

Academic Stress and Subjective Well-Being among Chinese and American Adolescents: A Cross-Cultural Analysis Using LLM-Generated Synthetic Data

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Abstract

The well-being of adolescents is tightly connected with the long-term mental health and is vulnerable to the academic demands. This paper will study the correlation between academic stress and subjective well-being among Chinese and US adolescents in terms of cross-cultural comparative design. A culturally sensitive bilingual (Mandarin English) synthetic survey responses were produced using large language models, and then screened by hand using plausibility criteria to help methodologically validate the selection of this methodology before the collection of large amounts of empirical data. The findings show that subjective well-being is very much negatively correlated with academic stress in the two countries. The Chinese adolescents have higher levels of academic stress and lower levels of well-being with an average and stress-well-being relationship is also stronger in China. Mediation analysis also indicates that perceived academic autonomy was a mediator of the negative impact of academic stress on well-being, with the indirect impact being bigger in Chinese sample. Such results indicate culture-specific processes of academic stress and attractive use of the synthetic data produced by LLC to cross-cultural research design.

Keywords

Adolescent well-being, academic stress, cross-cultural comparison, individualism and collectivism.

1. Introduction

The well-being of adolescents has emerged as a key issue among scholars, educators, and policy-makers in the world [1]. Healthiness in adolescence is linked closely to long-term psychological health, academic activity and social adaptation in adulthood [1]. Adolescents are very sensitive to the environmental demands and stressors during this development stage due to the rapid cognitive, emotional and social changes during this stage. Among such stressors, academic pressure has always been one of the most significant factors that influence adolescents and their mental health and subjective well-being [2].

Subjective well-being typically denotes cognitive and affective judgments of their lives among individuals, such as life satisfaction, positive affect and lack of negative affect [3]. Efforts on empirical research have revealed that high levels of stress are adversely related to subjective well-being especially in the teenage years when coping resources are yet to be fully developed [2]. Academic stress, a stress when there are demands of the school-related stressors like examinations, homework, and expectation to perform, is a special type of stress because of the chronicity and evaluative quality of academic stress [4].

Although the association between academic stress and the well-being of adolescents has been well reported, the available data points to the fact that such association is not universal. Culturally based values and schooling systems as well as societal anticipations influence the

way teenagers will perceive the academic pressures and the effect those pressures will have on their psychological well-being [5]. Therefore, cross cultural research will be crucial in determining whether academic stress has similar or varied impacts on the well-being of the adolescent in different societies with various cultural orientations.

The case of China and the United States is a particularly useful contrast to study in terms of cross-cultural. The Chinese people have historically placed a strong value on collectivism, academic excellence, and social peace, which are greatly instilled in Confucianism [6]. In this cultural environment, teenagers tend to have high academic demands caused not only by the school demands but also by the parental requirements and social norms which correlate academic performance with a family prestige and social mobility [7]. Academic pressure among Chinese teenagers is further enhanced by the very competitive examination-based system of education, which is represented by the National College Entrance Examination (Gaokao).

Conversely, the American culture is normally defined in terms of individualism, personal freedom of choice, and self-definition [8]. Even though academic success is still significant in the United States, teens are usually urged to take on various means to become successful such as extra-curricular activities, creativity and interests. The former researches indicate that adolescents in America might react to academic pressure in a different manner, seeing it as one of the numerous developmental issues but not necessarily as the key factor, which creates the sense of self-worth [9]. Consequently, the psychological effect of academic anxiety on the well-being can be reduced, in comparatively.

Although a large amount of literature has been compiled on the well-being of adolescents, there is a dearth of comparative research on how academic stress and happiness relate to each other among Chinese and American adolescents. The majority of the current studies are based on samples of one country or are generalized to address culture without its consideration. Further, the high rates of social changes in China and the shift in educational and social values within the United States require new studies, which mirror the new experiences of adolescence [10]. In the absence of cross-cultural comparison, it is not yet understood whether academic stress has a universally negative effect or that it is counteracted by a cultural background.

This means that the current research intends to provide a systematic cross-cultural comparison of the academic stress and subjective well-being relationship in adolescents in China and the United States. This research aims to answer three major questions: (1) the negative relationship of academic stress and well-being among teenagers in the two countries is confirmed, (2) the relationship between the levels of academic stress and well-being in Chinese and American adolescents is significantly different, and (3) the relationship between academic stress and well-being is stronger in one country compared to another due to cultural aspects.

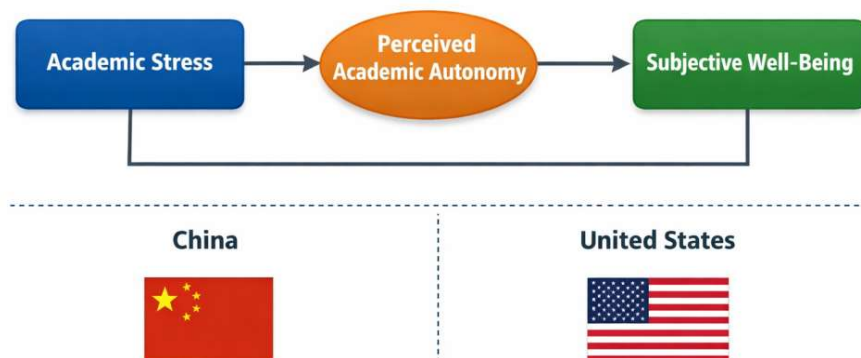


Figure 1. Conceptual framework of academic stress, perceived academic autonomy, and subjective well-being across cultural contexts.

This research is the first of its kind methodologically in that it uses large language model (LLM)-generated synthetic survey information to help in hypothesis testing and methodological validation before obtaining large-scale empirical data [11]. In both English and Mandarin, it creates culturally sensitive and demographically informed survey responses, which make this technique possible to preliminarily examine cross-cultural trends and clearly explains the promise of artificial intelligence as a tool in psychological research design. In this framework, the paper will add to the existing body of work on the well-being of teenagers and the new debates on the responsible use of generative models in the field of social science study.

2. Theoretical Framework

2.1. Academic Stress and Subjective Well-Being

Subjective well-being (SWB) is a key concept of positive psychology and is the cognitive and affective judgments of people about their lives, which usually include life satisfaction, positive affect, and the lack of negative affect [3]. Subjective well-being is a significant predictor of mental health outcomes during adolescence because it is a major indicator of academic interest, psychological involvement, and social performance [2].

Academic stress is also usually referred to as the psychological distress that is linked to education requirements which surpass the adaptive resources of the individual such as examination pressure, academic work-load and parental and teacher expectations [4]. Academic stress unlike the acute stressors is more chronic and evaluative and this exposes the adolescents to prolonged performance based pressures in the long-term. Empirical studies carried out in the past have shown unequivocally that an increase in the degree of academic stress is correlated with a decrease in subjective well-being, anxiety and depressive symptoms in adolescents [2, 7].

Stress-coping wise, adolescents have minimal emotional control and coping mechanisms than adults and this makes them especially susceptible to the adverse psychological effects of long term academic stress [12]. In line with this, the academic stress is extensively considered as a negative predictor of well-being in adolescents that can be regarded as salient [2].

2.2. Cultural Differences: Individualism versus Collectivism

Although the negative impacts of academic stress regarding well-being have been extensively reported, the cultural context is highly important in influencing the ways in which academic demands are perceived and internalized [2]. In the cultural dimension theory of Hofstede, the cultures vary in their fundamental differences along the individualism/collectivism dimension, which dictates motivation, self-concept and reaction to social expectations [8, 5].

Collectivist societies like China focus on interdependence, social cohesiveness and group expectations [8]. In such a cultural context, college performance can be considered a duty, and a major gateway to family respect and social advancement [6]. As a result, Chinese teenagers will tend to feel increased academic pressure not only by the institutional pressure but also by the high expectations of parents and social expectations that educational performance is associated with individual values [7]. Academic performance therefore becomes a main source of personal examination and the psychological effects of the academic stress are heightened.

Conversely, individualistic societies like the United States emphasize on personal freedom, self-expression and choice [8]. School performance is still valued, but American teenagers are typically advised to take various developmental options such as extracurricular activities and hobbies [9]. Individualistic contexts tend to base self-worth more on personal qualities and influences of peers as opposed to performance in schools [5]. Consequently, academic stress can be a part of multiple stressors affecting well-being, which can be the cause of mitigating the adverse psychological impact.

These cultural differences imply that the extent of academic stress as well as its relationship to subjective well-being could be systematically different between Chinese and American adolescents.

2.3. Hypothesis Development

According to the theoretical worldviews discussed above and previous empirical evidence, the following hypotheses are proposed in the current study.

H1: There is a negative relationship between academic stress and adolescent subjective well-being.

The hypothesis is based on the theory of stress and well-being which postulates that the long-term exposure to evaluative stressors compromises emotional well-being and satisfaction in life, especially in the adolescent age.

H2: The levels of academic stress among the Chinese adolescents are higher as compared to the American ones.

Since the educational system in China is examination-oriented, and there is a high emphasis on academic performance in the culture, the adolescents will have a higher academic pressure than the American ones.

H3: The correlation between academic stress and subjective well-being is negative and more likely among the Chinese adolescents than the American adolescents.

This hypothesis is based on the cultural dimensions theory, which supposes that academic performance is more dominant in self-evaluation in collectivist settings, and, therefore, the negative impact of academic stress on well-being in Chinese adolescents is enhanced compared to the situation in the United States.

3. Methodology

3.1. Research Design

The research design to be used in this study is quantitative research design because it aims at exploring the relationship between academic stress and subjective well-being among members of the adolescent population. A comparative design is used by applying cross-cultural approach to a closer look at the possible distinctions between Chinese and American adolescents. Quantitative approaches prove to be especially appropriate when it comes to testing hypotheses derived through theory and also in facilitating systematic comparisons of psychological constructs across cultures.

3.2. Data Generation Using Large Language Models

This paper performs hypothesis testing and methodological validation before collecting large quantities of empirical data by using synthetic survey data produced by large language models (LLMs). Recent methodological studies are proposing that properly constrained and validated data generated by LLM can be used to approximate human response patterns and is a useful tool in initial analysis and research design[11].

Chinese and American adolescents were given culturally sensitive prompts, which included contextual information, which is the educational system, family expectations, and social norms. The survey items were created in Mandarin and English to capture the language and cultural differences. It was specifically stated during data generation that demographic limitations (age range, 13-18 years and educational context) should be considered to make sure that they fit the target population.

The researchers screened all responses produced manually in order to achieve internal consistency and plausibility. Contradictory and unrealistic responses were rejected. Notably, the data created by the LLM were only utilized in methodological exploration, hypothesis-

refining, and testing a statistical model, and not to substitute actual empirical data in the world. This cautious use is in accordance with the new best practices of using generative models in social science research in a responsible manner.

3.3. Participants

This research study has a target population of adolescents aged between 13-18 years both in China and the United States. The synthetic samples were made to reflect adolescents in urban areas, suburban areas, and rural areas of the two countries.

Each country had around 500 simulated participants that make up the final dataset. Instead, a stratified sampling approach was embraced to provide a balance of representation of each national group in relation to geographical area as well as socioeconomic status, which would enable a real cross-cultural comparison.

3.4. Measures

3.4.1. Academic Stress

Academic stress was measured by considering items that represent three fundamental dimensions of academic stress namely academic workload, examination pressure and perceived parental academic expectations. The literature identifies these dimensions to be the key elements of academic stress in adolescents[4, 7]. Respondents were asked to indicate their level of concurrence with each item on a Likert-type scale with the highest scores used to reflect the perceived academic stress. The score was done by averaging the responses of the items.

3.4.2. Subjective Well-Being

The scale of subjective well-being was determined on multidimensional basis that included life satisfaction, positive affect and negative affect (reverse-coded). This operationalization is consistent with established definitions of subjective well-being in adolescent populations [3, 2]. Higher composite scores indicate higher levels of overall well-being.

3.5. Data Analysis

The statistical analyses were done through conventional quantitative methods that are suitable in cross cultural psychological studies.

3.5.1. Descriptive Statistics

The preliminary calculations were descriptive statistics that were performed to describe the central tendency and dispersion of scores of academic stress and subjective well-being. The standard deviation and the mean of the samples were computed as:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i \quad (1)$$

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2} \quad (2)$$

where x_i denotes the observed score for participant i , $\bar{x}$ represents the sample mean, s is the sample standard deviation, and n is the sample size.

3.5.2. Pearson Correlation Analysis

The preliminary calculations were descriptive statistics that were performed to describe the central tendency and dispersion of scores of academic stress and subjective well-being. The standard deviation and the mean of the samples were computed as:

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}} \quad (3)$$

where x_i and y_i represent academic stress and subjective well-being scores for participant i , respectively, and $\bar{x}$ and $\bar{y}$ are their corresponding sample means. Correlation coefficients were calculated separately for Chinese and American adolescents.

3.5.3. Independent Samples t-Test

To test Hypothesis 2, independent samples t-tests were conducted to compare mean levels of academic stress and subjective well-being between Chinese and American adolescents. The t-statistic is expressed as:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (4)$$

where $\bar{x}_1$ and $\bar{x}_2$ denote the sample means of the Chinese and American groups, s_1^2 and s_2^2 are the corresponding sample variances, and n_1 and n_2 represent the group sample sizes.

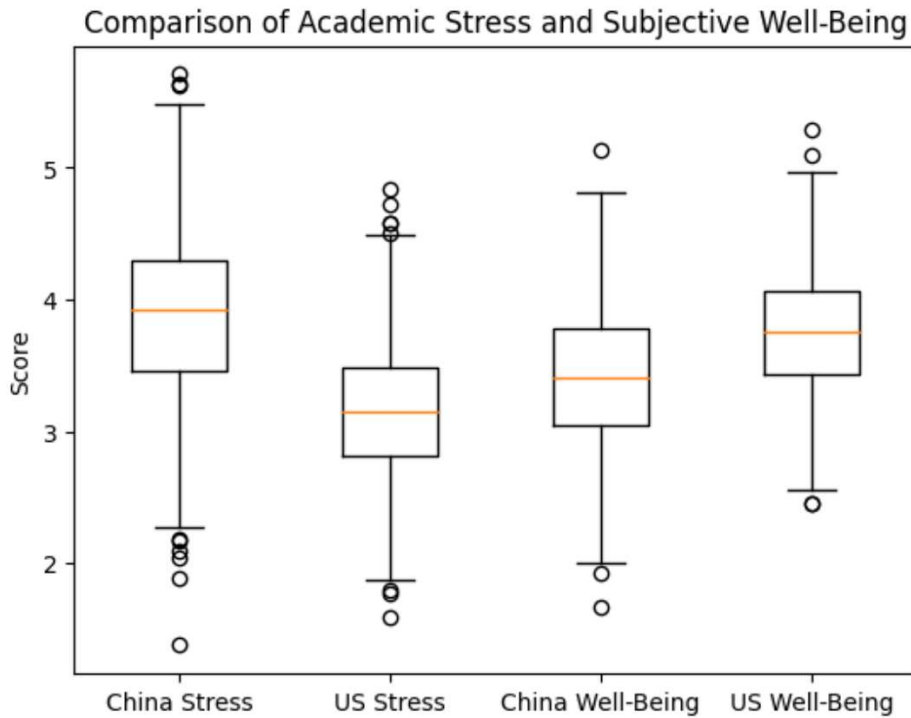


Figure 2. Comparison of academic stress and subjective well-being between Chinese and American adolescents.

3.5.4. Cross-Cultural Comparison of Associations

To test Hypothesis 3, the intensity of the correlation between academic stress and subjective well-being was contrasted with cross-cultural groups. Correlation coefficients were also calculated between Chinese and American adolescents using Pearson correlation thus and the differences between the absolute value of the correlation coefficients were compared to find out whether academic stress had a stronger negative relationship with well-being in one cultural group as compared to the other. All statistical analyses were measured on traditional significance levels.

3.5.5. Mediation Analysis

In order to further test the mediating role in which academic stress is related to adolescent subjective well-being, a mediation test was performed. As an intervening variable, perceived academic autonomy was added that represented the perceived sense of control and choice in the academic activity provided to adolescents.

A mediation regression methodology was used according to the standard steps. In the first place, the overall impact of academic stress on subjective well-being was obtained:

$$Y = cX + \varepsilon_1 \quad (5)$$

Second, the effect of academic stress on perceived academic autonomy was examined:

$$M = aX + \varepsilon_2 \quad (6)$$

Third, both academic stress and perceived academic autonomy were entered simultaneously to predict subjective well-being:

$$Y = c'X + bM + \varepsilon_3 \quad (7)$$

where X denotes academic stress, M represents perceived academic autonomy, and Y indicates subjective well-being. The indirect effect of academic stress on well-being through perceived autonomy was calculated as the product ab . Mediation is supported if the indirect effect is statistically significant and the direct effect c' is reduced in magnitude compared to the total effect c .

Chinese and American adolescents were analyzed in all mediation analyses to examine the possibility of cross cultural dissimilarities in the mediation mechanism.

4. Results

4.1. Descriptive Statistics

To summarize the academic stress levels and subjective well-being of Chinese and American adolescents, descriptive statistics were calculated. Table 1 presents the means and standard deviations for each variable by country.

Table 1. Descriptive Statistics of Academic Stress and Subjective Well-Being.

Variable	China Mean	China SD	United States Mean	United States SD
Academic Stress	3.87	0.62	3.21	0.58
Subjective Well-Being	3.42	0.55	3.76	0.51

As shown in Table 1, Chinese adolescents reported higher levels of academic stress compared to their American counterparts. On the contrary, American teenagers indicated higher average scores on subjective well-being. The standard deviations also represent a moderate variability in each group implying that there are enough dispersion to conduct further inferential analysis.

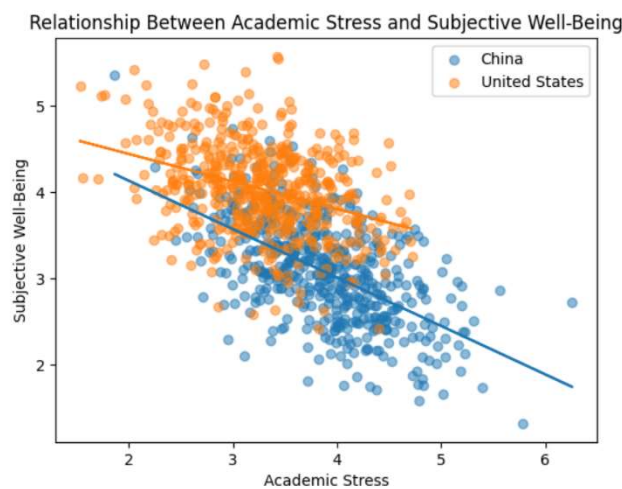
4.2. Pearson Correlation Analysis

To address Hypothesis 1, Pearson correlation analyses were used to determine the relationship between academic stress and subjective well-being. The correlation coefficients were estimated using a full sample and the Chinese and American adolescents.

Table 2. Pearson Correlations Between Academic Stress and Subjective Well-Being.

Sample	r	p
Full Sample	-0.46	< .001
China	-0.54	< .001
United States	-0.32	< .001

As presented in Table 2, academic stress was significantly negatively correlated with subjective well-being across the full sample, providing support for Hypothesis 1. The negative relationship was at a stronger level among Chinese adolescents as compared to American adolescents when analyzed individually by country. These results indicate a negative relationship between increased academic stress and well-being in both cultural samples, and the effect is stronger in the Chinese sample.

**Figure 3.** Scatter plots illustrating the relationship between academic stress and subjective well-being among Chinese and American adolescents.

4.3. Cross-Cultural Comparison

To examine cross-cultural differences in academic stress and subjective well-being, independent samples t-tests were conducted. The results are summarized in Table 3.

Table 3. Independent Samples t-Tests Comparing Chinese and American Adolescents.

Variable	t	p	Cohen's d
Academic Stress	17.21	< .001	1.10
Subjective Well-Being	-11.08	< .001	0.69

Those findings show that Chinese adolescents reported to be much more stressed about their school performance compared to American adolescents, which confirms Hypothesis 2. On the other hand, the scores of subjective well-being among American adolescents were much higher. The estimates of the effect sizes indicate that there is a large difference and medium-to-large difference in the academic stress and subjective well-being between the two groups, respectively.

To further seek whether the relationship between academic stress and subjective well-being is moderated by cultural context, simple linear regression was performed with each of the countries. The academic stress was a significant predictor of subjective well-being in the two samples, but the negative regression coefficient was higher in the Chinese sample, which is also evidence of a stronger negative correlation. This trend will contribute further to Hypothesis 3

that the relationship between academic stress and adolescent well-being depends on cultural context.

4.4. Mediation Analysis

The mediation analysis was performed to test the hypothesis of the relationship between academic stress and subjective well-being mediated by the perceived academic autonomy. Table 4 presents the standardized regression coefficients for each path of the mediation model, estimated separately for Chinese and American adolescents.

Table 4. Mediation Analysis Results for Perceived Academic Autonomy.

Path	China β	China p	United States β	United States p
Academic Stress $\rightarrow$ Well-Being (c)	-0.54	< .001	-0.32	< .001
Academic Stress $\rightarrow$ Autonomy (a)	-0.47	< .001	-0.28	< .001
Autonomy $\rightarrow$ Well-Being (b)	0.41	< .001	0.35	< .001
Academic Stress $\rightarrow$ Well-Being (c')	-0.35	< .001	-0.22	< .01
Indirect Effect (ab)	-0.19	< .001	-0.10	< .01

As shown in Table 4, academic stress had a significant negative total effect on subjective well-being in both cultural groups. Perceived academic autonomy was also negatively related to academic stress as well as perceived autonomy was positively related to subjective well-being. The direct influence of academic stress on subjective well-being was smaller but statistically significant when perceived academic autonomy was added to the model signifying partial mediation. In both samples, the indirect effect was strong, which is why it is possible to conclude that perceived academic autonomy mediates the connection between academic stress and adolescent well-being partially.

Mediation Model of Academic Stress, Autonomy, and Well-Being

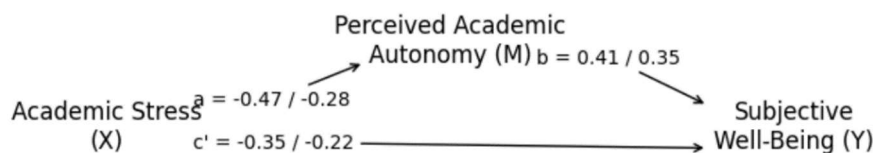


Figure 4. Mediation model illustrating the indirect effect of academic stress on subjective well-being through perceived academic autonomy. Standardized coefficients are reported for China and the United States, respectively.

It is important to note that the indirect effect was more significant among Chinese adolescents as compared to their American counterparts, which means that lower academic autonomy is a more significant factor in the explanation of the harmful effect of academic stress on the well-being of Chinese adolescents than among American adolescents in the cultural context.

5. Discussion

5.1. Interpretation of Key Findings

The current paper analyzed the correlation between academic stress and subjective well-being in the adolescents in China and the United States with emphasis on the cross-cultural

differences. In line with the previous studies, academic stress was established to be negatively related to subjective well-being in both cultural settings. Teenagers with greater academic pressure were found to have less life and emotional well-being, which is consistent with the perception that academic pressure is a risk factor salient to the adolescent mental health.

Notably, the findings demonstrated that the adverse effect of academic stress on well-being was statistically significant among Chinese adolescents compared to the effect in the American adolescents. This observation implies that academic stress is not simply a personal psychological phenomenon but a phenomenon which is ingrained in more extensive educational and cultural structure. Academic performance in China is highly linked to high-stakes tests, the most prominent of which is the National College Entrance Examination (Gaokao) which is pivotal in the future careers and studies. Consequently, academic pressure is more likely to be enduring, cumulative, and hard to get out of and thus, has a greater impact on the psychological well-being of the teens.

Besides, this is further aggravated by cultural demands about high academic performance. The Chinese adolescents are subjected to high expectations of their parents and the society that the performance of the adolescents is identical to personal worth, family dignity, and social progress. In this scenario, academic stress will be more internalized and perceived as a statement of self-worth, which will increase its harmful effect on well-being. On the contrary, although academic requirements are still significant in the United States, they are built into a more diversified system of education that provides various opportunities to attain success and self-improvement. Therefore, academic stress can be among multiple stressors that affect the well-being of adolescents and hence, diminishes its overall psychological effect.

5.2. Cultural Implications

The results of the research indicate the great importance of cultural context in the development of adolescents in terms of academic stress and well-being. Within the collectivist societies like China, academic achievement is perceived as a society goal as opposed to an individual goal. Teenagers are conditioned to value group norms especially those of family and society which can make them highly responsive to academic judgment and setbacks. This collectivist orientation may contribute to the increase of academic stress because this orientation presents educational performance as the moral requirement and one of the most important factors of social acceptance.

In comparison, individualistic societies like the United States focus on autonomy, self-expression, and the choice of an individual. In this cultural context, the adolescents will be motivated to build their identities on a wider skill set that includes social relationships, extracurricular activities, and interests. Consequently, academic performance might be less central in self-esteem, and the degree of academic stress as a factor in the overall well-being decreases.

Such cultural differences imply cultural adaptation of the interventions that contribute to the well-being of the adolescents. In the environment of collectivism, the attempt to diminish the undue academic pressure and the encouragement of more balanced notions of success may be especially vital. Within the individualistic setting, it might be more effective to assist adolescents to deal with several or multiple stressors and develop coping strategies that are adaptive. The study of these cultural dynamics can help educators, parents, and policymakers create supportive learning settings that enhance psychological well-being.

5.3. Methodological Contributions

In addition to its substantive results, this research has a methodological contribution to the cross-cultural psychological research since it shows that large language models (LLMs) can be useful in research design and methodological validation. This method produced culturally

sensitive, bilingual synthetic survey data, which allowed pre-testing hypotheses, testing of measurement strategies, and optimization of statistical tests before conducting empirical research on a large scale.

There are a number of benefits associated with using the synthetics generated by LLM. First, it enables researchers to investigate cross-cultural trends in a cost effective and scalable way especially in the initial phases of research planning. Second, it helps to determine the nature of possible biases, inconsistency in measurements, and analysis issues prior to committing to a data-gathering exercise that uses resources. Synthetic data in this sense, are a methodological sandbox, not a replacement of real-world observations.

Meanwhile, there are significant limitations that should be taken into consideration. Even highly advanced synthetic data cannot possibly be able to fully grasp the complexity, variability and unpredictability of human experiences. The results obtained using such data are therefore not to be taken as conclusive but rather as being exploratory. To make the current findings more valid, future studies should prove the findings with empirical data gathered on actual adolescent groups to verify the strength and appropriateness of the observed patterns.

6. Implications

6.1. Educational Implications

The results of the current research make the necessity of educational systems to focus on excessive academic stress as one of the factors that affect the well-being of adolescents critically. In settings where the academic pressure is especially strong, as in China, the reform of educational activities should be focused on stress reduction through the re-estimation of the structure, frequency, and stakes of academic evaluation. A decreased dependence on high stakes tests could help reduce the chronic performance pressure and even create healthier learning conditions.

Besides this, the findings also emphasize the need to move towards more diversified assessment systems in education. Instead of being fixated on a single measure such as the test scores, schools can consider adding several measures of student progress such as creativity, social skills, emotional competence, and participation in extracurricular activities. An evaluation framework with multidimensional measurements could be useful in assisting adolescents to have a better perspective of their own worth and thus cushion the adverse psychological effects of academic stress.

Additionally, teachers are important to the perception of the academic requirements by the students. Training programs based on teacher instructions processes, formative feedback, and autonomy-supportive interactions are associated with the possibility of positive academic experiences and improved subjective well-being of students.

6.2. Policy and Family Implications

In policy matters, the current findings imply that adolescent mental health ought to be incorporated as fundamental consideration in the education policymaking. Governments and educational authorities can think about putting in place policies that encourages one to balance academic workloads, check excessive homework and provide adequate time to rest and other non academic activities. School-based mental health services are especially significant to be invested in, since early psychological interventions can minimize the impact of the academic stress on a person in the long term.

The family environments are also a central factor that influences the experience of academic pressure among adolescents. Aspects of communication, expectations and definitions of success in parents may either contribute or reduce academic stress. Promoting families to set realistic and helpful expectations, focus more on effort than results, and appreciate different

kinds of success can lead to more healthy adolescent growth. Education programs on parents that are enlightening on the psychologic danger of being overly academic may also be of a special value.

Lastly, schools in collaboration with families should take action to promote the well-being of adolescents. By reinforcing home-school relationships and creating proper lines of communication, it may be possible to synchronize expectations and to give adolescents consistent emotional support. The combined efforts can help provide more conducive conditions that would help the adolescents not only to succeed in their studies but also to have positive psychological health.

7. Limitations and Future Research

Regardless of the value of the current research, a number of limitations must be recognized. In the first place, the research is based on synthetic survey data produced by large language models to validate the methodology and conduct exploratory research. Despite the recent studies indicating that the data created through the use of the LLM can be used to calculate and provide an approximation of how similar a human being would respond to some specific situations, they simply cannot be considered the most complex, variable and rich in terms of context adolescents experience. Consequently, one is to be careful with the findings and is not to consider them as the final empirical evidence.

Second, synthetic data can be targeting implicit biases in the training data and response generation mechanisms of large language models. Regardless of the close consideration of prompt design and manual validation, it is always difficult to make sure that all cultural, socioeconomic, and individual differences are correctly reflected. These restrictions emphasize the role of transparency and moderation in the interpretation of results obtained with the use of generative models.

The current study should be further developed in future by using the empirical data available on the actual adolescent population in both China and the United States. Future research directions might be larger-scale surveys, longitudinal studies, and mixed-method studies that may be more convincing about the connection between academic stress and subjective well-being. Furthermore, other psychological processes, including coping or motivation or social support, can be discussed in future research to further explain the impact of academic stress on the well-being of adolescents in different cultural backgrounds. These extensions would increase the theoretical and practical significance of cross-cultural studies of adolescent mental health.

8. Conclusion

The current research examined a correlation between academic stress and subjective well-being among Chinese and US adolescents, the purpose of which was to determine the universal tendencies as well as specific differences. The paper was based on the cross-cultural psychological theory to determine whether academic stress has a negative effect on adolescent well-being and the relationship between the two may be different in cultural backgrounds.

The results have proven that academic stress is negatively and significantly correlated with subjective well-being among life in both countries among adolescents. In addition, Chinese teens also reported an increased level of academic stress and showed more negative relationship between academic stress and well-being, in comparison with American teens. These findings indicate that although academic stress is a universal issue among adolescent people across the globe, its psychological consequences are influenced by cultural values, education systems, and social expectations.

This research has demonstrated that one must take into account cultural context to investigate the mental health of adolescents by addressing it through a cross-cultural comparative approach. The combination of large language model-generated synthetic data illustrates a new and cautious methodological course able to affirm the research design and hypothesis testing in cross cultural studies. Altogether, the current study helps gain a better insight into the impact of academic pressure on the well-being of adolescents and stress the necessity to implement culturally sensitive educational and psychological interventions to ensure better developmental outcomes.

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