0 were used to evaluate the effect of the mental health curriculum of the university on the social responsibility of students. It was established that the explanatory power is 81.5%. Furthermore, the results obtained from the regression equation have demonstrated a positive effect of the courses on the social responsibility of students with the following coefficients: 0.163 (participation in national-responsibility activities), 0.612 (integration of responsibility topics), 0.645 (satisfaction with the course format) and 0.657 (module recognition).*

KEYWORDS: *descriptive statistics; Pearson's coefficient; multiple linear regression; mental health education program; college students' social responsibility*

1 Introduction

Social responsibility is not only a form of social moral psychology, but also a duty and mission that reflects the interaction between social ethical norms and personal values. For university students, this sense of responsibility means that individuals, within a given social context, consciously undertake corresponding duties, fulfill their obligations, accomplish their missions, and contribute to society [1-3]. The integration of personal values, social responsibility, national honor, and sense of mission among college students is a necessary condition for establishing correct values and an essential requirement for realizing the fundamental task of fostering virtue through education. As an outstanding young group, college students' awareness of social responsibility is closely connected with the future of the country and the nation.

The value of mental health education programs in universities lies not only in improving students' capacity to cope with psychological adjustment difficulties, but also in shaping sound personal values and, more importantly, in guiding them to make meaningful contributions to society [4, 5]. As the backbone of social development, college students are an important part

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of realizing the goal of the great rejuvenation of the Chinese nation. Mental health education programs in colleges and universities are not only to impart knowledge, but more importantly to cultivate correct values and moral concepts among college students [6, 7]. College students do not just exist as individuals, but are in various social relationships at all times, and the cultivation of personal values helps to improve their ability to think and make better judgments about the direction of future development [8]. Social values and moral concepts help to help college students get out of the campus, and when facing the problems of wealth and power, they take the interests of the group as the base point of thinking, combine their roles and responsibilities in the society, and make choices more favorable to the society [9-12]. Therefore, it is worth exploring the role of mental health education programs in colleges and universities in enhancing college students' sense of social responsibility.

Based on the existing literature and related literature sources, the survey named “The Effect of Mental Health Education Programmes on University Students’ Social Responsibility” was formulated and divided into three parts. In the first part, the demographic data of respondents were recorded, and the second part included their opinions about mental health courses, while the third section measured their social responsibility. After conducting the reliability test, good results were obtained, which assured the reliability of the data used in this study. With the help of online and pen-and-paper versions, 422 respondents provided valid responses, all of which were analyzed by inputting the data in SPSS 17.0. Descriptive statistics, Pearson correlation and multiple linear regression analysis methods were used in order to explore the impact of mental health courses offered at universities on the level of social responsibility of students.

2 Questionnaire development and data collection and processing

2.1 Questionnaire development

2.1.1 Scale design

Before using the questionnaire in this thesis, the overall structure of the original questionnaire, “The Impact of Mental Health Education Programs on Social Responsibility”, was slightly modified and added to, and the finalized paper was divided into three parts.

Part I: Sample information included gender, grade level, nature of major (science and engineering, economics and management, literature and history, and arts), political appearance, whether they were student leaders, and school level.

Part Two: There are a total of 20 measurement questions in the mental health education course scale, which are divided into course participation duration, integration of course content and responsibility, satisfaction with teaching methods, and recognition of course modules. This scale adopts the Likert five-point scoring method, requiring respondents to judge the degree of conformity between each measurement item and their actual behavior. "1" indicates "completely inconsistent", and "5" indicates "completely consistent".

Part Three: The college students' social responsibility test scale consists of 20 to 30 test questions, which are divided into 4 dimensions: responsibility towards others, collective responsibility, national responsibility, and social commitment. This scale adopts the Likert five-point scoring method, requiring the questionnaire respondents to judge the degree of conformity between each measurement item and their actual behavior, with "1" indicating "completely inconsistent" and "5" indicating "completely consistent".

2.1.2 Reliability tests

Credibility testing for the questionnaire took place before the analysis of survey responses through statistics. As for reliability testing in SPSS, it was conducted mostly using the coefficient of Cronbach's alpha. Usually, the larger the value of the alpha, the better consistency and correlations between items. However, only when the coefficient falls within an adequate range, can the results be further analyzed. Reliability testing results are presented in Table 1. Cronbach's alpha is one of the most popular tools in estimating reliability of the measurement. Generally, the larger its value, the higher internal consistency. The coefficient above 0.90 refers to very high reliability, values between 0.80 and 0.90 can be considered as good reliability levels, between 0.70 and 0.80 indicate that a major revision may be required in order to preserve scale, and below 0.70 mean that it needs to be thrown away as it will not meet the standards for proper research. Overall alpha of the survey "The Impact of Mental Health Education Programs on Social Responsibility" was 0.893 which proves its high level of reliability. Thus, it can be concluded that the scales used in this research are highly consistent.

Table 1: Reliability test results

Project	Number of items	Cronbach's Alpha
Course participation duration	5	0.876
The responsibility integration of course content	5	0.882
Satisfaction with teaching forms	5	0.916
The recognition of course modules	5	0.884
Responsibility of others	5	0.914
Collective responsibility	5	0.868
National responsibility	5	0.886
Social responsibility	5	0.914
Total	40	0.893

2.1.3 Validity tests

Validity refers to the level of accuracy in representing the target content by measuring results. This means that validity will indicate the level of consistency between the result and the construct being measured through the questionnaire. In this particular study, validity was tested mainly using the Kaiser-Meyer-Olkin (KMO) index and Bartlett's Test of Sphericity, with their respective results shown in Table 2. Overall, the KMO index of the questionnaire was found to be 0.899, significantly higher than 0.7, while the significance probability value was found to be 0.002, significantly lower than 0.05.

Table 2: Validity test results

Project	KMO	Bartlett sphere test
Course participation duration	0.909	0.006
The responsibility integration of course content	0.955	0.001
Satisfaction with teaching forms	0.917	0.008
The recognition of course modules	0.823	0.008
Responsibility of others	0.947	0.003
Collective responsibility	0.825	0.003
National responsibility	0.978	0.005
Social responsibility	0.843	0.002
Total	0.899	0.002

2.2 Data acquisition and processing

2.2.1 Composition of the subjects and analysis of the sample situation

The subjects of this study were college students, and all participants were recruited from universities. The survey covered three undergraduate institutions and one junior college. The target population included freshmen, sophomores, juniors, and seniors. Owing to the research conditions and practical needs of this thesis, questionnaires were distributed through both online and paper-based channels. A total of 437 questionnaires were issued, and 422 valid responses were finally obtained. In this way, both the size and quality of the sample were ensured, making the collected data more objective and reliable. The descriptive statistics of the student sample are presented in Table 3.

(1) Among the respondents, 192 were male and 230 were female, accounting for 45.5% and 54.5%, respectively.

(2) The college grades surveyed mainly include: freshmen, sophomores, juniors, and seniors, with sample sizes of 128, 113, 102, and 79. Although the number of seniors was relatively smaller than that of the other three grade groups, the overall sample distribution remained reasonably balanced.

(3) The majors studied by the surveyed college students were divided into four main categories: science and technology, economics and management, literature and history, and art. The number of survey respondents for the four different majors were 125, 161, 86 and 50 respectively. Among them, there are relatively more surveys on the majors of economics and management, mainly due to the fact that most of the schools in the survey belong to universities of science and technology and economics.

(4) he political status of the respondents included the masses, members of the League, and members of the CPC, with 61, 279, and 82 participants, respectively. Among them, the number of members of the League is the majority, accounting for 66.11% of the proportion.

(5) The number of surveyed university students who are student cadres and non-student cadres are 171 and 251 respectively, with the number of non-student cadres in the majority.

(6) The levels of the universities surveyed were undergraduate and specialized, and since three of the four universities surveyed were undergraduate institutions, the sample size of undergraduate institutions was larger. Due to the limited time, energy and conditions, the number of research subjects selected is small, and will continue to be studied if all subsequent conditions allow.

Table 3: Statistics on the frequency of college student samples

Project		Frequency ratio	Percentage
Gender	Male	192	45.50%
	Female	230	54.50%
Grade	Freshman Year	128	30.33%
	Sophomore year	113	26.78%
	Junior year	102	24.17%
	Senior year	79	18.72%
Professional	Science and engineering	125	29.62%
	Economics and Management	161	38.15%
	Liberal arts and history	86	20.38%
	Art category	50	11.85%
Political status	The masses	61	14.45%
	Member of the League	279	66.11%
	Party Member	82	19.43%
Student cadre	Yes	171	40.52%
	No	251	59.48%
Nature of the school	Undergraduate	304	72.04%
	Junior college	118	27.96%

2.2.2 Data processing methods

A combination of online surveys and paper questionnaires was administered, while entries for all the surveys were inputted consistently into SPSS 17.0 for further analysis. After the process of screening, only 422 valid questionnaires were selected after removing any invalid responses. Using SPSS 17.0, the valid data were analyzed through descriptive statistics, correlation analysis, and multiple linear regression so as to examine the relationship between university mental health education courses and students' sense of social responsibility.

(1) Pearson's Coefficient (PC)

The extent of dependence between two variables is often estimated by calculating the value of a correlation coefficient that ranges from -1 to 1. Commonly used coefficients include Pearson's, Spearman's, and Kendall's. In this research, Pearson's correlation coefficient was used to judge whether the selected variables were suitable for inclusion in the multiple linear regression model.

Pearson correlation, also known as the Pearson product-moment correlation, is commonly applied to assess the degree of linear association between two variables. It usually takes a value within the range of $\{-1,1\}$, and is calculated using Equation (1). Here x and y refer to the time series data for the two selected variables, cov(x,y) is the covariance of the two data series, $\bar{x}$ and $\bar{y}$ are their averages, respectively, and *i* is the time index.

$$\operatorname{cov}(x, y) = \frac{\sum_{i=1}^{n}(x_i - x_e)(y_i - y_e)}{n-1} \tag{1}$$

$$\rho_{x,y} = \frac{\operatorname{cov}(x, y)}{\sigma_x \sigma_y} \tag{2}$$

where x, y is the time series of the two selected reference variables, $\operatorname{cov}(x, y)$ denotes the

covariance of the series x with the reference series y, x_e, y_e is the mean of the x, y series, respectively, and i represents the time series, each of which corresponds to an actual value.

(2) Multiple linear regression analysis

The regression analysis refers to the statistical technique utilized to identify the numerical connection between two or more variables. According to the number of variables involved in the regression analysis, regression models can be classified as either simple regression models or multiple regression models. Regression models can further be divided into linear regression models or nonlinear regression models, depending on the nature of the dependent and independent variables. The relationship between one dependent variable and one independent variable where both variables exhibit a linear connection is called simple linear regression analysis. Meanwhile, the relationship between one dependent variable and two or more independent variables where there is still a linear connection is termed multiple linear regression analysis.

The simple linear regression equation shows the linear relationship between one independent variable and one dependent variable if the formula $y = a + bx$ is present, wherein a and b are specific parameters. Using the empirical study, a large quantity of points can be plotted in a Cartesian plane to generate the scatter diagram. While it is impossible for all points to lie in a straight line, a straight line can be drawn in such a way that the sum of the vertical distance from each point to the line is minimized.

Simple linear regression applies only when the dependent variable y is associated with one explanatory variable x. In practice, however, the dependent variable is often influenced by more than one explanatory variable, such as $x_1, x_2, \cdots, x_p$, which leads to the problem of multiple regression analysis. Although multiple linear regression follows the same general idea as univariate regression, namely minimizing the residual term Q the presence of a larger number of explanatory variables makes the analysis more complex.

Assuming a linear relationship between p independent variable $x_1, x_2, \cdots, x_p$ and a random variable y with a sample size of n, whose ith observation is $x_{i1}, x_{i2}, x_{i3}, \cdots, x_{ip}$; $y_i \left(i = 1, 2, \cdots, n\right)$, its nth observation can be written in the following form:

$$\begin{cases} y_1 = \beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \cdots + \beta_p x_{1p} + \varepsilon_1 \\ y_2 = \beta_0 + \beta_1 x_{21} + \beta_2 x_{22} + \cdots + \beta_p x_{2p} + \varepsilon_2 \\ \cdots\cdots \\ y_n = \beta_0 + \beta_1 x_{n1} + \beta_2 x_{n2} + \cdots + \beta_p x_{np} + \varepsilon_n \end{cases} \tag{3}$$

where $\beta_0, \beta_1, \cdots, \beta_p$ is an unknown parameter, $x_1, x_2, \cdots, x_p$ is a p general variable that can be controlled and measured accurately, and $\varepsilon_1, \varepsilon_2, \cdots, \varepsilon_n$ is a random error. The principle is the same as for the one-way linear regression analysis, and we can make the following assumptions: ε_i are random variables that obey the same normal distribution $N\left(0, \sigma^2\right)$ and are uncorrelated with each other.

If we use a matrix to represent the system of equations (3), we have:

$$Y = X\beta + \varepsilon \tag{4}$$

Among them:

$$Y=\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix} \quad X=\begin{pmatrix} 1 & x_{11} & x_{12} & \cdots & x_{1p} \\ 1 & x_{21} & x_{22} & \cdots & x_{2p} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & x_{n2} & \cdots & x_{np} \end{pmatrix}$$
$$\beta=\begin{pmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_p \end{pmatrix} \quad \varepsilon=\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix} \tag{5}$$

The key component of the multiple linear regression analysis is to obtain the valuation b of β to perform the construction of the multiple linear regression equation:

$$\hat{y}=b_0+b_1x_1+b_2x_2+\cdots+b_px_p \tag{6}$$

In turn, the multivariate linear model is described:

$$y=\beta_0+\beta_1x_1+\beta_2x_2+\cdots+\beta_px_p \tag{7}$$

This study further considers estimation of σ^2 and β based on the least-squares principle, significance testing of regression coefficients and regression equations, control and forecasting through the regression model, and the solution of linear equation systems in estimating β by elimination transformation and Gaussian elimination.

The construction of a multiple linear regression equation is essentially an estimation process based on the multiple linear model to obtain the parameter estimates of the regression equation. Similar to simple linear regression, its fundamental idea is to estimate $b_0,b_1,\cdots,b_p$ according to the least-squares criterion, so that the fitted value $\hat{y}_i$ corresponding to all observations y_i minimizes the objective function Q, namely the sum of squared residuals.

$$Q=\sum_{i=1}^{n}(y_i-\hat{y}_i)^2=\sum_{i=1}^{n}\left[y_i-\left(b_0+b_1x_{i1}+b_2x_{i2}+\cdots+b_px_{ip}\right)\right]^2 \tag{8}$$

is a non-negative quadratic of $b_0,b_1,\cdots,b_p$, so it must have a minimum value.

In accordance with the principle of extreme values, $b_0,b_1,\cdots,b_p$ should be satisfied when Q is the extreme value:

$$\frac{\partial Q}{\partial b_j}=0\left(j=0,1,2,\cdots,p\right) \tag{9}$$

by equation (8), which is satisfied:

$$\begin{cases} \sum_{i=1}^{n}\left[y_i - \left(b_0 + b_1 x_{i1} + b_2 x_{i2} + \cdots + b_p x_{ip}\right)\right] = 0 \\ \sum_{i=1}^{n}\left[y_i - \left(b_0 + b_1 x_{i1} + b_2 x_{i2} + \cdots + b_p x_{ip}\right)\right] x_{i1} = 0 \\ \sum_{i=1}^{n}\left[y_i - \left(b_0 + b_1 x_{i1} + b_2 x_{i2} + \cdots + b_p x_{ip}\right)\right] x_{ij} = 0 \\ \sum_{i=1}^{n}\left[y_i - \left(b_0 + b_1 x_{i1} + b_2 x_{i2} + \cdots + b_p x_{ip}\right)\right] x_{ip} = 0 \end{cases} \tag{10}$$

Equation (10) constitutes a normal equation system, which can be rewritten in the following form.

$$\begin{cases} nb_0 + \left(\sum_{i=1}^{n} x_{i1}\right) b_1 + \left(\sum_{i=1}^{n} x_{i2}\right) b_2 + \cdots + \left(\sum_{i=1}^{n} x_{ip}\right) b_p = \sum_{i=1}^{n} y_i \\ \left(\sum_{i=1}^{n} x_{i1}\right) b_0 + \left(\sum_{i=1}^{n} x_{i1}^2\right) b_1 + \left(\sum_{i=1}^{n} x_{i1}x_{i2}\right) b_2 + \cdots + \left(\sum_{i=1}^{n} x_{i1}x_{ip}\right) b_p = \sum_{i=1}^{n} x_{i1} y_i \\ \vdots \qquad \vdots \qquad \vdots \qquad \cdots \qquad \vdots \qquad \vdots \\ \left(\sum_{i=1}^{n} x_{ip}\right) b_0 + \left(\sum_{i=1}^{n} x_{ip}x_{i1}\right) b_1 + \left(\sum_{i=1}^{n} x_{ip}x_{i2}\right) b_2 + \cdots + \left(\sum_{i=1}^{n} x_{ip}^2\right) = \sum_{i=1}^{n} x_{ip} y_i \end{cases} \tag{11}$$

If A is used to represent the coefficient matrix of the above system of equations it can be found that A is a symmetric matrix. i.e:

$$\begin{aligned} A &= \begin{pmatrix} n & \sum_{i=1}^{n} x_{i1} & \sum_{i=1}^{n} x_{i2} & \cdots & \sum_{i=1}^{n} x_{ip} \\ \sum_{i=1}^{n} x_{i1} & \sum_{i=1}^{n} x_{i1}^2 & \sum_{i=1}^{n} x_{i1}x_{i2} & \cdots & \sum_{i=1}^{n} x_{i1}x_{ip} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \sum_{i=1}^{n} x_{ip} & \sum_{i=1}^{n} x_{ip}x_{i1} & \sum_{i=1}^{n} x_{ip}x_{i2} & \cdots & \sum_{i=1}^{n} x_{ip}^2 \end{pmatrix} \\ &= \begin{pmatrix} 1 & 1 & 1 & \cdots & 1 \\ x_{11} & x_{21} & x_{31} & \cdots & x_{n1} \\ x_{12} & x_{22} & x_{32} & \cdots & x_{n2} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_{1p} & x_{2p} & x_{3p} & \cdots & x_{np} \end{pmatrix} \begin{pmatrix} 1 & x_{11} & x_{12} & \cdots & x_{1p} \\ 1 & x_{21} & x_{22} & \cdots & x_{2p} \\ 1 & x_{31} & x_{32} & \cdots & x_{3p} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & x_{n2} & \cdots & x_{np} \end{pmatrix} \\ &= X'X \end{aligned} \tag{12}$$

In Eq. X is the structure matrix and X' is the transpose matrix of X. (The constant term at the right end of Eq. (11) can also be expressed as a matrix D, i.e:

$$D=\begin{pmatrix}\sum_{i=1}^{n} y_i\\ \sum_{i=1}^{n} x_{i1}y_i\\ \sum_{i=1}^{n} x_{i2}y_i\\ \vdots\\ \sum_{i=1}^{n} x_{ip}y_i\end{pmatrix}=\begin{pmatrix}1 & 1 & 1 & \cdots & 1\\ x_{11} & x_{21} & x_{31} & \cdots & x_{n1}\\ x_{12} & x_{22} & x_{32} & \cdots & x_{n2}\\ \vdots & \vdots & \vdots & \ddots & \vdots\\ x_{1p} & x_{2p} & x_{3p} & \cdots & x_{np}\end{pmatrix}\begin{pmatrix}y_1\\ y_2\\ y_3\\ \vdots\\ y_n\end{pmatrix}=X'Y \tag{13}$$

So equation (11) can be written as:

$$Ab=D \tag{14}$$

maybe

$$\left(X'X\right)b=X'Y \tag{15}$$

If A full rank has inverse matrix A^{-1}, the least squares of β can be estimated by equations (14) and (15) as:

$$b=A^{-1}D=\left(X'X\right)^{-1}X'Y \tag{16}$$

That is, the regression coefficient of the multiple linear regression equation.

For ease of computation, instead of solving for $(X'X)^{-1}$ and then b, the system of linear equations (11) is usually solved directly. (The first equation of (11) can be reduced to:

$$b_0=\bar{y}-b_1\bar{x}_1-b_2\bar{x}_2-\cdots-b_p\bar{x}_p \tag{17}$$

Inside the style:

$$\begin{cases}\bar{x}_j=\dfrac{1}{n}\sum_{i=1}^{n}x_{ij} \quad j=1,2,\cdots,p\\ \bar{y}=\dfrac{1}{n}\sum_{i=1}^{n}y_i\end{cases} \tag{18}$$

Substituting Eq. (17) in the other equations contained in Eq. (11) yields:

$$\begin{cases}L_{11}b_1+L_{12}b_2+\cdots+L_{1p}b_p=L_{1y}\\ L_{21}b_1+L_{22}b_2+\cdots+L_{2p}b_p=L_{2y}\\ \cdots\cdots\\ L_{p1}b_1+L_{p2}b_2+\cdots+L_{pp}b_p=L_{py}\end{cases} \tag{19}$$

Among them:

$$\begin{cases} L_{jk} = \sum_{i=1}^{n} (x_{ji} - \overline{x}_j)(x_{ki} - \overline{x}_k) = \sum_{i=1}^{n} x_{ji} x_{ki} - \frac{1}{n}\left(\sum_{i=1}^{n} x_{ji}\right)\left(\sum_{i=1}^{n} x_{ki}\right) \\ L_{jy} = \sum_{i=1}^{n} (x_{ji} - \overline{x}_j)(y_i - \overline{y}) = \sum_{i=1}^{n} x_{ji} y_i - \frac{1}{n}\left(\sum_{i=1}^{n} x_{ji}\right)\left(\sum_{i=1}^{n} y_i\right) \end{cases} \tag{20}$$

Using a matrix to represent the system of equations Eq. (19) yields:

$$Lb = F \tag{21}$$

Among them:

$$L = \begin{pmatrix} L_{11} & L_{12} & \cdots & L_{1p} \\ L_{21} & L_{22} & \cdots & L_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ L_{p1} & L_{p2} & \cdots & L_{pp} \end{pmatrix} \quad b = \begin{pmatrix} b_1 \\ b_2 \\ \vdots \\ b_p \end{pmatrix} \quad F = \begin{pmatrix} L_{1y} \\ L_{2y} \\ \vdots \\ L_{py} \end{pmatrix} \tag{22}$$

So:

$$b = L^{-1}F \tag{23}$$

Therefore, the coefficients of the multiple linear regression equation can be solved for by first solving L through equation (20) and then substituting L into equation (21). To solve for b, Gaussian transformation or Clem's law can be used. If b is directly substituted into equation (23), the inverse matrix of L needs to be solved, so it is relatively more complicated.

3 Analysis of empirical research on college students' sense of social responsibility

3.1 Descriptive statistical analysis

Based on the scale data collected in the questionnaire, quantitative scores were obtained for both university mental health education courses and college students' sense of social responsibility. These data were then examined through descriptive statistics in order to understand the current development level of mental health education in universities and students' social responsibility, while also providing an empirical basis for the subsequent analysis.

3.1.1 Descriptive statistical analysis of mental health education programs

Descriptive statistical analysis based on questionnaire data collected from a sample of 422 college students was carried out to measure the present state of mental health education programs in educational institutions of higher learning. Since there are equal numbers of questions in each scale dimension, a mean score per item was derived for each scale dimension by averaging its scores, which provided insight into the actual state of mental health education programs. The findings are presented in Table 4. It can be seen from the data that all scale dimensions scored over 3.5, indicating a high-medium state and that the present mental health education programs in colleges and universities are adequate. With regard to the scale

dimensions, it is evident that the highest score was recorded in the scale dimension of the integration of course content and responsibility, whereas the lowest score was obtained in the course-module recognition dimension.

Table 4: Descriptive statistics for mental health education courses

Project	N	Min	Max	Mean	SD
Course participation duration	422	1	5	3.635	0.715
The responsibility integration of course content	422	1	5	3.715	0.725
Satisfaction with teaching forms	422	1	5	3.622	0.719
The recognition of course modules	422	1	5	3.542	0.694

3.1.2 Descriptive statistical analysis of college students' sense of social responsibility

The social responsibility of 422 university students was assessed through a questionnaire scale, and the descriptive statistical results are reported in Table 5. As shown in the table, the mean score for collective responsibility exceeds 3.5, whereas the mean scores for responsibility toward others, national responsibility, and overall social responsibility are all above 4. Hence, it is possible to conclude that in general terms social responsibility is rather high among contemporary college students. Among the variables studied, national responsibility demonstrates the highest value, while collective responsibility is relatively low. All these data clearly point to the fact that psychological education plays a significant role in the formation of social responsibility of students. Moreover, the data show that modern youth is distinguished by patriotic orientation.

Table 5: Descriptive statistical analysis of social responsibility

Project	N	Min	Max	Mean	SD
Responsibility of others	422	1	5	4.121	0.723
Collective responsibility	422	1	5	3.915	0.711
National responsibility	422	1	5	4.217	0.727
Social responsibility	422	1	5	4.115	0.726

3.2 Relevance analysis of social responsibility

Using the descriptive statistics of mental health education courses and the awareness of college students regarding social responsibilities, Pearson correlation analysis was conducted to determine whether or not such variables could be included in the multiple linear regression model.

3.2.1 Relevance of mental health education programs to the responsibilities of others

Pearson’s correlation coefficient was used to examine the relationship between mental health education programs and responsibility towards others in this study. These findings are summarized in Table 6. From Table 6, it is evident that the values of the correlations between responsibility towards others and the four components of mental health education, namely the duration of the course, integration of course material with responsibility, satisfaction with the format of teaching, and awareness of course modules, are 0.508, 0.363, 0.271, and 0.279, respectively. Therefore, these findings depict a moderate relationship between mental health education courses and responsibility towards others in terms of college students' social responsibility.

Table 6: The relevance of mental health education courses to the responsibility of others

Project		Course participation duration	The responsibility integration of course content	Satisfaction with teaching forms	The recognition of course modules	Responsibility of others
Course participation duration	PC	1	0.589	0.397	0.593	0.508
	Sig.		0.004	0.005	0.007	0.003
	N	422	422	422	422	422
The responsibility integration of course content	PC	0.589	1	0.355	0.425	0.363
	Sig.	0.004		0.004	0.006	0.003
	N	422	422	422	422	422
Satisfaction with teaching forms	PC	0.397	0.355	1	0.454	0.271
	Sig.	0.005	0.004		0.006	0.002
	N	422	422	422	422	422
The recognition of course modules	PC	0.593	0.425	0.454	1	0.279
	Sig.	0.007	0.006	0.006		0.005
	N	422	422	422	422	422
Responsibility of others	PC	0.508	0.363	0.271	0.279	1
	Sig.	0.003	0.003	0.002	0.005	
	N	422	422	422	422	422

3.2.2 Relevance of mental health education programs to collective responsibility

By applying the same methodology, an analysis was conducted to examine the relationship between the duration of attendance in mental health education classes and the perception of collective responsibility, as well as the results shown in Table 7. The Pearson correlation coefficient between the length of time in the course, incorporation of the course material into responsibility, satisfaction with the mode of delivery of instruction, and awareness of the modules offered were 0.458, 0.593, 0.545, and 0.311, respectively. It is evident that there is a moderate relationship between mental health education and the social responsibility of college students.

Table 7: The correlation between mental health education and collective responsibility

Project		Course participation duration	The responsibility integration of course content	Satisfaction with teaching forms	The recognition of course modules	Collective responsibility
Course participation duration	PC	1	0.263	0.336	0.376	0.458
	Sig.		0.008	0.002	0.001	0.003
	N	422	422	422	422	422
The responsibility integration of course content	PC	0.263	1	0.376	0.519	0.593
	Sig.	0.008		0.005	0.006	0.003
	N	422	422	422	422	422
Satisfaction with teaching forms	PC	0.336	0.376	1	0.291	0.545
	Sig.	0.002	0.005		0.001	0.003
	N	422	422	422	422	422
The recognition of course modules	PC	0.376	0.519	0.291	1	0.311
	Sig.	0.001	0.006	0.001		0.002
	N	422	422	422	422	422
Collective responsibility	PC	0.458	0.593	0.545	0.311	1
	Sig.	0.003	0.003	0.003	0.002	
	N	422	422	422	422	422

3.2.3 Relevance of the Mental Health Education Curriculum to State Responsibility

The Pearson correlation test was used to evaluate the connection between mental health education courses and national responsibility, the results of which are presented in Table 8. The correlation coefficient values between national responsibility and four variables, namely the length of involvement in the course, integration of course content and responsibility, satisfaction with the teaching approach, and course module recognition were 0.277, 0.509, 0.329, and 0.477, respectively. This shows that there is a moderate connection between mental health education courses and national responsibility among college students.

Table 8: The correlation between mental health education and national responsibility

Project		Course participation duration	The responsibility integration of course content	Satisfaction with teaching forms	The recognition of course modules	National responsibility
Course participation duration	PC	1	0.424	0.589	0.486	0.277
	Sig.		0.006	0.002	0.008	0.007
	N	422	422	422	422	422
The responsibility integration of course content	PC	0.424	1	0.528	0.381	0.509
	Sig.	0.006		0.008	0.003	0.001
	N	422	422	422	422	422
Satisfaction with teaching forms	PC	0.589	0.528	1	0.463	0.329
	Sig.	0.002	0.008		0.002	0.004
	N	422	422	422	422	422
The recognition of course modules	PC	0.486	0.381	0.463	1	0.477
	Sig.	0.008	0.003	0.002		0.008
	N	422	422	422	422	422
National responsibility	PC	0.277	0.509	0.329	0.477	1
	Sig.	0.007	0.001	0.004	0.008	
	N	422	422	422	422	422

3.2.4 Relevance of Mental Health Education Programs to Social Commitment

In conclusion, the research assessed the connection between mental health education classes and general social responsibility, with the results displayed in Table 9. The Pearson correlation coefficient values obtained from course duration, correlation between course and responsibility, satisfaction with the mode of delivery, and recognition of course segments were 0.233, 0.225, 0.452, and 0.465, respectively. Based on the results, there is a positive correlation between mental health education and overall social responsibility among university students. The correlations are statistically significant at the 5% significance level and can therefore be used in the multiple linear regression model.

Table 9: The result of the correlation between the two

Project		Course participation duration	The responsibility integration of course content	Satisfaction with teaching forms	The recognition of course modules	Social responsibility
Course participation duration	PC	1	0.219	0.254	0.278	0.233
	Sig.		0.003	0.009	0.008	0.003
	N	422	422	422	422	422
The responsibility integration of course content	PC	0.219	1	0.257	0.463	0.225
	Sig.	0.003		0.005	0.002	0.006
	N	422	422	422	422	422
Satisfaction with teaching forms	PC	0.254	0.257	1	0.301	0.452
	Sig.	0.009	0.005		0.002	0.003
	N	422	422	422	422	422
The recognition of course modules	PC	0.278	0.463	0.301	1	0.465
	Sig.	0.008	0.002	0.002		0.004
	N	422	422	422	422	422
Social responsibility	PC	0.233	0.225	0.452	0.465	1
	Sig.	0.003	0.006	0.003	0.004	
	N	422	422	422	422	422

3.3 Regression analysis of college students' sense of social responsibility

On the basis of the aforementioned correlation analysis, it is evident that the four aspects of college mental health education courses are related to the social responsibility felt by college students and satisfy the conditions to be used in multiple linear regression analysis. In order to ascertain the effectiveness of mental health education courses in fostering social responsibility among students, a stepwise multiple regression analysis is carried out.

3.3.1 Regression analysis of the responsibility of others

According to the correlation analysis result of mental health education courses and sense of responsibility towards others, the conditions for conducting multiple linear regression have been met, and the regression results are shown in Table 10. According to the multivariate regression analysis result by step-by-step method, the explanatory power of responsibility towards others within the sense of social responsibility of the students is 0.675, which means that mental health education courses can explain 67.5% of the variation of this aspect. The regression equation of sense of responsibility towards others is 0.187 + 0.636* hours spent in courses + 0.282* responsibility incorporated into the content of the course + 0.613* satisfaction with teaching format + 0.514* recognition of modules of the course.

Table 10: Regression analysis of responsibility of others

Model	Non-standardized coefficient		Standardization coefficient	T-value	Sig.	Tolerance
	B	Standard error	Beta			
Constant	0.187	0.046		14.392	0.003	0.592
Course participation duration	0.636	0.048	0.362	10.241	0.007	0.518
The responsibility integration of course content	0.282	0.047	0.249	11.289	0.007	0.709
Satisfaction with teaching forms	0.613	0.079	0.166	8.552	0.007	0.644
The recognition of course modules	0.514	0.047	0.109	7.713	0.008	0.532
R^2	0.677					
Adjust R^2	0.675					
F	648.411					
Sig.	0.002					

3.3.2 Collective responsibility regression analysis

Following the correlation analysis, multiple linear regression analysis was used to investigate collective responsibility in students' social responsibility. These findings are presented in Table 11. The joint variance explained by the four predictors was 0.607, meaning that the four components of mental health education courses explained 60.7% of the variance in collective responsibility. This regression equation of collective responsibility is expressed as follows: 0.223 + 0.467* participation hours in the course + 0.623* integration of responsibility in course content + 0.786* satisfaction with teaching method + 0.715* recognition of course modules. Thus, it can be concluded that mental health education courses enable the enhancement of collective responsibility in college students.

Table 11: Results of collective responsibility regression analysis

Model	Non-standardized coefficient		Standardization coefficient	T-value	Sig.	Tolerance
	B	Standard error	Beta			
Constant	0.223	0.055		5.675	0.005	0.653
Course participation duration	0.467	0.057	0.352	10.538	0.007	0.534
The responsibility integration of course content	0.623	0.061	0.619	18.194	0.002	0.605
Satisfaction with teaching forms	0.786	0.065	0.507	5.001	0.005	0.601
The recognition of course modules	0.715	0.044	0.735	11.04	0.003	0.575
R^2	0.608					
Adjust R^2	0.607					
F	429.333					
Sig.	0.003					

3.3.3 State responsibility regression analysis

After the completion of correlation analysis, a multiple linear regression analysis was conducted to examine the effect of national responsibility on college students' social responsibility. The results are shown in Table 12. In the dimension of college mental health education programs, the overall R-squared value of the four independent variables was 0.815, suggesting that these variables explain 81.5% of the variation in national responsibility among students. This means

that mental health education courses have considerable predictive power in explaining national responsibility. The regression formula for national responsibility is as follows: National responsibility = 0.163 + 0.612* duration of course participation + 0.632* integration of course content responsibility + 0.645* satisfaction with teaching form + 0.657* course module recognition, highlighting the role of mental health education courses in fostering national responsibility among college students.

Table 12: Regression analysis results of national responsibility

Model	Non-standardized coefficient		Standardization coefficient	T-value	Sig.	Tolerance
	B	Standard error	Beta			
Constant	0.163	0.045		18.116	0.009	0.436
Course participation duration	0.612	0.044	0.461	16.406	0.007	0.646
The responsibility integration of course content	0.632	0.069	0.492	13.769	0.002	0.548
Satisfaction with teaching forms	0.645	0.053	0.315	15.056	0.008	0.351
The recognition of course modules	0.657	0.058	0.319	7.971	0.007	0.404
R^2	0.815					
Adjust R^2	0.815					
F	406.182					
Sig.	0.006					

3.3.4 Social Responsibility Regression Analysis

Lastly, given the established correlations between mental health education courses and overall social responsibility, the conditions for conducting multiple linear regression were fulfilled. Therefore, the proposed model of regression was used to investigate further the relationship between mental health education courses and overall social responsibility. The outcomes of such analysis are shown in Table 13. The value of R^2 is 0.724, meaning that the four dimensions of mental health education courses were able to explain 72.4% of variance in social responsibility of college students. The equation for estimating overall social responsibility can be stated as follows: Overall social responsibility = 0.102 + 0.352* course participation length + 0.328* course content responsibility integration + 0.294* satisfaction with teaching form + 0.465* course module recognition.Hence, one can observe that mental health education courses have an evident positive influence on social responsibility of college students.

Table 13: Regression analysis results of social responsibility

Model	Non-standardized coefficient		Standardization coefficient	T-value	Sig.	Tolerance
	B	Standard error	Beta			
Constant	0.102	0.056		8.042	0.006	8.042
Course participation duration	0.352	0.036	0.283	5.683	0.009	5.683
The responsibility integration of course content	0.328	0.054	0.222	6.119	0.003	6.119
Satisfaction with teaching forms	0.294	0.033	0.139	9.739	0.006	9.739
The recognition of course modules	0.465	0.041	0.312	6.824	0.002	6.824
R^2	0.724					
Adjust R^2	0.724					
F	306.452					
Sig.	0.002					

4 Conclusion

The social responsibility of college students should be promoted as it is essential to building socialism with Chinese characteristics in the new era. This paper discusses the effect of mental health education classes on the college student sense of social responsibility through multiple linear regression analysis.

(1) The mean scores of all dimensions of mental health education programs and sense of social responsibility among college students were higher than 3.5, indicating that the existing mental health education programs and social responsibility among college students were well situated. The results of the research have been successfully tested and may be used as a basis to carry out further analysis.

(2) The correlation coefficients between the mental health education course dimensions and the sense of social responsibility among college students were found to be between 0.2 to 0.6 and it had a statistical significance of 0.05 in all cases. This means that the variables satisfy the requirements of multiple linear regression analysis.

(3) With mental health education courses and social responsibility as the variables, the coefficient of determination was 0.724, revealing that the four dimensions of mental health education curricula accounted for 72.4% of the variance in social responsibility of college students. The corresponding regression equation was as follows: 0.102 + 0.352* duration of participation in the course + 0.328* integration of responsibility in the course content + 0.294* satisfaction with teaching forms + 0.465* recognition of modules in the course. The above analysis reveals the promoting effect of mental health education courses on social responsibility, and the same conclusion applies to others' responsibility, collective responsibility, and national responsibility.

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