

# *The Effect of the Learning Environment on Students' Anxiety and Depression Levels*

Alexander Z Hao<sup>1,a,\*</sup>

<sup>1</sup>The High School Affiliated to Renmin University of China, Beijing, 100080, China

a. alexh06@163.com

\*corresponding author

**Abstract:** Most people agree that different learning environments can create additional pressure situations for students. This study aims to investigate the effect of the learning environment on the level of social phobia and depression among high school students. The analysis assumes that International Baccalaureate (IB) students have the highest levels of anxiety and depression. The study distributed online anxiety and depression scales to 15 Advanced Placement students, 15 Advanced Level students, and 15 International Baccalaureate students in the same school. After data collection, the data was tested through ANOVA and correlational analysis to compare the scores of students in different learning environments. The study showed no significant differences in student scores across learning environments, but IB students scored higher than AP and Advanced Level students. The researcher concluded that IB students have higher levels of anxiety and depression than those enrolled in Advanced Placement courses and those enrolled at Advanced Level. Future work can increase the sample size of this study, to improve the credibility and significance of the present research.

**Keywords:** Adolescents, Social Anxiety, Depression, Learning Environment

## 1. Introduction

Learning environment typically refers to the education system in which the student participates, including Advanced Placement (AP), Advanced Level Qualifications (A-Level), and International Baccalaureate (IB). Among the three education systems, there are huge differences. AP originated in the United States and offers pre-college courses to advanced high school students. The students participating in AP programs can adjust the number and difficulty of methods according to their strength level, which is very accessible. As an education system that originated in the UK, the students who participate in A-levels are required to have high levels of academic interests and abilities, and most students conduct extracurricular research and competitions related to subjects of their claim to show their interest. In addition, as a global education system, IB has high requirements for students' comprehensive abilities, and IB offers general education, which demands students' essay writing ability heavily.

The study was conducted at a leading international high school in Beijing, China. The high school offers AP, A-Level, and IB programs. As prospective international students, the students here have to consider more things for undergraduate applications than local students, which is typically competitive. Among them, IB students are more stressed than AP and A-Level students. An IB

student will be required to write eight essays in class (6 Internal assessments, 1 Extended Essay, and 1 Theory of Knowledge essay) before graduation. Therefore, IB students often complain that they are under too much pressure when the IB curriculum is already challenging.

The field of this research has not been deeply studied because the research target is easy to be preconceived of as a group of people that has an acceptable mental health status, and the research in this area has more pedagogical than medical significance, so those who aim to treat anxiety and depression have paid less attention to this field.

The purpose of this study is to find out the effects of the learning environment on the anxiety and depression index of students and, if so, whether specific factors can be identified and then improved. Additionally, this study hopes to find an education method that enables the students to grow without undue pressure after the completion of the study. This study issued online social anxiety scales and depression scales to senior students in this school. After collecting enough data, statistical analyses were conducted on the data, and finally, the anxiety and depression index of students in the three education systems were compared. This study hypothesized that IB students have the highest levels of anxiety and depression and that this phenomenon is due to the high demands of the IB system itself on IB students.

## 2. Literature Review

The main focus of this paper is to compare the anxiety and depression indices of students in different learning environments and to analyze the reasons for the differences in the index, so the literature review section will concentrate on the factors that have been identified in existing research as contributing to anxiety and depression. This review categorized and discussed three factors affecting mental health: biological factors, social relationships, and environment.

Even though anxiety and depression are two different mental disorders, they possess so many areas of overlap that it would be inefficient to discuss them separately, so this review discussed both.

### 2.1. Biological Factors

Biologically, the factors contributing to anxiety and depression are also very diverse. From the existing studies on families and twins, all studies specify family genetics as a possible contributor to anxiety and depression [1]. In addition, dietary conditions can also have an impact on the anxiety and depression of the subjects. Recent studies have found that changes in the gut microbiome increase the release of microbial lipopolysaccharide (LPS), which in turn activates gut inflammatory responses. These gut responses stimulate nerves and induce depression-related symptoms. The field of nutritional psychiatry has generated observational and efficacy data that suggests that healthy eating patterns play a potentially positive role in the healing of depression by influencing mental and brain health. Therefore, poor dietary habits may contribute to anxiety and depression [2]. Finally, while the pathology of both anxiety and depression is still unknown, there are some neurobiological conjectures about both of them. The anxiety pathology hypothesis, the cyclooxygenase hypothesis, suggests that the release of Cox-2 from the enzyme cyclooxygenase is important for fine-tuning cortical networks and plays a homeostatic role in synaptic transmission and plasticity, and so may play a role in memory or anxiety. Still, at this point, this theory is only conjecture, and there is not sufficient evidence [3]. A major hypothesis for the pathology of depression is called the monoamine hypothesis, which suggests that depression is caused by changes in the levels of one or more monoamines in the body, including serotonin (5-HT), norepinephrine (NE), and dopamine (DA). Evidence points to reduced levels of these monoamines in patients suffering from major depression [4].

## 2.2. Environmental Factors

Environmentally, there is now experimental evidence that the quality of an organism's living environment can have an impact on the development of anxiety and depression. A comparison study conducted in 2022 compared the effects of different residential environments on body weight, pubertal onset, and anxiety-like behavior in Long Evans rats. The rats were kept in two settings: standard rat food, plastic cages, plastic water bottles, and corncob bedding, which had higher endocrine-disrupting compounds (EDCs). Other environmental items are phytoestrogen-free foods, polysulfone cages, glass bottles, and wood chip bedding, which are low in EDC. Compared with the high-EDC environment group, the rats raised in the low-EDC environment showed less anxiety-like behavior on multiple tests, providing evidence for the effects of the residential environment on development and behaviour [5]. Another study also suggested that stressful environments may contribute to depressive symptoms. The experiment was intended to demonstrate that selective serotonin reuptake inhibitors (SSRI), a standard treatment for major depressive disorder, do not affect mood per se, but rather make recipients more susceptible to environmental influences by enhancing neuroplasticity. To test this hypothesis, C57BL/6 mice were treated with fluoxetine in an intensive and stressful environment after inducing a depression-like phenotype. The results showed that the environment influenced the depression-like phenotype of mice. More specifically, the mice treated under the enrichment conditions improved their depression-like phenotype overall, while those treated under the stress conditions showed significant deterioration [6]. Although this experiment does not provide direct evidence that the environment causes the depression-like phenotype, it demonstrates that the climate is essentially the driver.

## 2.3. Social Relationship

Socially, Poor social relationships are linked to an increased risk of anxiety and depression. In a review of 181 articles on anxiety and depression, the authors concluded that various family factors, including decreased parental affection, increased parental conflict, and excessive parental intervention or aversion to children, can increase the risk of anxiety and depression in adolescents [7]. Another study conducted in Lebanon supports this view. According to an analysis of 1,810 students aged 14 to 17 who filled out questionnaires from schools in Lebanon, parents' divorce and child abuse were associated with social anxiety in young people [8]. Finally, a literature review on major depression and generalized anxiety disorder showed that parental loss, parenting styles, and abuse were all associated with major depression and generalized anxiety disorder in adulthood. Moreover, it is also mentioned that positive social support can play a specific protective role for patients with major depression. Hence, individuals' social support degree is also related to anxiety and depression [1]. In summary, the poor environment of the family of origin and the degree of social support for an individual are related factors for an individual to suffer from anxiety and depression.

The above articles have explained the related factors of anxiety and depression from many aspects. Still, the study participants mostly lived in poor environments, so in these studies, poor environments and unhappy lives are related to anxiety and depression. Unlike the above article, this study was conducted in a top high school in Beijing, China. This study mainly focuses on the learning environment rather than the living environment and wants to collect the anxiety and depression index of students in different learning environments and analyze the contributing factors. In addition, the study focuses on social anxiety and persistent depressive disorder.

## 3. Methods

Due to the scarcity of references in similar fields, this study collected quantitative primary data. The independent variable for this study is the student's learning environment, including AP, A-Level, and

IB. The data was only collected from one school to eliminate differences between schools. The collection was strictly limited to senior students who will apply to universities this school year. Online questionnaires were issued to support the data collection method of this study. The designed online social anxiety scale and depression scale for adolescents were sent to the students eligible through convenient sampling. All students participating in this study were told to fill in the two scales precisely the same, so information bias was avoided. The participants were strictly limited to students of the same grade in the same school and from different education systems, and the time to fill in the questionnaire was set one week after all students completed the final exam. Therefore, school pressure would not affect the data collection results as a variable, and the omitted variable bias was eliminated as little as possible.

### **3.1. Participants**

Forty-five subjects were recruited in the present study, divided into three groups according to the student's education system (15 people for AP, A-Level, and IB, respectively).

### **3.2. Materials and Procedure**

For the anxiety scale, this study used the Social Anxiety Scales for Adolescents (SAS-A), which has been adopted from Annette M. La Greca's "Social Anxiety Scales for Children and Adolescents: Manual and Instructions for the SASC, SASC-R, SAS-A (Adolescents), and Parent versions of the scales "[9]. The scale tests the subject's anxiety index through three aspects: Fear of Negative Evaluation (FNE), Social Avoidance and Distress to New Situations (SAD-New), and Social Avoidance and Distress in general (SAD-General).

For the depression scale, this study used the Quick Inventory of Depressive Symptomatology (QIDS-SR16) to test a person's depression level [10].

The selected students have completed the scales online by scanning the QR code sent to them. The total filling time of the two forms is about five minutes, with 41 questions.

### **3.3. Statistical Analysis**

All the statistical analyses were performed using SPSS 27.0. One-way ANOVA was conducted between the different education systems to examine whether there are differences in students' scoring situations; Bivariate correlation (Pearson, 2-tailed) was conducted between the four factors (FNE, SAD-New, SAD-General, QIDS-SR16) to examine whether there are correlations between the scoring situations. In addition, a simple average score was calculated to represent the scores straightforwardly.

### **3.4. Evaluation**

Although the data collection process has tried to reduce the factors that may affect the data results, there are still some biases in the data of this study. The sampling method chosen in this study is convenient sampling. Although this method can ensure that the participants meet the requirements of data collection, the survey results are not full-sided enough to infer the overall. Meanwhile, due to the limited number of students in the school, the amount of data that can be collected in this study to some extent, limited the generalizability and credibility of the present research. Meanwhile, the questionnaire did not consider the gender balance of the respondents, so the unknown gender distribution may be a factor affecting the data results.

## 4. Results

### 4.1. Descriptive Statistics

The mean and standard deviation of students' scores in different learning environments (including AP, AL, IB) in the four factors (FNE, SAD-New, SAD-General, QIDS-SR16) were calculated to represent students' scores visually.

IB students scored the highest in the FNE factor ( $M = 22.0667$ ,  $SD = 6.04113$ ), the highest in SAD-New aspect ( $M = 18.2667$ ,  $SD = 5.13346$ ) and SAD-General factor ( $M = 10.4667$ ,  $SD = 3.11372$ ), and the highest in QIDS-SR16 factor ( $M = 11.4000$ ,  $SD = 6.06865$ ). This is consistent with the original assumption that IB students would have the highest levels of anxiety and depression (See Table 1).

Table 1: Descriptive Statistics for the score levels of all participants.

Descriptive Statistics - Scores			
	N	Mean	Std. Deviation
FNE-IB	15	22.0667	6.04113
FNE-AL	15	18.7333	7.35300
FNE-AP	15	22.0000	5.76938
SAD-New-IB	15	18.2667	5.13346
SAD-New-AL	15	16.8000	5.55749
SAD-New-AP	15	14.4000	4.38830
SAD-General-IB	15	10.4667	3.11372
SAD-General-AL	15	8.8000	3.68782
SAD-General-AP	15	9.2000	2.30527
QIDS-SR16-IB	15	11.4000	6.06865
QIDS-SR16-AL	15	8.533	6.53416
QIDS-SR16-AP	15	9.9333	6.63827

### 4.2. One-way ANOVA

One-way ANOVA was conducted to test the score otherness of students with different learning environments on the anxiety and depression scales in four aspects: FNE, SAD-New, SAD-General, and QIDS-SR16. The test indicates that there was no significant difference in scores between students with different learning environments by the data from the FNE factor  $F(2,42) = 1.3$ ,  $p = .278$ ; SAD-New factor  $F(2,42) = 2.4$ ,  $p = .119$ ; SAD-General factor  $F(2,42) = 1.2$ ,  $p = .314$ , and QIDS-SR16 factor  $F(2,42) = .7$ ,  $p = .479$ . This contradicts the original assumption that IB students would have the highest levels of anxiety and depression.

### 4.3. Bivariate Correlation

Bivariate correlational analyses (Pearson, 2-tailed) were performed to examine the correlations among the four test factors (FNE, SAD-New, SAD-General, QIDS-SR16). The test integrated the

scores of the students in the four factors, paired the four factors, and analyzed the correlation between them.

A positive correlation was found between FNE and SAD-New ( $r = 0.441$ ,  $p = 0.002$ ). A positive weak correlation was found between SAD-New and SAD-General ( $r = 0.550$ ,  $p = 0.000$ ). The fact suggests that the three factors in the anxiety scale interact with each other, but the scores of the anxiety scale and the depression scale have very little influence on each other.

Table 2: Bivariate correlational analyses (Pearson, 2-tailed) between the QIDS, FNE, SAD-NEW, and SAD-GEN.

Variables	r	p
QIDS and FNE	.000	1.000
QIDS and SAD-NEW	-.056	.717
QIDS and SAD-GEN	.036	.817
FNE and SAD-NEW	.441	<b>.002</b>
FNE and SAD-GEN	.081	.597
SAD-NEW and SAD-GEN	.550	.000

(\*FNE: Fear of Negative Evaluation; SAD-NEW: Social Avoidance and Distress to New Situations; SAD-GEN: Social Avoidance and Distress in general; QIDS: Quick Inventory of Depressive Symptomatology.

## 5. Discussion

Among the three data analysis methods used in this study, the results of the One-way ANOVA show that there is no significant difference in the scores of students in different learning environments among the four factors collected in this study ( $p = 0.278$ ,  $p = 0.119$ ,  $p = 0.314$ ,  $p = 0.479$ , corresponding to FNE, SAD-New, SAD-General, and QIDS respectively). Bivariate correlation (Pearson, 2-tailed) analyses showed that there was a positive weak correlation between FNE, SAD-New ( $r = 0.441$ ,  $p = 0.002$ ), and SAD-General scores on the anxiety scale ( $r = 0.550$ ,  $p = 0.000$ ). Still, there is no significant correlation between scores on the anxiety scale and depression scale. The descriptive statistics showed that the average score of IB students in the four factors in this study is the highest compared with the average score of AP and A-level students.

The results of descriptive statistics are consistent with the hypothesis of this study. The highest average score of IB students in all four factors proves that IB students have higher anxiety and depression index than AP and A-Level students, and IB students have the most stressful learning environment. Since this research data is collected from students of the same grade in the same school, the learning environment is the most significant difference between these students. Thus, it can be further assumed that the high pressure of the learning environment of IB students may be caused by the high requirements of the IB learning system itself for students. The results of one-way ANOVA did not provide evidence for the hypothesis due to the insignificance of the results. However, ANOVA showed that the high school seniors in this school generally had some level of anxiety and depression. Bivariate correlation showed that there is no significant correlation between anxiety and depression, the scores are independent. In the literature review of this study, some articles discuss anxiety and depression together. Still, the bivariate correlation results of this time prove the independence of the two, suggesting that the two should be addressed separately in future studies.

There were limitations in the research. Due to the small sample size of 15 people in each system, the results cannot confirm the conclusion of this study. Also, it is beyond the scope of this study to collect data from multiple schools, so the data can only be representative of the students in the school

being tested. In addition, the two scales used in this study are not professional test scales, so there may be inaccuracies in assessing students' status. Finally, as the data collection method of this study is online, the seriousness of the subjects when filling in the questionnaire is an uncertain factor, which cannot guarantee the validity of all the collected data.

In the future, this research can be improved from three aspects. The first aspect is the data collection method. The researcher can use a professional scale to fill in a face-to-face way to ensure the validity of the data. However, if the subjects know that they will fill in the professional hierarchy, there may be psychological pressure, leading to the deviation of the validity of the data. Therefore, how to solve this problem remains to be studied. The second aspect is the data collection of subjects. The number of schools participating in this study and questionnaire fillers should be increased to increase the sample size, making the result more representative. However, this approach can incorporate unknown variables, such as the overall learning environment from school to school, resulting in unrepresentative data. How to avoid these variables remains to be studied. The third aspect is to add qualitative research, through the way of interview, interview from the perspective of students, what will cause their anxiety or depression factors, as a reference to study the pathology of anxiety and depression.

## 6. Conclusion

The current research aimed to find out whether students' learning environments can influence their anxiety and depression levels, and it is assumed that IB students will have the highest scores on both the anxiety scale and the depression scale due to the IB education system's complex subjects and writing tasks. Based on the quantitative analysis of students' scores in four factors (i.e., FNE, SAD-New, SAD-General, QIDS-SR16) in different learning environments (including AP, AL, IB) It can be concluded that although there was no significant difference in anxiety and depression among students in diverse learning environments, IB students still had higher levels of anxiety and depression than their AP and A-Level peers.

This study clearly shows that the learning environment impacts students' anxiety and depression levels, but the reasons for this difference are unknown and need further research.

Based on these conclusions, when choosing a course system, students should make a thorough investigation in advance so that they can clearly know the course intensity and characteristics of each course system, and then make a choice based on their academic level rather than choosing a course system because they have heard that it is more comprehensive for the training of students.

To better understand the implications of these results, future research can focus on exploring the learning factors that affect students' anxiety levels and the learning factors that affect students' depression levels. In addition to the conclusion that the learning environment can affect students' anxiety and depression levels, this study also concludes that there is no significant correlation between students' anxiety and depression levels based on correlation tests, so researchers should consider discussing anxiety and depression separately when discussing this issue in the future.

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