

The Interaction Between Parenting Style and High School Students' Self-Regulation Ability on Test Anxiety

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Abstract. This study aims to explore the interaction between parenting rearing styles and the self-regulation ability of high school students in the mechanism of test anxiety because there are hardly any that have explored the interaction between both parenting-rearing styles and self-regulation ability in terms of test anxiety in the existing studies. The research employed a questionnaire survey, targeting students from senior 1 to 3 of several high schools in Beijing (including the Dalton Academy of Peking University Affiliated High School), including Multidimensional Test Anxiety Scale (MTAS), the Simplified Parenting Style Questionnaire (s-EMBU-C), and the Learning Motivation and Strategy Scale (LMSS) to conduct the questionnaire to collect data. We found that exam-related responses differ between encouraging and discouraging parenting styles, and parenting style interact with self-regulatory components, including motivation, confidence level and resilience. This study can provide empirical references for alleviating high school students' test anxiety and improving family education guidance.

Keywords: Test anxiety, Parenting Style, High School Students' Mental Health, Self-regulation Ability

1. Introduction

Test anxiety refers to a subjective and emotional discomfort that individuals experience when facing actual or potential examination situations. This discomfort is typically manifested as physical and cognitive symptoms, such as anxiety, tension, worry, self-doubt, accelerated heartbeat, and rapid breathing [1]. It is a common psychological phenomenon among high school students, especially the students in Beijing Haidian in China, a highly competitive community. Students show symptoms such as nervousness before the exam, restlessness during the test, and various physical reactions like dizziness, palpitations, loss of appetite, etc. They may even suffer from severe exam syndrome, which is known in psychology as test anxiety [2]. Recent studies have revealed that around 30 percent of Chinese high school students exhibit significant test anxiety, a trend that has remained consistent in recent years [3]. Excessive anxiety can negatively affect academic performance, cognitive functions, and school well-being [1]. However, although some studies have paid attention to the self-regulation or family factors effects (such as parenting rearing style or family relationships) on test anxiety, most of them only focus on the relationship between test anxiety and single influencing factors [4].

Therefore, this research aims to study the interaction between parenting styles and self-regulation abilities in predicting exam anxiety. It has great implication in launching a series of intervention programs to enhance self-regulation abilities or relieve test anxiety emotion among Beijing high school students under different parenting styles.

2. Literature review

Test anxiety is a complex and multi-dimensional emotional response triggered by the examination situation. It refers to the psychological discomfort, mainly characterized by worry, tension, when individuals experience face actual or potential examination pressure, accompanied by a series of chain reactions at the cognitive, in physiological, cognitive and behavioral levels [5]. The anxiety disorder among teenagers can lead to a series of adverse consequences, such as impaired social skills [6], and dysfunction in career and family life [7, 8]. Previous studies have identified individual factors and environmental factors (in campus or family) as the key correlates of test anxiety, but the interaction mechanisms between these factors have not been fully explored.

2.1. How to measure test anxiety

Anxiety disorder is a disease involving cognition. Research on the cognitive aspects of adolescents with anxiety disorder can focus on cognitive content, such as self-talk, as well as cognitive functions [9]. Test anxiety, as an emotion, can be reasonably believed to have an efficacy that can regulate test anxiety. It is an extension of emotional regulation self-efficacy in the field of test anxiety [5]. Early measures of test anxiety were mostly single dimensional scales (such as the TAI scale or TAS scale). Test Anxiety Scale is one of the most widely used scales for measuring exam anxiety in the international community at present, and the Chinese version of Test Anxiety Scale (TAS) also has good reliability and validity [4].

In order to address the issue that the indicators for measuring exam anxiety should only represent the assessment threat in the performance evaluation context, rather than the consequences (such as worrying about being ridiculed by others), Putwain et al. developed a new tool for measuring exam anxiety: the Multidimensional Test Anxiety Scale [4]. As research advanced, multi-dimensional measurement tools gradually became widely used. The research will use the Chinese version of the Multi-dimensional Test Anxiety Scale (MTAS), which has been tested and its four-dimensional structure (such as worry, cognitive interference, tension, and physiological indicators) shows good adaptability among Chinese adolescent populations. It is currently a high-quality tool for measuring test anxiety among high school students [1].

2.2. Investigating test anxiety from self-regulation perspective

The self-regulation ability of learning anxiety is defined as the students' ability to be aware of their own learning anxiety and to apply certain strategies to manage and regulate it without affecting normal study and life, based on the theory of autonomous learning [10]. Guo developed a learning anxiety self-regulation ability scale, which verified the independence and correlation of the four regulatory dimensions: cognitive regulation ability, metacognitive regulation ability, behavioral regulation ability, and emotional regulation ability.

The approach in behavioral regulation strategies has a significant effect on alleviating abnormal physiological indicators during exams. Students with a high level of efficacy in regulating exam anxiety tend to adopt positive coping strategies such as deep breathing, positive self-suggestion, and

relaxation techniques to effectively mitigate the negative effects of exam anxiety, and perform better according to their own abilities, thereby showing lower levels of exam anxiety [5].

Guo refined the Student Learning Anxiety Self-regulation Ability Scale developed based on the Learning Motivation Strategy Scale (LMSS) into four dimensions: cognitive regulation, metacognitive regulation, behavioral regulation, and emotional regulation. It was proposed that the core of cognitive regulation strategies lies in intervening in cognitive and thinking processes to reduce concerns and anxious thoughts caused by exams; the emotional regulation strategies focus on adjusting the negative emotions caused by anxiety in the exam situation, thereby alleviating the accompanying physiological reactions and tension state; the behavioral regulation strategies mainly revolve around the training of learning skills (such as test-taking techniques) to reduce learning anxiety [10].

2.3. Considering parental rearing style as a mediator of test anxiety

Parental rearing style refers to the stable behavioral pattern formed by parents during the process of raising their children. It can be classified into three types: democratic, authoritative, and permissive. The core dimensions of this style include emotional care and behavioral controls. Under an active parenting style, like democratic parenting style, children are less likely to have conflicts with their parents or exhibit extreme rebellious behavior. When it comes to dealing with exam results, children will not be overly worried about their parents' criticism due to poor exam performance and will not experience severe anxiety [11].

2.4. Research gap and hypotheses

Previous research has observed different levels of test anxiety in adolescents. However, their research did not explore whether the differences in self-regulation abilities under different parenting rearing styles mediated this phenomenon. Existing literature usually only examined the influence of parenting style or self-regulation ability on testing anxiety separately, in lack of considering the individual differences arising from potential interaction between family influence and self-control. This motivates the current study to explore the interaction between parenting style and high school students' self-regulation ability on test anxiety.

1. The first hypothesis generated from the current study is that using newly designed questionnaires, we can quantify and identify different levels of emotion responses related to test anxiety.

2. The 2nd hypothesis is that there is a relationship between parenting style and exam-related anxiety levels.

3. The 3rd hypothesis is that there is a relationship between parenting styles and self-regulation factors.

4. The final hypothesis is that there is a relationship between exam-related anxiety and self-control ability.

3. Methodology

The purpose of the research is to explore the interaction mechanism between parenting styles and self-regulation on test anxiety. In order to conduct a comprehensive study of this issue, this research needs to use quantitative approach via questionnaires. The questionnaire survey focuses on test anxiety levels, parenting rearing styles, and self-regulation on daily events in campus and families.

3.1. Subjects

This study adopted the method of s convenience sampling selected some students from high schools in Beijing. The research also investigates the high school students in Dalton Academy of Affiliated High School of Peking University, including students from senior 1 to senior 3. There were 75 number of subjects in this study, recruited from WeChat platform. They were students from Dalton Academy of Affiliated High School of Peking University (Male =15, Female = 60). For the ethical concern, all subjects gave their informed consent. Furthermore, the researchers will keep the information filled out by the participants confidential, in order to protect data privacy. All the collected information will not be used for commercial purposes. Before distributing the questionnaires, the researcher conducted a small sample test on the questionnaires to examine their feasibility and validity.

3.2. Design of questionnaires

The questionnaire was designed by referring to Chinese version of the Multidimensional Test Anxiety Scale (MTAS), Simplified Egna Minnen Beträffande Uppfostran (EMBU) Scale, and Learning Motivation Strategy Scale (LMSS). To further ensure the quality of the data, this study removes invalid questionnaires with too short or too long response times and those showing obvious response patterns after the questionnaires are collected. We followed the screening criteria proposed by [1] to ensure the authenticity and validity of analysis samples. The questions corresponding to the variables in the questionnaire are as shown in the table below (Table 1).

Table 1. Comparison table of variables and questionnaire items

Identified Variables	Definition	Categories of questions in Questionnaire
Grades	The level of pressure from exams may differ	Year 1, 2, 3
Exam-related emotional response	Direct behavioral readout of test anxiety	Q7, 8, 9, 10
Exam-related physical reactions	Direct behavioral readout of test anxiety	Q11-21
Influence by performance & external comments	Indirect report of test anxiety	Q22-27
Parenting Style (encouraging)	External factors influencing test anxiety	Q29, 33, 36, 38, 39, 42, 48
Parenting style (discouraging)	External factors influencing test anxiety	Q28, 31, 34, 40, 41, 43
Parenting style (strictly control)	External factors influencing test anxiety	Q30, 32, 35,37, 44, 45, 46, 47
Motivation of learning	Internal factors influencing test anxiety	Q49-56

Table 1. (continued)

Self-efficacy: Confidence	Internal factors influencing test anxiety	Q57, 58, 59
Self-management strategy for learning and testing	Internal factors influencing test anxiety	Q60-72
Self-efficacy: Resilience	Internal factors influencing test anxiety	Q73-76

4. Results

4.1. Subject information

There are 15 male students, 60 female students, 25 students in the 10th grade, 44 students in the 11th grade, and 6 students in the 12th grade. 78.67% of the participants are from Dalton Academy, and 18.67% of the participants are from the college entrance examination department of the Affiliated High School of Peking University. Most of the participants lived with their parents (either one of them), while only a few of them (6 out of 75) did not live with their parents.

4.1.1. Hypothesis 1: exam-related anxiety level

First, our results supported the first hypothesis that different levels of exam-related responses were observed across individuals. We first quantified exam-related responses and observed consistent patterns in exam-related emotional response and physical reactions, as well as similar level in the influence by external comments. The results support that our metrics are effective indicator of exam-related anxiety.

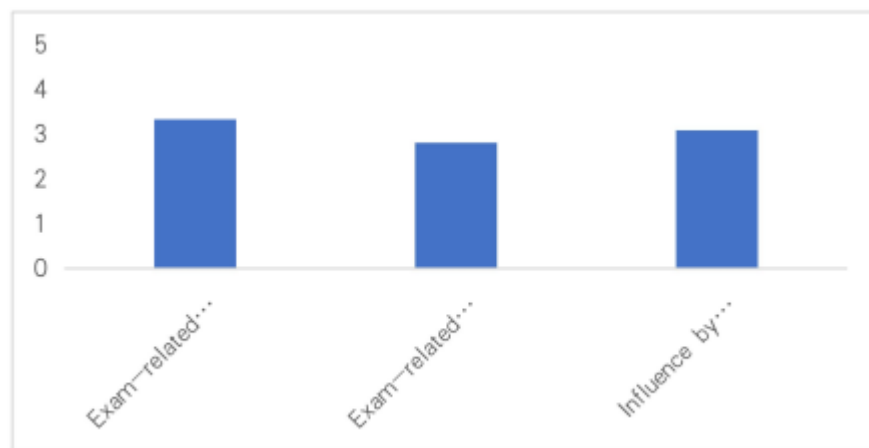


Figure 1. Mean level of exam-related responses in all subjects: including emotional response, physical reactions and influence by external comments. The mean of exam emotional responses was the highest, followed by the influence of external evaluations, while the mean score of physical reactions was the lowest

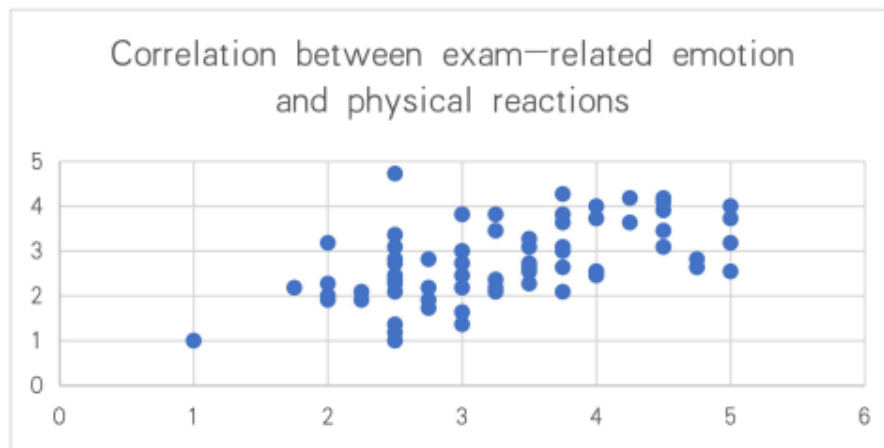


Figure 2. Highly correlated level between exam-related responses and physical reactions in all subjects: suggesting consistent exam-related anxiety emotionally and physically. The scatter plot shows an overall positive distribution from the lower left to the upper right. Lower scores in emotional response correspond to lower scores in physical response, and higher scores in emotional response correspond to higher scores in physical response

4.1.2. Hypothesis 2: test anxiety and parenting style

We can identify different levels of parenting style across the subjects and categorized the scores into 3 groups: encouraging, discouraging and strictly-control. For better quantification, we established a relative parenting style, which was calculated as the difference between the score of the encouraging parenting style and the score of the discouraging parenting style. We next quantified the relationship between parenting style and emotional responses to exams. A higher relative parenting value indicates a more encouraging family environment, while a lower relative value indicates a more discouraging family environment. The scores of the relative style gradually decreased from the low anxiety group to the high anxiety group. The scores of the relative parenting style in the high anxiety group were the lowest.

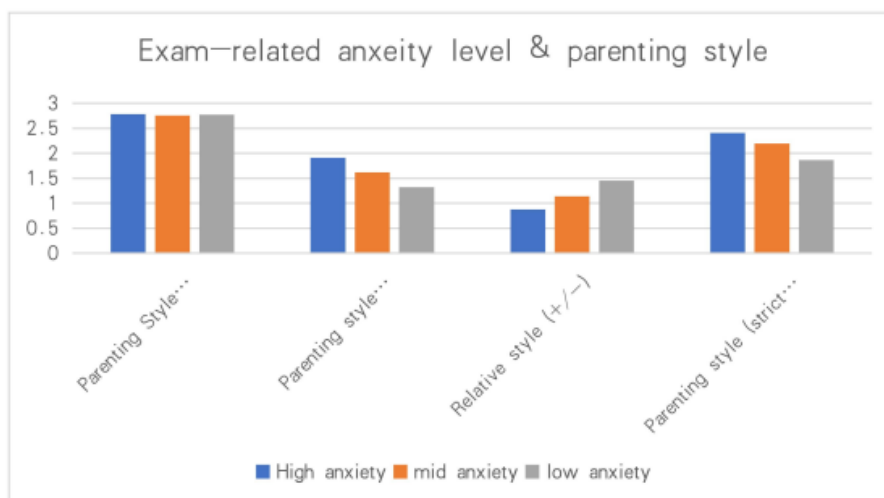


Figure 3. Exam-related anxiety level in different groups of parenting style

From this histogram, it can be seen that the means of the high, medium and low anxiety groups in the encouraging parenting style group are almost the same, with no significant difference. The mean value of the discouraging parenting style increases with the rise in anxiety level, with the lowest value in the low-anxiety group and the highest in the high-anxiety group. The average value of strict control parenting style steadily increases as the level of anxiety rises.

4.1.3. Hypothesis 3: parenting style and self-regulation factors

We next quantified the interaction between parenting style being positive or negative (encouraging vs. discouraging) is highly related to the level of self-control and self-regulation, as measured in learning motivation, confidence and resilience (not apparent in self-management strategy).

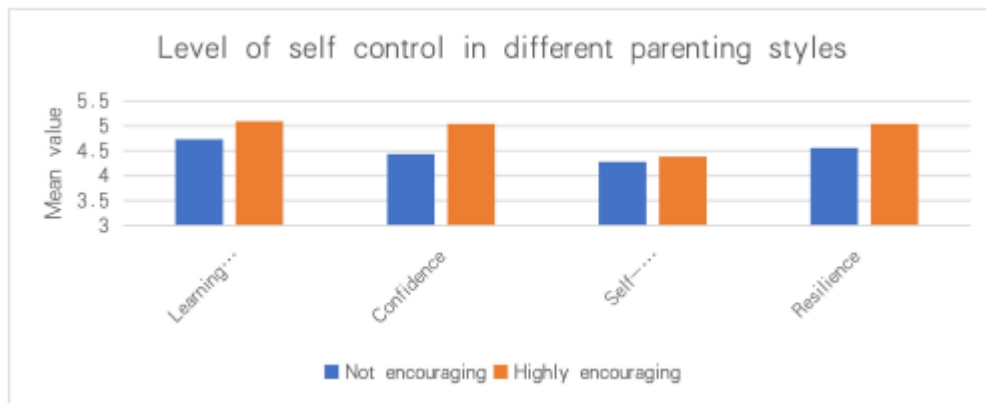


Figure 4. Levels of self-control in different groups of parenting style

- In the three dimensions of learning motivation, confidence and resilience, the scores of the highly encouraging parenting style were significantly higher than those of the discouraging parenting style, except for the self-management dimension where there was no significant difference.

4.1.4. Hypothesis 4: self-regulation ability& exam-related emotional response

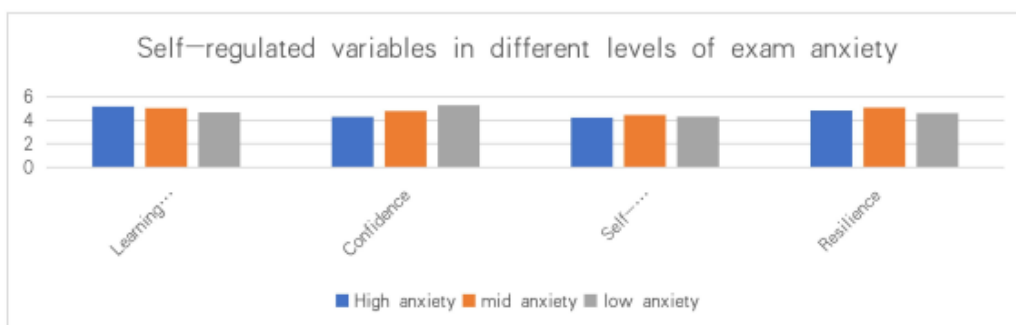


Figure 5. Levels of self-control in low/mid/high levels of test anxiety

The level of learning motivation is highly correlated with anxiety level, showing consistent tendency in which low anxiety group shows the lowest level of learning motivation, whereas groups of high anxiety display higher level of learning motivation. In contrast, the level of confidence

shows an opposite trend correlating with anxiety: low anxiety group shows the highest level of confidence whereas high anxiety group display the lowest level of self confidence.

The mean value of learning motivation gradually increased as anxiety levels rise, and the high-anxiety group achieved the highest score. The mean value of the confidence dimension continuously decreased as anxiety increased. The low-anxiety group had the highest score, while the high-anxiety group had the lowest score. The tiny average differences among the three anxiety groups of exam self-management strategy for learning and testing shows no significant upward or downward trend. In the resilience dimension, the mean score of the moderate anxiety group was the highest, while the resilience scores of the high and low anxiety groups were lower.

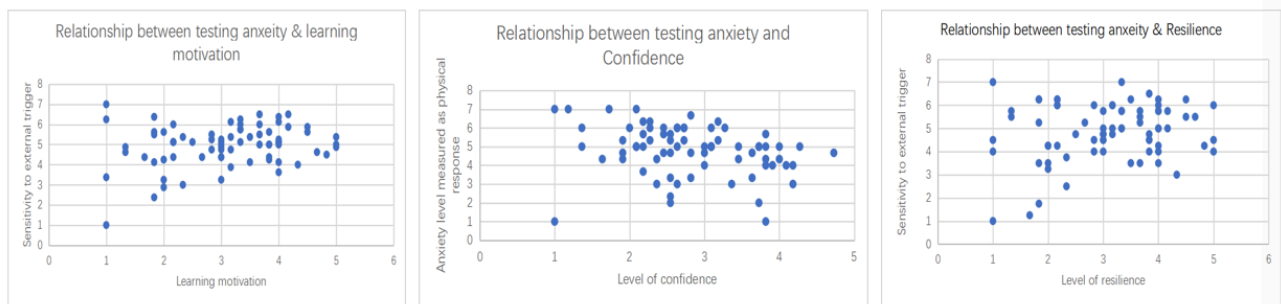


Figure 6. Correlation between self-control level and test anxiety

Resilience: in general, the intermediate and high level of anxiety groups show slightly higher level of resilience when they encounter challenges, in comparison to low anxiety group. Correlation between sensitivity to external influence and level of resilience shows positive relationship, suggesting strong correlation between testing anxiety and resilience.

5. Discussion

First, we did not observe clear difference regarding exam-related anxiety, parenting styles in different grades, with minimal level of difference in confidence and resilience (higher in lower grade students). Only year 1 (grade 10) students show higher level of self-control capacity, in terms of the learning motivation, self-management strategy of learning and level of resilience. This suggests that the current samples may not show grade-dependent test anxiety, possibly due to smaller sample size of final-grade groups and variance in education systems in subjects.

This research divides exam-related responses into two difference dimensions, which are exam-related emotional response and exam-related physical reactions. Emotional responses are highly correlated with physical reactions could represent quantification of emotion response is valid.

5.1. Parenting rearing style

From the mean value perspective, the overall mean of the encouraging parenting style is between 2.5 and 3, indicating that the majority of the participants' families provide them with positive feedback. However, there is no significant difference in this dimension score among the high, medium, and low anxiety groups, suggesting that the positive encouragement mentioned in the questionnaire cannot alleviate students' test anxiety, which indicates a limitation. In contrast, the mean values of discouraging and strictly controlling parenting styles are lower. The scores of the two negative parenting style dimensions increase as the students' anxiety levels rise. Long-term negative evaluation by parents can make students worry about poor test results, attributing the failure to

themselves. Therefore, before the exam, students who have strict-control parents and discouraging parents are more likely to have feelings of tension and anxiety, forming vicious loop of emotion regulation.

5.2. Self-regulation

The reason why two variables show the opposite trends, perhaps low anxiety group show high level of confidence in self capacity, thus they don't feel necessary to spend extra efforts in learning, hence the low learning motivation. On the other hands, low anxiety group may also show lower sensitivity to exam results, which means they may not let the results of learning and testing have too much influence on their own evaluation.

Confidence is negatively correlated with students test anxiety. The low-anxiety group has the highest confidence score, while the high-anxiety group has the lowest. Confident students are less likely to be overly affected by the results of failed exams and are less likely to be nervous during the exams. The data of parenting style shows that students who grew up in highly encouraging families have significantly higher confidence scores than those with not encouraging parenting styles. Encouraging parenting style helps individuals develop a sense of self-identity and helps them build higher self-confidence. On the contrary, if parents constantly suppress their children, children are likely to lose their sense of self-identity and have difficulty building confidence. Parenting rearing style can indirectly reduce their anxiety levels by shaping students' self-confidence.

Self management and control capacity could be higher in those high anxiety groups, but it is also possible that low anxiety group may not find the hypothetical situation being as challenging as the other two groups.

5.3. Research limitations and future directions

The sample only includes 75 Beijing high school students, mostly from one high school. The proportion of male students is relatively low, and there are fewer participants in the senior year. The sample lacks representativeness and cannot be generalized to all high school students across the country. The variables are limited to analyzing the confidence dimension of self-regulation and do not cover all dimensions. Although the parenting styles are classified into three categories, in order to reduce the number of questionnaire questions, this study did not distinguish between parental differences.

In future research, the sample size can be expanded based on this study, with an aim to balance the gender ratio, grade ratio, types of school, and enhance the generalizability. Additionally, longitudinal tracking studies can be conducted to investigate the cause-and-effect relationships between self-regulation, parenting rearing style, and test anxiety. Furthermore, variables such as personality traits, including different dimensions of the Big Five personality traits, can be incorporated to study a more comprehensive influence mechanism.

6. Conclusion

In conclusion, using newly designed questionnaires, we identified different levels of emotion responses related to test anxiety. We found a close relationship between parenting style and exam-related anxiety levels, as well as its connection to self-regulation factors. Finally, we report a relationship between exam-related anxiety and self-control ability.

In encouraging parenting style, students showed lower level of test anxiety but higher confidence level and self-regulation ability. In contrast, higher level of anxiety is observed in discouraging and strict parenting style. Moreover, the research results indicate that the higher the learning motivation and resilience, the higher the test anxiety, but it is reversed for confidence level. This suggests that students of higher exam-related tension may set higher level of standards for themselves, therefore showing lower level of confidence in themselves, and *vice versa*. With correlational research, it is challenging to identify the causal link between these factors.

Future research should explore the influence of other parenting styles on the self-regulation ability of teenagers, with the aim of more comprehensively examining the family factors that affect students' self-regulation ability. In different family backgrounds, parenting behaviors may vary, and these differences may lead to different outcomes in the development of teenagers' self-regulation ability. Subsequent studies will also delve into the influence of different parenting styles on students' exam-related response. At the same time, this study only focuses on the confidence dimension of self-regulation ability, and future research will pay attention to other self-regulation factors such as self-control and stress management, in order to explore a more complete association between them and exam-related emotional responses. It is advocated that parents should attach great importance to the cultivation of children's self-regulation skills. By frequently providing students with positive feedback, their confidence can be enhanced, thereby reducing the negative impact of exam anxiety at the family level. The school counselor can provide different types of guidance based on the family rearing style of the students, in order to achieve the goal of individualized education.

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