
The Compilation of the Adversity Quotient Scale for College Students

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Abstract: Research objective: The purpose of this study is to compile the adversity quotient scale (AQS) for college students and to test its reliability and validity in order to provide a measuring tool for studying of college students. Methods: By means of literature review, open investigation and other methods, the initial project of adversity quotient scale for college students is formed. The test was conducted on 578 students from 4 local universities in Guangdong Province, and the final scale was formed through project analysis, exploratory factor analysis and confirmatory factor analysis. Results: The adversity quotient scale for college students consists of 43 questions and 6 dimensions. The result of Confirmatory factor analysis showed that the extracted six factor models fit well ($\chi^2/df=2.595$, NNFI=0.835, RMSEA=0.058, CFI=0.844, RMR=0.07, GFI=0.814, AGFI=0.794), The reliability coefficient of each dimension of the scale is between 0.684~0.917. The correlation validity between the adversity quotient scale and the social adaptability scale (SAS) was 0.291, which was significant at the level of 0.01. Conclusion: the adversity quotient scale has good and high reliability and validity, which is able to be used as an effective tool to measure the inverse quotient of college students.

Keywords: Collage Students, Adversity Quotient (AQ), Reliability, Validity, HuaGong

1. Introduction

Any successful person will face great pressure, no matter it is social pressure, survival pressure or self-pressure. But instead of being crushed, they managed to turn pressure into motivation. The main reason is that they have excellent HuaGong, which is the Kung-fu to turn pressure into motivation. According to Kelly McGonigal, a professor of psychology at Stanford University in USA, "the happiest people are not the ones without stress. Instead, they are people who are stressed but see pressure as a friend. Such pressure is the driving force of their lives and makes their lives more meaningful." [1] He conducted an eight-year longitudinal study of 30,000 American adults. The study's result found that people who believe that pressure is harmful to their health are more likely to suffer from insomnia, endocrine disorders, and to take a risk of cancer or heart disease, with a 43% increased risk of death, severely affecting their physical and mental health. On the contrary, those who were under extreme

pressure but did not consider it harmful did not have an increased risk of death, even lower than those who were less stressed [1]. This result shows that whether or not stress is harmful or beneficial to people rest with people's perceptions, attitudes and transitions to pressure rather than the pressure itself. Those who believe that pressure is harmful try to escape rather than to cope with it when they feel it. People who think pressure is good for them would proactively mobilize their various resources cope with the pressure that they are under. If so, they would construct and maintain the closer and closer social relationships, and enhance their confident in meeting the challenges of life ahead. They who believe that pressure is beneficial can not only do things better and more effectively under pressure, but also enhance their mental resilience and ability to resist frustration. They believe that they have ability to cope with a variety of challenges of future lif, thus actively take up possible challenges in the future. No matter whoever is, if he can change the negative cognition or mental attitude of pressure into the positive and turn the pressure into impetus, the pressure encountered by him would be not only harmless

but also beneficial to him, which is good for his health and success.

In China today, with the rapid development of society and economy, not only is people's higher and higher spiritual needs stimulated, but also is the society to be in a materialized and utilitarian process or state promoted [2]. Social spiritual dilemma and the loss of life meaning are becoming the more and more serious and common, so that it's more possible to result in social maladjustment and large social pressures [3]. Today's people, especially today's college students, face and bear many pressures from various aspects, such as the pressure to study and to apply for a job, work pressure, love and marriage pressure, and so on [4]. If they do not have HuaGong, they would be overwhelmed by the pressure to collapse and crush dead. Nowadays, the reason why many people have psychological problems or even suicide and other violent behaviors is mainly that they have no or poor HuaGong so as to be unable to bear the pressure from many aspects of life [5]. But there are those who someone, despite also under these pressures, even greater than them aforementioned, can constantly improve and go beyond themselves and reach the pinnacle of success at last, which main reason is that they have strong HuaGong to effectively realize to turn pressures into impetus.

Transformation is the core of adversity quotient (Referred to as AQ), AQ is reflected in transformation. The concepts of both of Paul G. Stoltz and others' definition emphasize or highlight transformation that is turning dilemma or adversity into opportunity [6, 7]. Cultivating AQ is to cultivate the ability, power or Kung-fu of transformation, namely HuaGong [8, 9]. The difference between the high and the low of AQ is reflected in the difference of HuaGong. Those who have high AQ have profound HuaGong, who can turn pressure into power, adversity into favourable circumstance, and setbacks or failures into psychological capital. Those who have low AQ, on the other hand, can hardly realize the transformation of pressure, adversity, frustration or failure. As cultivating AQ is to realize the transformation from low AQ to high AQ, which essence is to enhance or promote HuaGong, it can be said that cultivating AQ is to cultivate HuaGong, which is the only way to cultivate and promote AQ. By cultivating and training, people's HuaGong becomes stronger and stronger, their AQ naturally become higher and higher, so that many unfavorable conditions or circumstances faced by them would turn into favorable, the adversity encountered by them would have a positive impact on them rather than a negative effect.

Many results of psychological research show that one must have high IQ (Intelligence Quotient), EQ (Emotional Intelligence Quotient) and AQ (Adversity Quotient) for his success. Its formula is: $100\%S (\text{success}) = 20\%IQ + 30\%EQ + 50\%AQ$ [10, 11]. Thus it can be seen the importance of AQ. Generally speaking, Those who have high AQ are often able to clearly understand the reasons for their failure caused by adversity and willing to assume all responsibilities. They are able to take effective actions in a timely manner and to learn from their mistakes and to be neither elated by success nor disturbed by failure. In addition, it is able to transform the

pattern of coping with adversity from "rumination pattern"¹ to "positive response pattern"², which is to transform the process of continuously matching the object's features in the cognitive process into the reaction of internal behavior change. If one does not have a certain level of AQ, he would not be able to cope well with his life's problem. If so, not only is he unsuccessful, but also produce psychological problems easily, which will affect his happiness in life. Therefore, as an ability to turn adversity into opportunity, AQ has become an indispensable part of the way to success, as well as a quality that contemporary college students should possess when facing and coping with setbacks and difficulties. In today's stressful and competitive society, if they want to be successful, it is necessary for them to have a certain level of AQ.

In order to know the level of AQ of college students, we need an effective tool to measure it. Taking the student population as the test object, Li Bingquan and Chen Canrui revised the AQ scale of Stoltz. The total score of the AQ scale and the Cronbach's coefficient of the four factors all reached above 0.7, the semi-reliability coefficient was between 0.7297 ~ 0.7730, and the retest reliability coefficient was between 0.7251 ~ 0.7907 [12]. However, the four factors of AQ measured by Stoltz's scale mainly talked about how to cope with adversity or frustration and failure, which did not truly reflect the core "transformation" of AQ's concept that is the factor of "transforming difficulties into opportunities"[7]. Therefore, it is necessary to compile an AQ scale that can reflect individual psychological quality of "transformation", especially the scale that is suitable to measure the AQ level of

¹"Rumination pattern" refers to the thinking mode in which one repeatedly pays attention to his own negative emotions and corresponding events when encountering negative events such as setbacks or failures. It is mainly manifested as: reflecting on the emotion itself, the cause of the emotion and various possible adverse consequences when encountering the painful emotion, instead of making positive solutions to the problem. It typically manifests itself in forced thinking about bad feelings and causes, such as "why did I fail? What the hell is wrong with me? I don't think I can get rid of my bad luck." This response is negative, hindering problem-solving and bad for mental health. The rumination model focuses the mind on the negative events or the negative aspects of the event, knowing that it has no value or meaning other than to upset the mind, has no benefit to the event, and the thought cannot be verified, but keeps thinking. This, in turn, increases feelings of sadness, depression, anxiety and even hopelessness, which in turn leads to a vicious cycle of stronger thoughts. The rumination pattern is not conducive to the resolution of events, but causes individuals to fall into negative emotions and behaviors again. There are negative attention bias, attribution bias, interpretation bias, memory bias and other cognitive biases in rumination patterns. Individuals can easily increase their negative memory by constantly recalling the process, the original and their own feelings of negative events. The negative attribution of events will also distort their interpretation of events and reduce their ability to solve problems.

²"Response pattern" is a positive behavior pattern that focuses on solving problems or eliminating individual negative emotions. Such as transfer mode, problem solving mode and so on. transfer mode is that individuals shift their attention or focus away from negative events to engage in other positive activities. Such as love, no longer to think of love, to read novels, movies or study. Problem solving mode is to actively analyze negative events, identify problems, and then improve their behavior. Of course, the "response pattern" here refers to the positive reaction pattern, excluding the negative reaction pattern. In fact, there are both broad and narrow ways of responding. The broad sense includes both positive and negative response patterns. The "rumination pattern" is actually a reaction pattern, but a negative one. The narrow sense is just the positive response pattern.

college students. The reason is that college students, as a new force of future social development and the main force of future times' progress, need to improve their ability of turning adversity into opportunity in daily life and social practice so that they can effectively adapt to the extremely fierce competition in the contemporary society. It is based on this, we established this topic and set up a research group to study the compilation of AQ based on the existing research results and the actual situation of Chinese college students. This paper aims to compile an effective measurement tool to measure the level of college students' AQ, and to provide a basis for systematically studying their AQ and their mental health, so as to provide material support and guidance for effectively improving the level of college students' AQ.

2. Objects and Methods

2.1. Subjects

Samples 1: A total of 725 questionnaires were sent out and 683 questionnaires were returned, 105 questionnaires were rejected for incomplete or obvious response tendency, and 578 valid questionnaires were finally obtained. Among them, there were 205 male students, 373 female students, 121 freshmen, 125 sophomore students, 158 junior students, and 174 senior students. SPSS21.0 and AMOS21.0 were used for statistical analysis.

Samples 2: Confirmatory factor analysis. In two universities in Guangdong province, 240 questionnaires were randomly distributed in class and 193 valid questionnaires were recovered, with an effective recovery rate of 80.42%.

2.2. Collection and Preparation of Questionnaire Items

By referring to relevant research tools at home and abroad, after repeated deliberation and revise, a preliminary scale of 68 items was finally formed. In order to avoid the mental set of answering questions, some items in the questionnaire adopted reverse presentation (reverse scoring), and the items were mixed and arranged to form the AQ scale. The scale is divided into two parts. In the first part, Likert five-point scoring method is adopted. In the test, subjects are asked to assess the degree of conformity with the description of each item according to their own actual situation. The second part listed 20 events, each of which included two items. During the test, the subjects were asked to assess the conformity degree and tendency degree of each item description according to their actual situation, and gave 5~1 points respectively.

2.3. Research Tool

«The diagnostic scale of social adaptability» (short name: SADS or SAD Scale) is selected from «the psychological diagnosis of college students» compiled by professor Zheng Ri-chang, who is a professor of psychology and doctoral supervisor of Beijing Normal University. Where, for the single number, A is -2, B is 0 and C is 2. The double number items is the opposite of the single. The higher the score is, the stronger the social adaptability is. 35~40 points represent strong social

adaptability; 29~34 points, good social adaptability; 17~28 points, average social adaptability; 6~16 points, poor social adaptability; Less than 5 points, poor social adaptability.

The reason why the diagnostic scale of social adaptability is used as the criterion to measure the self-compiled AQ scale is that social adaptation is the premise for individuals to stand on and develop in society. Social adaptation refers to the process in which individuals or groups actively adjust their behaviors in order to adapt to their social environment. Social adaptability is a kind of comprehensive ability that need be possessed in the adjustment process. College students' social adaptability would determine their degree identified and accepted by society and themselves [13].

3. Results and Analysis

3.1. Project Analysis

Project analysis was performed on 578 data sets and discrimination was calculated by determining values. Then the total score of the entries are sorted and group in descending order, with the top 27% being high and the bottom 27% being low. The high and low groups were coded as the grouping variables, and the independent sample *t* test of the grouping variables was conducted for every topic. The differences of the high and low groups of subjects in every item were tested, and the correlation coefficients of every item and the total score of the scale were obtained. According to the results of the project analysis, the questions with the correlation coefficient less than 0.2 and the determination value less than 0.01 were deleted. The result is that 2 items altogether were deleted and 66 items were reserved.

3.2. Exploratory Factor Analysis

In order to make the scale have better structure validity, we conducted exploratory factor analysis on 66 items after project analysis. According to the results of the initial factor analysis, there are 13 factors generated which feature root values are greater than 1, the cumulative variance interpretation rate is 59.628%, KMO value is 0.928, Bartlett sphericity test chi-square value is 18000.125, $p < 0.01$. The result shows that these items are suitable for factor analysis. The inappropriate items judged according to the following criteria would be deleted: firstly, all items whose common degree and the factor load value are less than 0.30; secondly, whose loads on two or more factors are greater than 0.3 and less than 0.4, and whose load sizes are close to each other. The result is that a total of 23 items were deleted, and the remaining items made up of the formal scale. To further clarify the scale's structural factors, we conducted factor analysis again on the formal scale to determine the number of factors. Firstly, we used KMO and Bartlett spherical test to test the characteristics of the scale variables. Next, principal component analysis is carried out, common factors are extracted, and the load matrix of factors is found. The determination of factor number is mainly based on the following criteria: firstly, the characteristic root value of the factor is greater than 1; Secondly, the number of factors is

determined from the result of lithograph based on the test of steep slope. Thirdly, the number of factors is determined by

further combining the results of parallel analysis [14] Fourthly, each factor should contain at least three items.

Table 1. The factor items and loads of AQ Scales.

	F1		F2		F3		F4		F5		F6	
	Item	Load	Item	Load	Item	Load	Item	Load	Item	Load	Item	Load
	B18b	0.751	B9a	0.671	A24	0.729	B7b	0.726	A17	0.766	A3	0.724
	B19a	0.719	B7a	0.668	A25	0.715	B8a	0.579	A23	0.757	A2	0.713
	B18a	0.712	B5a	0.663	A21	0.681	B2a	0.517	A18	0.636	A1	0.61
	B17a	0.711	B6a	0.655	A20	0.68	B2b	0.445	A10	0.553		
	B17b	0.697	B3b	0.655	A19	0.67						
	B20b	0.696	B1a	0.649	A8	0.567						
	B16b	0.69	B6b	0.639	A15	0.563						
	B19b	0.661	B3a	0.617								
	B15b	0.64	B9b	0.614								
	B15a	0.64	B1b	0.6								
	B20a	0.622	B5b	0.559								
	B16a	0.617	B10b	0.529								
			B4a	0.516								
Ev	11.772		3.99		2.831		2.037		1.41		1.16	
IR (%)	27.376		36.655		43.975		47.975		51.255		53.952	

Annotation: A and B stands for A and B AQ Scale. a and b stands for Different dimensions in B scale (the same below). F stands for Factor. Ev stands for Eigenvalue. IR stands for Interpretation ratio. The same below.

The results of the gravel plot and the parallel analysis show that it is more appropriate when the number of factors is 6. After repeated attempts, it was found that the project classification was relatively ideal when the number of factors is 6, and the total amount of variation that could be explained was 53.952%. Finally, six factors are named according to the item meaning in each factor, which are respectively cognition, responsibility, behavior, will, emotion and goal (see table 1 for details). The results of exploratory analysis show that the structure of AQ Scale for college students is able to be composed of 6 factors. The project distribution of 6 factors is reasonable, and the loads on the corresponding factors are relatively high. The total variation of 53.952% was explained by 6 factors, and the scale's structure and content were acceptable.

3.3. Reliability and Validity Analysis

The results of reliability analysis shows that the total internal consistency coefficient of the AQ Scale for college students was 0.932, and the internal consistency coefficient of every factor was respectively 0.917, 0.906, 0.835, 0.684, 0.680, 0.728.

Correlation analysis was made between each dimension and total score of the scale, which results were taken as indicators of content validity. Table 2 shows that the correlation coefficient between each dimension of the AQ Scales and the total Scales is 0.412-0.851, the correlation coefficients of all dimensions reach a significant level, which indicates that the Scales have a good content validity.

Table 2. Correlation matrix of AQ Scale and its every dimension with SAD Scale.

	F1	F2	F3	F4	F5	F6	AQ	SA
F1	1							
F2	.596**	1						
F3	.257**	.359**	1					
F4	.360**	.587**	.289**	1				
F5	.267**	.143**	.275**	.20***	1			
F6	.203**	.266**	.583**	.255**	.208**	1		
AQ	.831**	.851**	.579**	.629**	.412**	.465**	1	
SA	.174**	.135**	.328**	.230**	.325**	.245**	.291**	1

Annotation: *P<0.05, **P<0.01, ***P<0.001. AQ stands for the total score of AQ, SA stands for the total score of social adaptability

The social adaptability diagnostic scale was used as the validity scale of AQ Scale to analyze the degree of correlation between the scores of AQ of college students and its every dimension with the score of social adaptability diagnostic scale. The results show that low degree of significant positive correlation are presented between them. It is basically in line with the expected direction and level.

On this basis, we use the method of confirmatory factor analysis to analyze the data and further test the validity of

scale construction. The results of the analysis by AMOS are as follows: The numerical values of fit indices such as χ^2/df , NNFI, RMSEA, CFI, RMR, GFI and AGFI are respectively 2.959, 0.835, 0.058, 0.844, 0.7, 0.814 and 0.794. Generally speaking, the higher the load on the latent variable, the smaller the load of every factor on the error or unique factor, and the higher the quality of the model (see table 3 for the results) [15]. Table 3 shows that all the other dimensions are acceptable except for the factor load of the emotion dimension (factor 5)

with fewer items. Based on the results of the above indicators, the model structure has a good fitting effect on the data, and

the AQ Scale for college students has a good structure validity.

Table 3. The factor loading of the verifiable factor analysis of AQ Scale for college students.

F1		F2		F3		F4		F5		F6	
Item	Load	Item	Load	Item	Load	Item	Load	Item	Load	Item	Load
B18b	0.824	B9a	0.623	A24	0.613	B7b	0.599	A17	0.722	A3	0.755
B19a	0.79	B7a	0.661	A25	0.623	B8a	0.628	A23	0.706	A2	0.687
B18a	0.768	B5a	0.654	A21	0.662	B2a	0.604	A18	0.466	A1	0.625
B17a	0.719	B6a	0.673	A20	0.689	B2b	0.544	A10	0.486		
B17b	0.679	B3b	0.73	A19	0.692						
B20b	0.728	B1a	0.547	A8	0.654						
B16b	0.62	B6b	0.715	A15	0.601						
B19b	0.768	B3a	0.6								
B15b	0.565	B9b	0.734								
B15a	0.62	B1b	0.706								
B20a	0.672	B5b	0.617								
B16a	0.562	B10b	0.57								
		B4a	0.66								

4. Discussion

The AQ Scale compiled by Stoltz consists of four dimensions: control, attribution, reach and endurance. Although the four factors are related to success, they are not the most important and major factors that can lead to success in the face of setbacks or difficulties [6, 8, 9]. Therefore, by referring to the existing research results at home and abroad and according to the group characteristics of college students, this paper finally combines the items with good representativeness to form the formal scale by the open investigation, prediction and formal test.

According to the results of the open questionnaire survey, six dimensions of the self-compiled AQ Scale for college students were finally determined, which were respectively named as cognitive dimension, responsibility dimension, behavior dimension, volition dimension, emotion dimension and goal dimension. Among them, cognitive component reflects the individual's attitude to adversity and the corresponding coping strategies and tendencies when he encounter difficulties or setbacks or failures. Proper cognition enables individuals to cope with adversity and actively seek correct solutions to problems. Responsibility component refers to the sense of responsibility and mission shown by individuals when he face difficulties or adversities, which enables individuals to take corresponding responsibilities bravely when facing adversity. Behavior component is the behavior performance of the individual as he encounter adversity, which can be divided into positive performance and negative performance. Positive performance means that one does not withdraw and actively seek ways to cope with adversity when he encounters adversity. Volition component refers to the volition shown by individuals when they encounter adversity. Individuals with good volitional quality would become more and more courageous by honing in difficulties so as not to be brought down by difficulties when they are in adversity. Emotional component is the emotional experience of individuals when they encounter adversity. The positive emotional motivation enables individuals to face

adversity and meet challenges with a positive mentality, and have few negative emotional experiences. Goal component is the situation or standard that the individual expects to reach. A firm goal can provide sufficient driving force for the individual to strive for achieving the goal.

For contemporary college students, on the one hand, they are under great mental pressure since they start school, such as academic pressure, improvement of comprehensive quality, uncertainty of future employment, and inadaptability of the environment. On the other hand, college students are in their early adulthood and lack of life experience. Their ability to resist setbacks and regulate and control is relatively poor. Faced with difficulties and pressure, they are very easy and possible to fall into the negative mire so as not to extricate themselves. In order to solve this problem, the above 6 factors need to be cultivated or promoted. In other words, when they face adversity, their correct cognition of adversity, sense of mission, positive emotion, positive behavior mode, firm goal and tenacious volition are the key of transforming adversity into advantageous circumstances and turning failure into success [6]. The six dimensions of the self-compiled AQ Scale for college students is able to interpret the meaning of AQ well, and reflect the content of AQ and the aspects that it contains, which is able to make up for the defects of the AQ Scale compiled by Stoltz.

The results show that the self-compiled AQ Scale for college students has good reliability and validity. SAD Scale is to measure one's ability to adapt to social life and social environment. In a sense, the level of social adaptability indicates one's degree of maturity. AQ Scale for college students is mainly to measure the ability of college students to transform adversity into opportunity when they are faced with adversity. To some extent, the level of AQ indicates a person's ability to transform adversity into favorable condition in the process of adapting to society. As adaptation to society involves confronting and overcoming adversity, the social adaptability diagnostic scale is able to provide a qualitative basis for the self-compiled AQ Scale for college students. Because there is a significant positive correlation between the score of the self-compiled AQ Scale for college students and

the diagnostic scale of social adaptability, it meets expectations. According to the above conclusions, the self-compiled AQ Scale for college students in this paper can be used as a measurement tool in relevant fields.

5. Conclusion

1. The self-compiled AQ Scale for college students has good reliability and validity
2. SAD Scale provides a qualitative basis for the self-compiled AQ Scale
3. The self-compiled AQ Scale is a valid measurement tool of measuring undergraduate's AQ

6. Suggestion

Based on the research results, the following recommendations are made:

6.1. The AQ Scale for College Students Is Used as a Measuring Tool

The scale is compiled with contemporary college students as the research object, which is more suitable for them. Therefore, it can be used as an effective tool to measure the AQ of college students. Of course, due to the limited sample selected when compiling the scale, its validity and reliability are affected to a certain extent. Therefore, the measurement results of the scale should be combined with other results for analysis and consideration.

6.2. To Cultivate the Positive Psychological Quality of College Students Comprehensively

Research results show that college students' AQ is closely related to other psychological factors such as social adaptation ability, therefore, the cultivation and promotion AQ of college students should be considered the relationship of AQ with other psychological factors, and take comprehensive training or promotion mode or method or comprehensive mental health education cultivate or enhance the various qualities of college students. For college students themselves, they should adopt a comprehensive way or approach to cultivate AQ and other positive psychological quality instead of Practicing AQ in isolation.

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