

# The Relationship Between Emotional Intelligence, Mental Health, and the English Achievement of College Students Based on Big Data Statistical Analysis

Xiuzhen Chen, College of Humanities and Arts, Hainan College of Economics and Business, China\*  
Hye Kyung Kim, Hanseo University, South Korea

## ABSTRACT

This article explores the association between emotional intelligence, mental health, and English proficiency among college students. Survey results reveal that the gender ratio of college students is roughly equal, and the number of participants is stable each year. Humanities majors comprise 31% of the total. The authors collected data from nearly 1000 college students, which was analyzed using a matrix model. Results suggest that while there is a weak correlation between emotional intelligence scores and English grades, there is a strong correlation between mental health scores and English grades. The researchers conducted a 3-month psychological intervention experiment on 60 sophomore students. These students showed improvement in both mental health scores and English scores. Additionally, survey results indicate student satisfaction with the testing and psychological intervention. Overall, this study demonstrates that mental health and English proficiency are closely related, and psychological interventions can positively affect language skills.

## KEYWORDS

College Students, Emotional Intelligence, Mental Health, English Performance

## INTRODUCTION

Advances in medical technology have increased human life expectancy by decades relative to ancient times and have eliminated many diseases on a physical level. Therefore, the term health has expanded its meaning, and it no longer refers only to physical health. In 1990, the World Health Organization included mental health, moral health, and good social adjustment among the criteria for individual health (Yanyu & Jizu, 2022). In the same year, the concept of emotional intelligence, or emotional quotient (EQ), was first introduced by the famous Swiss psychologist Professor Salovey and Meyer. She defined emotional intelligence as the ability of human beings to recognize their own and others' emotions and to take active measures to control and influence them (Zhu et al., 2022). Emotional intelligence research tends to obtain evidence of its impact on individual academic and career success in the fields of career and life, highlighting the regulation and promotion of emotional intelligence on

DOI: 10.4018/IJWLTT.338716

\*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

cognitive activities. In recent years, emotional intelligence has been applied to the study of individual social adaptation, life satisfaction, and subjective well-being, thus opening the way to explore the introduction of emotional intelligence into individual psychological adjustment and social adaptation.

The scope of EQ research covers emotion recognition and expression, emotion regulation and self-management, self-awareness and social awareness, interpersonal and social skills, and the relationship between EQ and the domains of academics and work. By studying these areas in depth, we can gain a more comprehensive understanding of the composition and development of emotional intelligence and its impact on individuals in different domains. This is of great significance in promoting the cultivation and enhancement of emotional intelligence and provides scientific basis and guidance for practice in the fields of education, mental health, and human resource management.

In the decades since then, emotional intelligence and mental health have been more comprehensively defined and more widely studied as technology has evolved. The American psychologist, Goleman, included the ability to recognize, understand, and regulate emotions and manage interpersonal relationships in the scope of emotional intelligence (Wei et al., 2022). In the 2000s, a Chinese researcher, Professor Zhiyuan Xu, introduced the concept of emotional information, broadening its definition. In contemporary times, from the perspective of positive psychology, mental health is also a personal competence that includes the ability of a person to strive to achieve goals, to fully enjoy their personal life, and to balance real life and behavior (Mérida-López et al., 2022). The university period is a critical period for the development and shaping of individual cognitive structure. During this critical period, in addition to the development of students' academic intelligence, which has attracted much attention from society, schools, and families, emotional intelligence has also been increasingly valued by educators and even society as a whole. The purpose of improving college students' emotional intelligence can be achieved by discussing the problems related to college students' emotional intelligence and mental health.

In recent years, the rapid development of big data technology has profoundly changed all walks of life, including the field of education. The emotional intelligence and mental health of college students play a crucial role in their personal development and academic performance (Rashid et al., 2022). At the same time, English language performance is gaining global attention as an important academic indicator (Wu et al., 2022). Understanding the relationship between these factors is crucial for improving the overall quality and academic performance of university students.

Emotional intelligence refers to an individual's ability in emotion recognition, emotion expression, emotion management and emotion utilization. It is closely related to an individual's ability to socialize, make decisions, and cope with stress. Mental health, on the other hand, encompasses emotional, cognitive, and behavioral well-being, and it has a significant impact on an individual's quality of life and academic performance (Andrei et al., 2022). However, although emotional intelligence and mental health play a key role in the overall growth of individuals, there are still many unanswered questions about their relationship with academic performance (Chu et al., 2022).

Meanwhile, English, as an internationally recognized language, is important for the academic and professional development of university students. English performance is often used as a marker of students' language proficiency, but we need to delve deeper into whether there is an association between emotional intelligence and psychological well-being and English performance and the nature and mechanisms of this association (Galehouse et al., 2022).

Currently, many college students are only children in their families and have not experienced many setbacks after being loved by their families since childhood. After entering university, many college students face a relatively independent life and are prone to negative emotions when faced with heavy academic burdens, noisy dormitory environments, or poor quality meals (Huang et al., 2022). If these negative emotions are not well controlled, college students who lack high emotional intelligence not only have their own mental health problems but also have difficulty handling interpersonal relationships, leading to arguments and even fights. In addition, most college students are still young adults and have poor psychological resilience (Blasco-Belled et al., 2022). If they cannot find a way

to vent and alleviate stress, they may engage in extreme behavior under excessive psychological pressure. The survey results of the past decade show that the proportion of low self-esteem, anxiety, depression, and psychological problems among college students has been increasing each year. Due to the fact that most college students are far away from their hometowns and soon need to adapt to unfamiliar environments upon arrival at their university, they may not receive timely attention from their family and friends in the event of psychological problems (Hartley, 2011). Therefore, schools play an important role and obligation in this regard. Establishing a mental health program for college students and recruiting psychological counselors should be the responsibility and obligation of contemporary universities (Galehouse et al., 2022).

The current mental health of college students has attracted the attention of the educational and medical communities, and there have been numerous medical studies on emotional intelligence (Ravens-Sieberer et al., 2022). However, most of these studies have focused on the effects of low mental health and emotional intelligence on the physical level and less on the academic performance of college students. When college students have mild psychological problems or low emotional intelligence, the probability is that they will not behave excessively. However, we ask the question, will this cause a decline in English performance? There is still a lack of research in this area, so this study is of practical significance and great scientific value based on scientific statistics and algorithms implemented to investigate the relationship between emotional intelligence and mental health and English performance of college students (Mendez-Lopez et al., 2022). This study investigates the connection between English proficiency, mental health, and emotional intelligence in college students. First, a matrix representing the relationship model for the three first was created. The psychological state survey results of around 1,000 college students were then acquired via questionnaires. The results of the research show that while mental health and English proficiency are strongly correlated.

This study delves into the relationship between college students' emotional intelligence, mental health, and English achievement and employs big data statistical analysis methods to obtain more comprehensive and accurate findings. By filling the knowledge gap regarding this relationship between emotional intelligence, mental health, and English performance, we provide new understanding to the field of higher education. In addition, our findings will hopefully provide guidance for real-world educational practices and help higher education educators better support students' academic and mental health needs. By utilizing an integrative approach, we also encourage interdisciplinary research to explore in depth the associations between emotional intelligence, mental health, and academic performance, thereby advancing the frontiers of knowledge in the field of education. Thus, the contributions of this study are valuable not only in the academic realm, but also in practical education and student support.

## METHODS

Before mental illness or emotional and intellectual problems appear, people usually have a psychological crisis, and if timely intervention can be made, psychological problems and emotional deterioration can be effectively avoided. In 1964, the American scientist Kepler first proposed the theory of psychological crisis, which pioneered the concept of the psychological crisis. She believed that when a person is suddenly faced with a major life change or life setback, and past coping measures do not help the present dilemma, the person will experience temporary psychological distress (Krifa et al., 2021). Such a psychological imbalance is a psychological crisis, which is temporary and cumulative in nature. The psychological crisis of a college student refers to a serious psychological predicament of a college student, in which the person involved is in a state of extreme anxiety, depression, loss of control, and even inability to extricate their self when encountering a tense stimulus that exceeds their psychological endurance.

College students are usually in a special period of rapid psychological maturity, and at this critical stage, college students have to face the difficult problem of finding employment after completing their

heavy studies (Pishghadam, 2009). The psychological crisis at this stage of life is different from the general psychological crisis and has its own characteristics of occurrence in the group. It needs to be considered comprehensively by adding the factors of maturity and social transformation of college students and the factors of psychological crisis characteristics of colleges and universities (Rodriguez et al., 2022). In a broader sense, a group of college students is a phenomenon of psychological distress when they encounter pressure beyond their ability to bear. In a narrow sense, the psychological crisis of college students with their own characteristics is a state of depression and behavior imbalance when they can't deal with problems in school, employment, family, school, love, friendship, and other aspects of life. When there is the first sign of psychological crisis, on the one hand, it will cause physical and psychological harm to the college students concerned, and on the other hand, it will directly affect the college students' education and employment. If effective intervention is not provided, then the college student in question will experience reduced emotional intelligence, mental health breakdown, and even may threaten his or her own life or the lives of others (Tomko, et al., 2022). However, the stress caused by a psychological crisis can sometimes stimulate the desire and motivation of college students, which is a valuable opportunity for their growth. If effective and reasonable interventions are made at the early stage, these precautionary acts can prevent the reduction of emotional intelligence and prevent more serious psychological problems. It can also restore a healthy psychological state and contribute to the psychological maturity of these college students (Méndez-Méndez et al., 2021).

Common crisis intervention mainly includes the following modes: (1) The balance mode is mainly used in the early stage of crisis intervention. In the case of finding that the person concerned has had a psychological crisis, and their psychological emotions appear unbalanced, but their original solutions cannot deal with and meet their need to regain the balance between themselves and the outside world crisis intervention can teach them to use their surrounding people and all other available ways and means to get out of the unbalanced state, so as to regain psychological balance. (2) The essence of the cognitive model is to think that the root of psychological crisis is the fundamental wrong thinking of things, not the facts of things themselves. This model advocates that crisis interveners help the parties to improve their self-cognition and social cognition, remove their subjective part, and increase their rational part to control the psychological crisis they are experiencing.

Crisis intervention models for college students' positive mental health include counseling and support, education and advocacy, community and network support, skills training, and emergency intervention. These models help college students cope with distress, enhance emotional management and adaptability, and improve overall mental health through professional counseling, increasing awareness, building support networks, developing psychological skills, and responding quickly to crises. These models combine with each other to provide comprehensive support to university students and help them face challenges positively.

The existing research shows that psychological crisis intervention is a short-term targeted treatment that can be effective in keeping the patient in crisis from entering into reduced emotional intelligence and impaired mental health. Its main goal is to resolve the events that the person is currently experiencing, giving them care, advice, support, and help to restore their psychological balance as soon as possible. The process of this intervention does not involve correcting a person's personality and is, therefore, highly safe (Cruz et al., 2021). Psychological crisis intervention for university students is more targeted, and data from previous years can summarize representative events that produce psychological imbalance in this group. Therefore, a counselling room can be set up on campus or a mutual support group can be created by professional counsellors to give help to college students in need in multiple ways. The picture below shows the case diagram of foreign psychological counsellors and mutual aid groups in the field (Dalton-Locke et al., 2021).

As you can see, the counseling room in the above left picture creates a warm and private atmosphere, and the distance between the college student and the counselor is in a friendly but not offensive range (Loi & Pryce, 2022). College students are still immature and in a state of psychological imbalance and need a warm environment with professional guidance. In contrast, the environment of

Figure 1. On-Site case map of foreign psychological counselors and mutual aid associations



a support group, pictured above right, is relatively bright where college students who are suffering from similar problems can sit together and listen to each other and support and encourage each other. In some cases, this can be more effective than top-to-bottom counseling by teachers. And it also helps to improve the emotional intelligence of college students (Adeyemo, 2007). In summary, psychological interventions of college students can be effective in addressing a person's psychological imbalance before more serious psychological problems arise and can help with academic performance, especially in English. And their direct and specific relationship needs to be studied by collecting data and experiments in a follow-up study (Chew et al., 2013).

Building mental health interventions is a complex and systematic process. Theoretical frameworks for mental health interventions, such as cognitive-behavioral therapy and humanistic psychology, need to be clarified to provide guidance and explanatory models. In addition, mental health professionals need to receive systematic training, acquire professional knowledge and practice skills, and establish trusting relationships to facilitate effective communication and counseling with individuals. The accumulation of experience, scientific research, and reference to practice guidelines are also crucial factors. The support and promotion of all aspects in an integrated manner can promote the development and improvement of mental health intervention mechanisms to better meet the mental health needs of individuals.

Most of the existing studies on college students' psychology and achievement are based on perceptual understanding and are not reasonably quantified. Furthermore, they do not intuitively reflect the true relationship between the three factors of this study in terms of data and graphs. When the existing research discusses the relationship between emotional intelligence and academic performance, most researchers regard a student's average grade point average as a marker for academic performance. This may lead to inconsistent results and not exhibit whether emotional intelligence is related to academic performance due to the low degree of standardization of some academic tests and inconsistent scoring standards. As English scores account for a large proportion of college students' academic achievements, this study uses standardized CET-4 scores to replace academic achievements. Through in-depth discussion on the relationship between emotional intelligence, mental health, and English scores, this study aims to provide a theoretical basis for intervention measures to improve college students' mental health, English scores, and academic achievements.

Firstly, a university was selected to collect a dataset of approximately 1,000 college students from their freshman to senior years, and a matrix relationship model was established for the three. Then, by distributing questionnaires, a survey report on the environmental psychological status of nearly 1,000 college students was obtained and a relevant statistical analysis was conducted against the background of ecological environment pollution factors. During this process, a matrix model was used to group the emotional intelligence and mental health scores of participating college students, and these scores were compared and analyzed with their English scores.

The subjects used a stratified sampling method to conduct a questionnaire survey on students in a certain university. Among them, there are 500 male students and 500 female students, ranging in age from 18 to 21 years old. So, a university selected for cooperation in this experiment collected a dataset of about 1,000 college students from freshmen to seniors integrated as  $T = \{(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)\}$ , the loss function as  $l(y_i, \hat{y}_i)$ , and the regularization term as  $\Omega(f_k)$ , then the overall objective function can be expressed as the following (1):

$$\Lambda(\phi) = \sum_i l(y_i, \hat{y}_i) + \sum_k \Omega(f_k) \quad (1)$$

where  $\Lambda(\phi)$  is the linear expression of the objective function on the achievement data space,  $i$  refers to the  $i$  th sample in the English achievement data set, and  $k$  refers to the  $k$  th tree in the sample.  $\hat{y}_i$  is the predicted value of the  $i$  th sample of  $x_i$  is expressed below (2):

$$\hat{y}_i = \sum_{k=1}^K f_k(x_i) \quad (2)$$

As the expression of achievement and quantified mental states are below (3):

$$\hat{y}_i = y_i^{\wedge(t-1)} + f_i(x_i) \quad (3)$$

Therefore, the expression that can be obtained by substituting in equation (1) is represented in (4):

$$\Lambda(\phi) = \sum_i l(y_i, y_i^{\wedge(t-1)} + f_i(x_i)) + \sum_k \Omega(f_k) \quad (4)$$

A data matrix is created for the three components of emotional intelligence, mental health, and English language achievement. This matrix differs from the classical singular decomposition matrix in that it does not decompose the scoring matrix into the product of three matrices. The hidden relationship matrix decomposes a set of college students and their corresponding scores into two matrices of hidden factors: one for the students and one for the scores. There is no need to supplement the original matrix. Finally, the matrix is fitted using the derived hidden factors to predict the scores. This process can be expressed by the following equation (5):

$$R_{m \times n} \approx R_{m \times n}^2 = P_{m \times k} Q_{n \times k}^T \quad (5)$$

In this context, the number of college users represents the emotional intelligence score and is an approximate square matrix resulting from the decomposition. This matrix, also known as the estimated score matrix, can be used to calculate the emotional intelligence score of a college student user using the following equation (6):

$$p_u q_i^T = \sum_{k=1}^K p_{uk} q_{ki} \quad (6)$$

The hidden relationship matrix can be well used to represent the student user's ability to respond to the potential features of the event using hidden factors. Furthermore, it reduces the complexity of matrix decomposition. The next step requires calculating the two hidden factor matrices,  $P$  and  $Q$ , by first initializing them and then iterating continuously until a local optimum is reached. The scoring error for each student user can be defined by the following equation (7):

$$e_{ui}^2 = (r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})^2 \quad (7)$$

This study uses squared error to reduce the difference between predicted and actual scores by first defining the error function as follows (8):

$$\arg Loss = \sum e_{ui}^2 = \sum (r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})^2 \quad (8)$$

Then, find the direction of the positive gradient of the current value using two directional variables to differentiate as expressed in (9):

$$\begin{cases} \frac{\partial}{\partial p_{uk}} e_{ui}^2 = -2q_{ki} = -2e_{ui} q_{ki} \\ \frac{\partial}{\partial q_{uk}} e_{ui}^2 = -2p_{ki} = -2e_{ui} p_{ki} \end{cases} \quad (9)$$

Update rules are then developed to iterate on the direction of rising sentiment (10):

$$\begin{cases} p_{uk} + \alpha \frac{\partial}{\partial p_{uk}} e_{ui}^2 = p_{uk} + 2\alpha e_{ui} q_{ki} \\ q_{uk} + \alpha \frac{\partial}{\partial q_{uk}} e_{ui}^2 = q_{uk} + 2\alpha e_{ui} p_{ki} \end{cases} \quad (10)$$

A constant of small value in above equation (10)  $\alpha$  determines the minimum value of the computation rate. The iterative operation with rising emotions is performed continuously until the minimum error is reached. The iteration is stopped when the error of the function is less than the set threshold  $e$ , and the final space matrix of the three is obtained as shown in (11):

$$E = \sum e_{ui}^2 = \sum (r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})^2 \leq e \quad (11)$$

The above formula (11) is the most basic method used for the decomposition of the hidden relational matrix, and direct loss function optimization cannot be performed because it easily leads to overfitting. This experiment adds the regularization term to the original loss function (i.e., introduces regularization), after which the error value for the loss function is expressed as shown in (12):

$$e_{ui}^2 = (r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})^2 + \lambda (\|p_u\|^2 + \|q_i\|^2) \quad (12)$$

$$\arg Loss = \sum (r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})^2 + \lambda (\|p_u\|^2 + \|q_i\|^2) \quad (13)$$

In (13), above,  $\lambda$  can be obtained through systematic experiments and is the regularization parameter. The final optimization of (14) and (15) is performed using the stochastic gradient ascent method (i.e., the partial derivatives of the two matrices):

$$\frac{\partial Loss}{\partial p_{uk}} = -2(r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})q_{ki} + 2\lambda p_{uk} \quad (14)$$

$$\frac{\partial Loss}{\partial q_{ki}} = -2(r_{ui} - \sum_{k=1}^K p_{uk} q_{ki})p_{uk} + 2\lambda q_{ki} \quad (15)$$

In this way, the optimal matrix of hidden relationships among emotional intelligence, mental health, and English language achievement is obtained for this experiment, and the relevant calculations can be carried out afterwards by performing the required parameter selection of various functions.

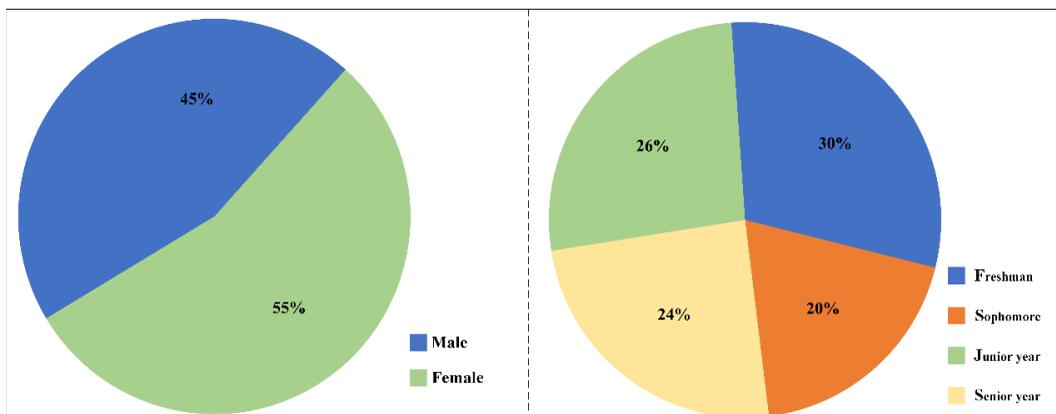
## RESULTS AND DISCUSSION

### Example Analysis of Students' English Proficiency Data

In addition to influencing how people respond to demands and pressures from their surroundings, emotional intelligence is a necessary trait for success. Additionally, it directly affects people's physical and mental health. Numerous studies have demonstrated a positive correlation between emotional intelligence and a person's mental health.

The experiment was conducted in cooperation with a university, and the English performance data and basic personal information of freshman to senior students of this school. Through the actual visit records and the online and offline distribution of questionnaires, we got hold of the survey reports of the psychological status of nearly 1,000 college students. This preliminary study exhibits the statistics and analysis on the gender and grade of the college students who participated in the experiment, and the results are shown in Figure 2.

Figure 2. Distribution map of gender ratio and grade ratio of college students participating in this experiment



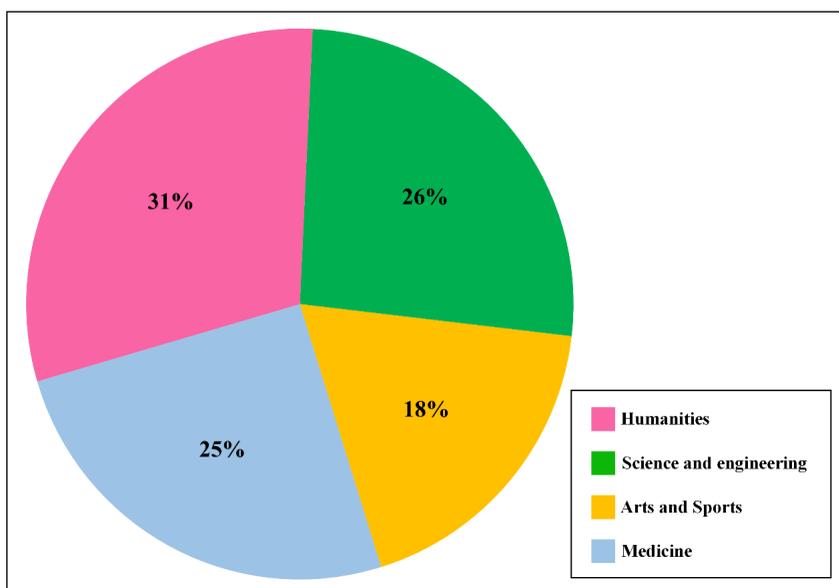
The results show that the gender ratio of college students is close to 50%, with slightly fewer male college students than female college students. The number of students in each year of study at the university was also relatively even, with freshmen accounting for 30% of all students, sophomores for 26%, juniors for 24%, and seniors for the lowest 20% of graduates. The results show that both the gender ratio and the number of students in each year are close to their normal distribution, indicating that this data is reliable and suitable for the study.

First, seniors have the greatest ratings while freshmen have the lowest in terms of overall emotional intelligence, stress management, etc. This could be because first-year students are still adjusting after leaving familiar high school campuses and families. In the wave stage, which includes sophomores, juniors, and seniors, socializing and emotional intelligence among students are constantly developing. Second, there aren't many differences between male and female pupils in terms of self-emotional perception and regulation, but girls are clearly superior to boys in these areas when it comes to understanding, managing.

The academic problems faced by college students of different majors may also be different, and thus, the mechanisms of psychological crises are also different, which require separate questionnaire design and analysis. In addition, the English proficiency requirements of different majors vary, with science and technology majors requiring English to read and understand relevant literature, art majors requiring relatively less English, and humanities majors, especially those studying English literature, requiring extremely high English proficiency. For these reasons, it is necessary for this experiment to count the majors of the participating university students and to calculate their English scores in a personalized and dynamic way using the matrix model previously established in this paper.

The analysis of the results shows that this university has the largest number of students majoring in humanities, accounting for 31% of the total number of students. The number of science and engineering students and medical students is similar, at 26% and 25%, respectively. The number of art and sports students is relatively small, accounting for only 18% of the student population. Overall, it is a comprehensive university with a wide and diverse range of majors for these different majors and familiarity with the common dilemmas they will encounter. After the preliminary statistics were established, the emotional intelligence of the participating college students was divided into five levels

Figure 3. Students who actively study English after school



from 1 to 5 using a matrix model, with 1 representing the lower emotional intelligence and gradually increasing up to 5 which represented the highest emotional intelligence. Similarly, the mental health status of college students was also divided into five levels from 1 to 5, and the higher the number, the healthier the mental status of the college student.

These two scores can be used to visually represent the psychological state of the participating college students and can be easily compared with their English scores to find the relationship between them. First, the emotional intelligence scores were compared with the English scores in a graphical analysis. See Figure 4.

With a score of 120 out of 100, the distribution of college students' scores in a university basically conforms to a normal distribution. The results of the data analysis showed that the whole university had a passing level of students in English, with the number of those in the 80 to 90 range doing more. The number of students with an emotional intelligence score of 4 is the highest sector, and there is obviously a gap. But as the emotional intelligence scores increase, the corresponding, reaching a maximum point and then beginning to decline, respectively, and the two curves remain in general agreement. Both the slope at the increase and the slope indicated by the dashed line in the graph are positive, as largely as expected. The research shows the students with higher English scores have higher scores on emotional intelligence tests, while the students with lower English scores have lower scores on emotional intelligence tests, and the students with higher English scores have a higher ability to regulate and apply complex emotions. This study found there is a positive relationship between college students' emotional intelligence and their English performance/achievement, and that high emotional intelligence may contribute to improved English learning and performance. This suggests that there is a relationship between college students' emotional intelligence and English performance, but not a strong one. The possible reasons for this are that emotional intelligence mainly affects one's own emotional management and interpersonal relationships with classmates and teachers, both of which have a limited impact on English learning, so they show a weak association.

After that, the mental health scores were compared and analyzed against the English performance scores using a graph. See Figure 5.

Figure 4. Direct relationship between emotional intelligence and english achievement of college students

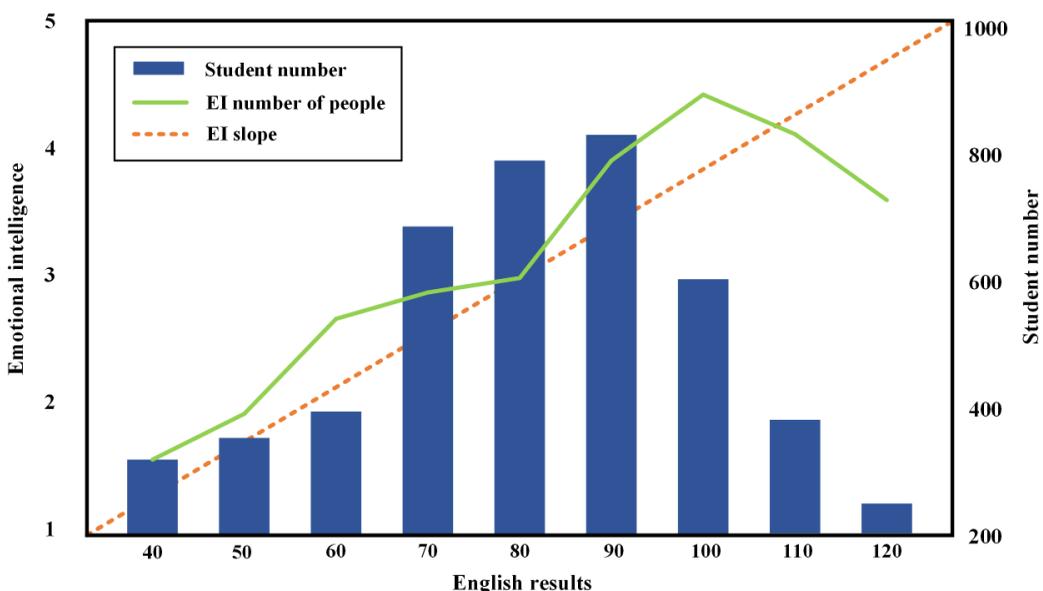
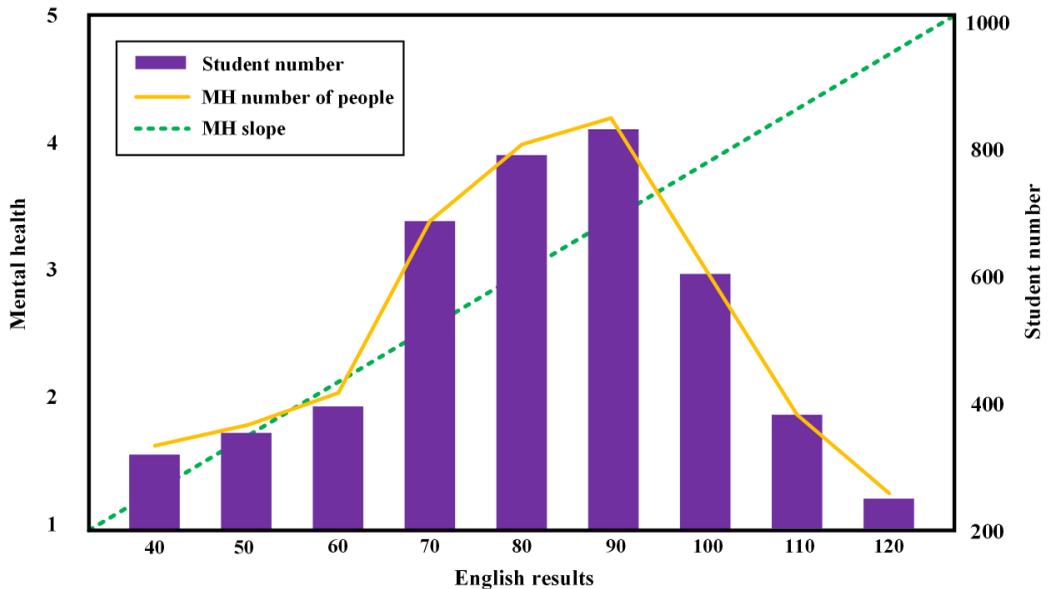


Figure 5. Direct relationship between mental health scores and English scores of college students



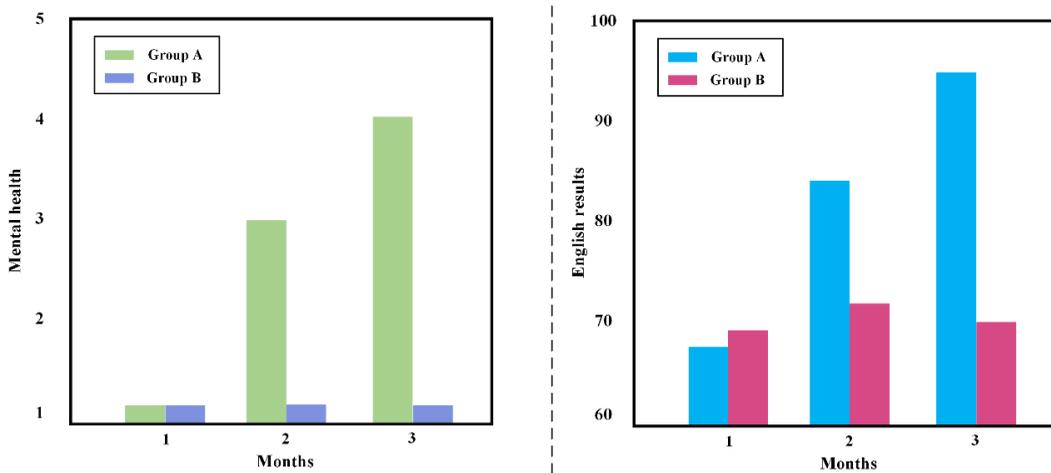
The students' English scores were taken from the same data, so the distribution of the rectangular plots in both Figure 4 and Figure 5 largely conform to a normal distribution, and do not match the slope of the dashed line at all. In contrast, the scores of college students' mental health degree highly coincides with their English scores, reaching the highest point simultaneously with the increase of the number of scores, and then decreasing with a similar slope as the scores continue to increase. Such results suggest that there is a strong relationship between college students' psychological well-being and their English scores.

Based on the results obtained, the association between emotional intelligence and English performance is weak, while the relationship between mental health is strong. Therefore, 60 college students with a psychological health level score of 1 in the second year of college were selected and divided into two groups of 30 students each. The students in group A were treated with psychological intervention, while group B served as a control group without psychological intervention, and the English teaching environment was kept the same for both groups. A comparative control experiment was conducted for 3 months, and English tests were administered at the end of each month, and the results are shown in Figure 6.

The college students in group A, who received the psychological intervention, demonstrated a consistent increase in their psychological health ratings after three months of experimentation (see Figure 6). They had essentially reverted to a healthy state by the end of the trial. The English test results and mental health status of the student in Group B, who did not receive psychological assistance, did not alter significantly in contrast.

This confirms that there is a significant correlation between psychological health and English test scores and psychological therapy can help. The 30 students in Group B who did not receive psychological intervention treatment during the study, were then treated with psychological therapy after the three-month experiment was over. Within a few months, all of them had changed their perspectives and achieved a balanced level of psychological well-being. It is possible to think about enhancing English learners' emotional management skills through psychological intervention in order to improve their emotional experience during the language learning process, given the malleability

Figure 6. Changes in mental health scores and english scores of two groups of college students after three months of psychological intervention

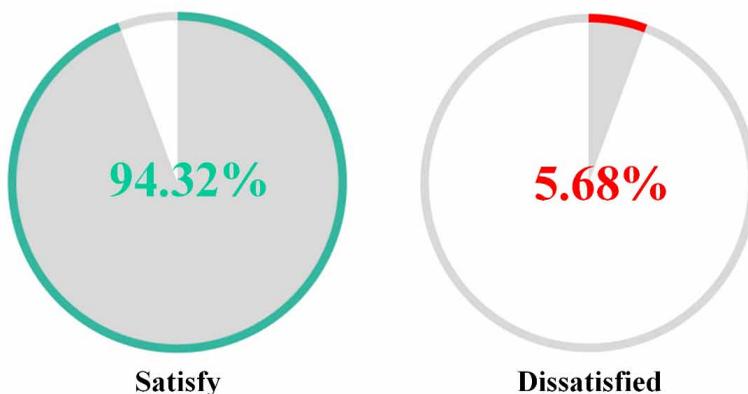


of mental health and the maturity and applicability of emotional intelligence training practice in the field of education.

Changes in mental health status and English performance are closely related to English teaching and learning. Good mental health promotes better engagement in learning and enhances motivation and the ability to concentrate, which is conducive to English learning. On the contrary, mental health problems may lead to a decline in learning interest and motivation, which negatively affects English learning. Meanwhile, improved student performance in English can stimulate positive learning feedback and a sense of achievement, further enhancing learning motivation, while decreased performance progress may trigger frustration and loss of interest, negatively affecting motivation and performance. Therefore, teachers should pay attention to changes in students' mental health status and English performance and provide them with individualized support and guidance to promote good learning status and English academic performance.

Finally, a satisfaction questionnaire was distributed to the 60 students who participated in the practice, and the results are shown in Figure 7.

Figure 7. College student survey satisfaction



The results of the questionnaire survey show that 94.32% of the students were satisfied with the test and the psychological intervention, again indicating the scientific validity of the findings and the psychological intervention adopted in this study. In addition to focusing on students' academic performance (i.e., intellectual development), higher education educators should also pay attention to the cultivation of students' emotional intelligence, the development of students' emotional well-being, and the content of teaching in all subjects. They should cultivate and promote the development of college students' self-awareness through various ways inside and outside the classroom, teach them to deal with interpersonal relationships correctly, to face pressure with a positive mindset, to be flexible enough to cope with emergencies in their studies and lives in order to generate a subjective sense of well-being, and to complete their college studies smoothly and happily.

In this study, a dataset of approximately 1,000 students from freshman to senior year of a university are used to explore and analyze the relationship between emotional intelligence, mental health, and English proficiency among college students. It is known that the gender ratio of the university is close to 50%, though there are slightly fewer male students than female students. The number of students in all grades is relatively uniform, with freshmen accounting for 30% of all students and sophomores accounting for 26%. Junior students account for 24%, while senior students account for the lowest percentage of the student body at 20%. The university is mainly specialized in humanities, accounting for 31% of the total number of students. The number of science and engineering students is similar to that of medical students, accounting for 26% and 25% respectively, while art and sports students are relatively small, accounting for only 18% of the student body.

Through statistical analysis, it was found that there is a weak correlation between college students' emotional intelligence and English grades, while there is a strong correlation between college students' mental health and English grades. In a control group experiment, the researchers randomly divided participants into two groups, only one of which received English learning guidance through psychological therapy. In addition, the study also found that female students generally have higher levels of emotional intelligence and mental health than male students. Medical students have relatively good levels of emotional intelligence and mental health, while art and sports students have relatively poor levels. These findings can provide some reference and assistance for students' mental health and English learning. The results of this study are consistent or similar to the conclusion of the study by Li (2020). Li (2020) discovered multiple mediating effects between emotional intelligence, pleasure, anxiety, fatigue, and English proficiency among Chinese high school sophomores.

## CONCLUSION

As human lifespan increases, we not only focus on physical health but also invest energy and financial resources in research on mental health. Emotional intelligence represents a person's ability to control and manipulate emotions. As the backbone of future society, college students should have more time to devote to their mental health. However, there are few papers on the impact of college students' emotional intelligence and mental health on their English performance, so this study focuses on the relationship between the three.

First of all, it introduces the definition and mechanism of psychological crisis in detail and expounds the research status of psychological intervention at home and abroad. On this basis, a matrix relationship model between college students' emotional intelligence, mental health and English performance is established. Then, through the actual interview records and online and offline questionnaires, we mastered the investigation report on the psychological status of nearly 1,000 college students. The gender ratio of college students is close to 50%, and the number of students in discipline universities is relatively average every year, indicating that the gender ratio and the number of students every year are close to the normal distribution, indicating that the data is reliable and suitable for use in research. Professional results show that the number of students in humanities is the largest, accounting for 31% of the total number of students. The number of science and engineering students and medical

students is similar, 26% and 25% respectively. The number of students majoring in art and sports is relatively small, accounting for 18%. By comparing the scores of emotional intelligence and mental health with English scores, it is found that the relationship between emotional intelligence scores and English scores is weak, while the degree of mental health is closely related to English scores. Finally, in the control group experiment, after three months of psychological intervention, the average English score of college students who received treatment improved by about 30 points. However, the model developed in this study still has room for optimization. In the future, with the development of therapy, new research tools will appear and be applied to mental health research and English teaching in time to keep up with the pace advanced pedagogy. Based on the method of statistical analysis of big data, this study explores the relationship between college students' emotional intelligence, mental health, and English performance. The results of the study present a series of meaningful findings that reveal the potential impact of emotional intelligence and mental health status on college students' English academic performance. The results of this study provide important references and insights for future related research, and it becomes an important direction for research to further explore individual differences and develop effective intervention strategies to enhance college students' mental health and English learning performance. In addition, the results of this study provide practical guidance for university education administrators and mental health educators to promote the development of mental health education and support systems and to provide more comprehensive and personalized learning environments and support services for college students. In summary, the results of this study are important for understanding the relationship between college students' emotional intelligence, mental health, and English performance, as well as for promoting college students' comprehensive quality improvement.

## **AUTHOR NOTE**

The authors of this publication declare there are no competing interests.

This research was supported by the Ministry of Education and UNICEF project, "Improve Core Competencies" for young people.

## REFERENCES

- Adeyemo, D. A. (2007). Moderating Influence of Emotional Intelligence on the Link Between Academic Self-efficacy and Achievement of University Students. *Psychology and Developing Societies, 19*(2), 199–213. doi:10.1177/097133360701900204
- Andrei, F., Mancini, G., Agostini, F., Epifanio, M. S., Piombo, M. A., Riolo, M., Spicuzza, V., Neri, E., Lo Baido, R., La Grutta, S., & Trombini, E. (2022). Quality of life and job loss during the COVID-19 pandemic: Mediation by hopelessness and moderation by trait emotional intelligence. *International Journal of Environmental Research and Public Health, 19*(5), 2756. doi:10.3390/ijerph19052756 PMID:35270449
- Blasco-Belled, A., Rogoza, R., Torrelles-Nadal, C., & Alsinet, C. (2022). Differentiating Optimists from Pessimists in the Prediction of Emotional Intelligence, Happiness, and Life Satisfaction: A Latent Profile Analysis. *Journal of Happiness Studies, 23*(5), 2371–2387. doi:10.1007/s10902-022-00507-4
- Chew, B. H., Zain, A. M., & Hassan, F. (2013). Emotional intelligence and academic performance in first and final year medical students: A cross-sectional study. *BMC Medical Education, 13*(1), 44. Advance online publication. doi:10.1186/1472-6920-13-44 PMID:23537129
- Chu, H.-F., Cheng, S.-C., Sun, C.-Y., Chou, C.-Y., Lin, T.-H., & Chen, W.-Y. (2022). Structural and biochemical characterization of Porcine epidemic diarrhea virus Papain-Like protease 2. *Journal of Virology, 96*(1), e01372-21. Advance online publication. doi:10.1128/JVI.01372-21 PMID:34643430
- Cruz, C. M., Giri, P., Vanderburg, J. L., Ferrarone, P., Bhattarai, S., Giardina, A. A., Gaynes, B. N., Hampanda, K., Lamb, M. M., & Matergia, M. (2021). The Potential Emergence of “Education as Mental Health Therapy” as a Feasible Form of Teacher-Delivered Child Mental Health Care in a Low and Middle Income Country: A Mixed Methods Pragmatic Pilot Study. *Frontiers in Psychiatry, 12*, 790536. Advance online publication. doi:10.3389/fpsyt.2021.790536 PMID:34975588
- Dalton-Locke, C., Johnson, S., Harju-Seppänen, J., Lyons, N., Sheridan Rains, L., Stuart, R., Campbell, A., Clark, J., Clifford, A., Courtney, L., Dare, C., Kathleen, K., Lynch, C., McCrone, P., Nairi, S., Newbigging, K., Nyikavaranda, P., Osborn, D., Persaud, K., & Stefan, M. (2021). Emerging models and trends in mental health crisis care in England: A national investigation of crisis care systems. *BMC Health Services Research, 21*(1), 1174. Advance online publication. doi:10.1186/s12913-021-07181-x PMID:34711222
- Galehouse, P., Peterson, B., Kwasky, A., & Raphael, S. (2022). Strengthening the safety nets for child and adolescent mental health. *Archives of Psychiatric Nursing, 36*, A2–A4. doi:10.1016/j.apnu.2021.12.008 PMID:35094832
- Hartley, M. T. (2011). Examining the Relationships Between Resilience, Mental Health, and Academic Persistence in Undergraduate College Students. *Journal of American College Health, 59*(7), 596–604. doi:10.1080/07448481.2010.515632 PMID:21823954
- Huang, J.-J., Chen, X.-F., & Clement, K. M. (2022). Persistence of an epidemic cluster of *Rhodotorula mucilaginosa* in multiple geographic regions in China and the emergence of a 5-flucytosine resistant clone. *Emerging Microbes & Infections, 11*(1), 1079–1089. doi:10.1080/22221751.2022.2059402 PMID:35343400
- Krifa, I., Hallez, Q., Zyl, L. E., Braham, A., Sahli, J., Ben Nasr, S., & Shankland, R. (2021). Effectiveness of an online positive psychology intervention among Tunisian healthcare students on mental health and study engagement during the Covid-19 pandemic. *Applied Psychology: Health and Well-Being, 14*(4). 10.1111/apwh.12332
- Li, C. (2019). A positive psychology perspective on Chinese EFL students’ trait emotional intelligence, foreign language enjoyment and EFL learning achievement. *Journal of Multilingual and Multicultural Development, 41*(3), 246–263. https://doi.org/10.1080/01434632.2019.1614187
- Loi, N. M., & Pryce, N. (2022). The role of mindful self-care in the relationship between emotional intelligence and burnout in university students. *The Journal of Psychology, 156*(4), 1–15. doi:10.1080/00223980.2022.2045887 PMID:35303414
- Mendez-Lopez, A., Stuckler, D., McKee, M., Semenza, J. C., & Lazarus, J. V. (2021). The mental health crisis during the COVID-19 pandemic in older adults and the role of physical distancing interventions and social protection measures in 26 European countries. *SSM - Population Health, 17*(101017), 101017. doi:10.1016/j.ssmph.2021.101017 PMID:34977323

- Méndez-Méndez, M. D., Fontanil, Y., Martín-Higarza, Y., Fernández-Álvarez, N., & Ezama, E. (2021). Configurations of adult attachment, indicators of mental health and adverse childhood experiences in women: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 18(24), 13385. doi:10.3390/ijerph182413385 PMID:34948994
- Mérida-López, S., Quintana-Orts, C., Hints, T., & Extremera, N. (2022). Emotional intelligence and social support of teachers: Exploring how personal and social resources are associated with job satisfaction and intentions to quit job. *Revista de Psicodidáctica (English Ed.)*, 27(2). doi:10.1016/j.psicoe.2022.02.001
- Pishghadam, R. (2009). A quantitative analysis of the relationship between emotional intelligence and foreign language learning. *Electronic Journal of Foreign Language Teaching*, 6(1), 31–41.
- Rashid, S., Jarad, F., Ahmad, A. G., & Abualnaja, K. M. (2022). New numerical dynamics of the heroin epidemic model using a fractional derivative with Mittag-Leffler kernel and consequences for control mechanisms. *Results in Physics*, 35(105304), 105304. doi:10.1016/j.rinp.2022.105304
- Ravens-Sieberer, U., Kaman, A., Erhart, M., Devine, J., Schlack, R., & Otto, C. (2022). Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *European Child & Adolescent Psychiatry*, 31(6), 879–889. doi:10.1007/s00787-021-01726-5 PMID:33492480
- Rodríguez, V., Rojas, N. M., Rabadi-Raol, A., Souto-Manning, M. V., & Brotmana, L. M. (2024). . *Early Childhood Research Quarterly*, 60(3), 80–95. doi:10.1016/j.ecri.2021.12.006 PMID:34955598
- Tomko, C., Schneider, K. E., Rouhani, S., Urquhart, G. J., Nyeong Park, J., Morris, M., & Sherman, S. G. (2022). Identifying pathways to recent non-fatal overdose among people who use opioids non-medically: How do psychological pain and unmet mental health need contribute to overdose risk? *Addictive Behaviors*, 127(107215), 107215. doi:10.1016/j.addbeh.2021.107215 PMID:34953432
- Wei, J., Zhu, S., Hou, Z., Dong, H., & Li, J. (2022). Research on the influence mechanism of emotional intelligence and psychological empowerment on customers' repurchase intention under the situation of online shopping service recovery. *Current Psychology (New Brunswick, N.J.)*, 42(2), 17595–17611. doi:10.1007/s12144-022-02841-5
- Wu, J., Zuo, R., He, C., Xiong, H., Zhao, K., & Hu, Z. (2022). The effect of information literacy heterogeneity on epidemic spreading in information and epidemic coupled multiplex networks. *Physica A*, 596, 127119. doi:10.1016/j.physa.2022.127119 PMID:35342220
- Yanyu, G., & Jizu, L. (2022). The effect of emotional intelligence on unsafe behavior of miners: The role of emotional labor strategies and perceived organizational support. *International Journal of Occupational Safety and Ergonomics*, 29(2), 1–43. doi:10.1080/10803548.2022.2055920 PMID:35322760
- Zhu, D., Doan, T., Kanjanakan, P., & Kim, P. B. (2021). The impact of emotional intelligence on hospitality employees' work outcomes: A systematic and meta-analytical review. *Journal of Hospitality Marketing & Management*, 31(3), 1–22. doi:10.1080/19368623.2021.1978914