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Xin Wang, Ming Liu, Stephen Tee, Hongxia Dai



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Title: Analysis of adversity quotient of nursing students in Macao: A cross-section and correlation study

Authors:

Xin Wang^a,

Ming Liu^{a,*},

Stephen Tee^b,

Hongxia Dai^a

a. School of Health Science and Sports, Macao Polytechnic Institute, Macao SAR, China

b. Faculty of Health and Social Sciences, Bournemouth University, UK

*Corresponding author.

E-mail address: karryliu@ipm.edu.mo (M. Liu)

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Conflict of interest

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Abstract

Objectives To investigate the adversity quotient (AQ) of Macao undergraduate nursing students and analyse its influencing factors.

Methods A cross-section design was used, and a convenience sample of nursing students ($n = 158$ valid) was selected from a tertiary institute in Macao. In addition to demographic questions, the Adversity Quotient Scale, the Emotional Intelligence (EI) Scale, the Simplified Coping Style Questionnaire and the Parenting Styles Scale were used to assess the students' characteristics.

Results The average AQ score of the students was 116.72 ± 11.39 . AQ scores were negatively correlated with coping-negative, and maternal style (excessive interference, excessive protection) ($r = -0.332, P < 0.001$; $r = -0.167, P = 0.036$). Coping-negative entered the regression equation ($F = 19.154, P < 0.001$). The female nursing students had higher scores in ownership dimension of AQ than their male counterparts (31.98 ± 3.26 vs. $29.21 \pm 3.08, t = -4.442, P < 0.001$).

Conclusions The average AQ scores of Macao undergraduate nursing students were moderate. The female nursing students are more likely to attribute the cause of adversity to themselves, and specific psychosocial and cultural issues may be at play. There is a necessity for Macao nursing students to improve their ability to overcome setbacks. Special attention should be paid to the cultivation of students' positive coping styles.

Keywords

Baccalaureate Nursing Education

Emotional Intelligence

Macau

Nursing Students

Psychological Adaptation,

Surveys and Questionnaires

What is known?

- Adversity quotient (AQ) may have a relationship with EI, family education, harmonious relationships, learning behavior, etc.

What is new?

- Negative coping styles had a predictive effect on AQ. Female nursing students had higher scores in the ownership dimension of AQ than males did. Nursing students with more negative coping styles were more likely to spread the impact of the adversity to other aspects of life.

1. Introduction

Adversity quotient (AQ) is the ability to handle adversities or a measure of human resilience [1]. It has become an important concept in human resource management and school education. Stoltz [1] applied the principles of his theory to the workplace, explaining how to measure AQ and how to improve one's AQ. Stoltz [2] posited that employees with higher AQ scores are more successful in their work and personal lives. AQ is not only an indicator of occupational success; it can also predict and influence all facets of human capacity and performance. There are four dimensions that measure an individual's AQ including Control, Ownership, Reach, and Endurance, which constitutes the CORE model [2]. Control refers to the amount of perceived control one has over an adverse situation. Individuals who achieve high scores on this dimension tend to be proactive in their approach toward negative events and have the ability to turn adversity into opportunity. Ownership is the extent to which people hold themselves responsible for improving their current situation. Individuals who accept responsibility for their actions and learn from event outcomes usually receive high scores on this dimension. Reach refers to the degree to which one perceives good or bad events as influencing other areas of one's life. Individuals who achieve high Reach scores are likely to control adversity and view it as a specific and limited event. They will tend to feel empowered and well prepared to deal with adversity. Endurance is the perception of the duration of positive or negative events. High Endurance scores indicate individuals who are likely to view adversity as temporary. They are optimistic and have more energy than others to cope with adversity.

When AQ was initially proposed, it aroused widespread interest, particularly in the education field. Many investigations and studies have shown that people's success depends not only on

intelligence and ability but also on their resilience and ability to overcome setbacks and adversity [3, 4].

The research on AQ has focused on a wide range of participants, from school-age children, college students to teachers and company employees. Singh and Parveen [5] explored the influence of AQ on the learning behavior of middle school students. They found that learning behavior is significantly positively correlated with AQ, and that AQ is an important predictor of students' learning behavior. Matore [6] surveyed 1,845 students from five Malaysian polytechnic colleges and discussed the impact of AQ on academic performance. The results show that the impact of AQ on academic performance was not that significant (only 0.9%, $r = 0.098$). However, researchers believe that the impact of AQ on the success factors of the students still has research potential.

Research on employee's AQ in the workplace has focused on the relationship between AQ and other factors such as job performance, organizational commitments, turnover rate or perceived stress [7,8,9,10]. The results indicate AQ is positively associated with job performance, psychological contracts, or organizational commitments [9], but negatively related to employee's turnover rate or occupational stress [10, 11, 12].

In terms of studies on nurse or nursing student's AQ, Woo and Song [13] investigated the factors affecting the AQ of nurses and office workers. They found a statistically significant correlation between the AQ and emotional intelligence in each group. Nurses were found to have both emotional intelligence and AQ at lower levels compared to office workers. The researchers suggested the reasons for this were that nurses undertake very demanding roles, which include significant psychosocial elements, as well as physical ones, simply due to an irregular schedule and higher role expectations. A study on the relationship between AQ and career adaptability of

internship nursing students by Shalihah and colleagues [14] in Indonesia showed that there was no significant correlation between these two variables generally. Tian and Fan [15] conducted a study on AQ, environmental variables, and career adaptability in student nurses in China and found AQ was associated positively with student nurses' career adaptability and was significantly affected by some learning environment variables such as a 'welcoming' learning environment and the delivery of clinical preceptorship.

Unfortunately, no similar studies have been conducted in the Macao Special Administrative Regions (Macao SAR), particularly on nursing students. Macao SAR is a relatively small region with an area of 32.9 km² and a 0.68 million population [16]. However, it has a very diverse culture, influenced by both East Asia and Western Europe, with multiple languages including three texts (Chinese, Portuguese, English) and four languages (Cantonese, Mandarin, Portuguese and English). In addition, postcolonial Macao has experienced the dynamic interplay of local, national, and global forces across all sectors from politics to economics to education. The AQ of youngsters such as young nursing students growing up in this social environment may be different from that of other similar countries or regions. There are two nursing education institutions; both are tertiary level with about 500 students in total, and these nursing students have recently experienced significant challenges and related stress. Along with a new higher education law of Macao SAR, which has been effective since 2018, and the implementation of a new professional qualification and legal system for practice registration for medical professions, there have also been significant changes in the mode of teaching and learning due to the sudden outbreak of COVID-19.

As a result of these factors and having reviewed the literature on AQ, which can significantly influence people's adaptability and stress resistance ability, we were curious to understand

Macao nursing students' AQ and what factors might influence their AQ. The purpose is to understand better how nursing programs can be designed to support adaptability and stress resistance.

The aims of this study were twofold: a. to assess the overall level of Macao nursing students' AQ, and b. to investigate the influencing factors of Macao nursing students' AQ. The following hypotheses are proposed:

(1) There is a relationship between overall AQ scores of Macao nursing students and factors such as demographic characteristics, grade point average (GPA), emotional intelligence, and coping style.

(2) There is a relationship between each dimension of AQ of Macao nursing students and factors such as demographic characteristics, GPA, emotional intelligence, and coping style.

2. Material and methods

2.1 Design and participant recruitment

The study applied a cross-sectional descriptive and correlational design. The design sought to describe the variables such as adversity quotient, gender, age, study year, GPA, parenting style, EI and coping style, and to examine if there is a relationship between variables.

From January to April 2020, a convenience sampling method was used to select nursing students from a tertiary institute in Macao. The total cohort of potential participants from first-year to fourth-year students was 220; they were all local students, and we aimed to achieve a participation rate of 70%. The inclusion criteria were: full-time nursing students, being able to understand, speak, read, and write Chinese, and voluntary participation in the research.

2.2 Data collection

A set of questionnaires, including a questionnaire of demographic characteristics and four scales, were distributed to participants, and completion instructions were provided. Participants were asked to imagine themselves in various situations and to give an immediate response stating how they would feel. It was emphasized that there was no right or wrong answer to each question and assurances were provided that individual responses would remain confidential. The questionnaires were distributed to the participants face-to-face and it took about 35 minutes to complete the responses to the questions. The questionnaires were collected upon completion onsite. A total of 160 students who met the inclusion criteria answered the questionnaire. Two questionnaires were deleted because of missing items, and so 158 valid questionnaires remained, with an effective response rate of 98.75%.

2.3 Measurements

Besides obtaining the demographic characteristics of each participant, the following four scales were applied.

2.3.1. The Adversity Quotient Scale. It was originally developed by Stoltz [2] and revised by Li and Chen [17]. The scale consists of 60 items in 30 contexts, including four dimensions (control, ownership, reach and endurance). The scale uses Likert 5 points. The higher the score, the higher the AQ. The AQ total score is divided into five grades, very low (≤ 59), low (60–94), medium (95–134), high (135–165), very high (166–200). The Cronbach's α coefficient of the total scale and of the four factors are all above 0.70. In this study, the Cronbach's α coefficient of the total scale was 0.755.

2.3.2 The Emotional Intelligence Scale. It was originally designed by Schutte and Malouff [18] and translated into Chinese by Wang [19]. The translated version demonstrated a Cronbach's α

coefficient of 0.83. The scale has 33 items, using Likert 5 points; the higher the score, the higher the EI. In this study, the Cronbach's α coefficient of the total scale is 0.808.

2.3.3 The Simplified Coping Style Questionnaire (SCSQ). This questionnaire was developed by Xie Yaning [20]. It consists of two dimensions (positive and negative coping styles) with 20 items, 12 items for positive and 8 for negative response. A Likert 4-point scale was used. The overall Cronbach's α coefficient was 0.900, and in this study, it was 0.890.

2.3.4 The Parenting Styles Scal(Egma Minnen av Bardndosna Uppforstran, EMBU). It was first compiled by Perris and colleagues in 1980 [21]. In 1993, it was translated into Chinese and revised by Yue et al. [22]. The Chinese version of EMBU (EMBU-C) includes two dimensions (paternal and maternal styles) with a total of 66 questions. The scale uses Likert 4-points; the higher the score, the higher the influence of the subject's parenting style. The Cronbach's α coefficient of the total scale was 0.940, and in this study, it was 0.946.

2.4 Ethical considerations

The study was approved by the Research Ethics Committee of the Institute. The purposes and methods of the study were explained to all participants. Participation was voluntary, and they could refuse to participate or withdraw at any time. Assurances were provided that responses would be confidential and their identities would not be revealed in study reports and publications. Those who agreed to participate in the study signed a consent form.

2.5 Data analysis

Demographic and descriptive characteristics were summarized by frequency, along with the percentage for categorical variables and the mean and standard deviation (SD) for continuous variables. One-Way ANOVA and *t*-tests were utilized to determine the significant difference in

AQ and its four-dimension's scores (indicated as AQ-total, AQ-control, AQ-ownership, AQ-reach, and AQ-endurance), according to gender, study year, nationality, being an only child, relationship with classmates and internship and part-time job experiences. Pearson's correlation coefficient was applied to the test of relationship between AQ-total, AQ-control, AQ-ownership, AQ-reach, AQ-endurance and age, GPA, coping style, EI, parenting styles, respectively. After correlation analysis, the variables with statistical significance were selected for multiple linear regression analysis. The data were analysed using SPSS version 26.0, and results were considered statistically significant if $P < 0.05$.

3. Results

3.1. Demographics of the participants

The participants' demographic characteristics, EI scores, coping styles, and parenting styles are shown in Table 1.

3.2. Scores of AQ and four dimensions

The description of AQ total scores and the four dimensions are shown in Table 2.

3.3 Single-factor analysis of AQ and the four dimensions

One-Way ANOVA and *t*-test were utilized to determine the statistical significance of differences in AQ-total, AQ-control, AQ-ownership, AQ-reach, and AQ-endurance among the samples with different gender, study year, nationality, the relationship with classmates, internship and part-time job experiences, and being an only child or not. No demographic factors were significantly associated with these five key variables ($P > 0.05$), except gender to AQ-ownership (29.21 ± 3.08 in male students vs. 31.98 ± 3.26 in female, $t = -4.442$, $P < 0.001$).

3.4 Bivariate correlate analysis of AQ and four dimensions

Pearson's correlation analysis was applied to test the relationship between AQ, four dimensions, age, GPA, coping style, EI, and parenting styles of the samples. Indicators with statistical significance are shown in Table 3.

3.5 Multiple regression analysis of AQ and four dimensions

AQ-total and four dimensions were used as dependent variables separately, variables with statistical significance in single-factor analysis and bivariate correlation analysis were selected as independent variables for multiple regression analysis with stepwise selection (selection criterion $P < 0.1$), and the results are shown in Table 4.

4. Discussion

4.1 The AQ of Macao nursing students and the analysis of influencing factors

In this study, the average AQ-total of undergraduate nursing students in Macao was moderate 116.72 ± 11.39 (Table 2), but low when compared with the findings either from Mainland China or other country studies [14, 23]. This may suggest that cultural factors are at play. Macao is a blended western and eastern culture society, but is also a very tolerant society [24]. This creates a favourable environment for residential living. Furthermore, Macao's relative affluence and 'sheltered' environment results in less exposure, and therefore adaption to, adverse events, thus reducing tolerance. Compared with Mainland China, or other similar countries, the employment and education pressures on Macao residents are much lower (the unemployment rate for Macao citizens and university enrolment rate for high school graduate was 1.7 % and 92.9% in 2019, respectively) [25, 26] and the superior social welfare provides them with considerable living security. As such, most of the Macao nursing students are in a relatively comfortable environment and they may rarely experience major setbacks or the hardship of adversity.

This study also revealed that the scores of the 'control' and 'ownership' dimensions were higher than those of the 'reach' and 'endurance' dimensions (Table 2). The low score of the 'reach' dimension indicates that Macao nursing students tend to believe the negative impact of adversity is extended to other aspects, such as study, life and work; similarly, the low score of the 'endurance' dimension suggests participants subjectively believe that the negative effects of adversity last for a long time and are not easy to eliminate.

There were some interesting outcomes in terms of coping style, which is regarded as a cognitive or behavioural strategy adopted by individuals when facing stressful situations [27, 28]. It is therefore a process of managing harmful circumstances, making active efforts to solve adversity, and seeking to master, or minimize stress or conflict [29]. A positive coping style is characterised by positive reappraisal, problem-focused coping, creation of positive meaning, and growth, whilst a negative coping style is characterised by self-blame, withholding, and escape; For the participants in this study the AQ-total was negatively correlated with negative coping, and maternal style (excessive interference, excessive protection) (Table 3). This is significant as studies have shown that a positive problem-focused coping style can effectively reduce depression, while a negative emotion-focused coping style may bring about mental health problems [30, 31]. Where nursing students have low AQ they tend to adopt negative coping methods such as self-blame, evasion and fantasy when they encounter setbacks, which does not help reduce the impact of adversity [32].

Interestingly the female nursing students had higher AQ-ownership scores than their male counterparts, and AQ-ownership was positively correlated with Emotional Intelligence (EI) and coping-negative, indicating that female nursing students are more likely to attribute the cause of adversity to themselves (Table 4). The higher the EI, the higher the likelihood of this happening.

EI is the ability to understand, evaluate, and express one's own feelings and those of others [33] and is an important attribute for a nurse. Setzler [34] suggested that different genders typically have significantly different responses to adversity. For instance, females tend to blame themselves whilst males focus on the results of adversity. Significantly, Woo [13] found that nurses' EI was correlated with AQ in that the higher the level of EI, the higher the AQ, thus improving EI could improve one's ability to cope with adversity. In other words, helping students with the perception, management, and utilization of their emotions or those of others, will help students adopt a healthy and effective way to solve problems.

This is an important finding because the data also indicated that the more negative the coping style, the more likely it will spread to other aspects of the person's life. In such circumstances, students may lack objectivity and feel that their whole life is disappointing, preventing them from seeking to make efforts to address the adversity, thus contributing to a negative emotional spiral.

Interestingly, the older participants had higher AQ-reach scores, which is perhaps not surprising as the ability to cope with adversity and frustration is often determined by one's experience in dealing with frustration and crisis (Table 4). However, such experiences may not naturally occur with age, and so even for older participants, response to adversity needs to be cultivated and improved through specific practical activities, which in nursing can be achieved through placement learning or role play.

So what are the implications for nurse educators in Macao and also in other institutions around the world? The results showed there is a need for Macao's nursing students to improve their ability to tolerate, handle and overcome adversity and setbacks. Whilst some of this may be

achieved through a typical journey through the trials and tribulations of university life, such as academic achievement, interpersonal relationships, and employment prospectation.

As Stoltz [1] points out, AQ can be improved through certain methods and targeted training and include a number of familiar techniques:

- Facilitated group sessions with students—These allow participants time to reflect on all aspects of their lives, including adverse experiences and explore coping strategies. The benefit of a group approach is that participants will have the opportunity to hear and share experiences, thus broadening their learning. It also encourages people to talk about their experiences and realize that they are not alone, as well as developing their emotional insight and intelligence.
- Reflective diaries—These are useful tools for capturing personal and professional experiences that may be having an emotional impact.
- Role play—the deliberate creation of an event that may provoke an emotional reaction and generate learning.

Addressing AQ is vital as studies have shown that the level of nurses' AQ will affect the level of input into their work [35]. More and more employers are beginning to pay attention to the ability of newly recruited nurses to cope with adversity and setbacks, and so nurse educators need to consider how best to incorporate AQ training into their nursing curricula.

4.2 Limitations and recommendations

Although this study found that negative coping style was a predictive variable for the AQ of Macao nursing students, it only contributed 33.2% of the changes in the variance of AQ-total. This showed that other variables might have an impact on AQ. The sample size of this study was

limited. Therefore, recommendations for future study include further exploration of the influencing factors of AQ, such as personality traits, depression tendency, and expanding the sample size to conduct a more in-depth analysis of the relationship between variables. In the future, further research on the intervention of AQ for nursing students, based on the influencing factors, should be considered.

5. Conclusion

This study investigated the AQ of undergraduate nursing students in Macao and analysed possible influencing factors. The results demonstrated that the average AQ scores of undergraduate nursing students in Macao were moderate. Negative coping styles had a predictive effect on the total score of AQ. Therefore, while cultivating the IQ and EI of students, nurse educators should also pay attention to strengthening the AQ of the students, helping them learn to analyse and solve problems calmly and objectively, and actively overcome the adversities with positive coping styles. This can be achieved through a number of individual and group techniques that facilitate self-reflection, develop insight and build resilience, which are vital characteristics for nurses managing demanding personal and professional lives.

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Table 1Demographics of the participants ($n = 158$)

Variables	Mean \pm SD	n (%)
Gender		
Male		34 (21.5)
Female		124 (78.5)
Study Year		
1		37 (23.4)
2		36 (22.8)
3		37 (23.4)
4		48 (30.4)
Age (years, range 18–28)	20.70 \pm 1.87	
GPA (range 0.78–3.47)	2.34 \pm 0.45	
Nationality		
China		151 (95.6)
Portugal		7 (4.4)
Being an only child		
Yes		22 (13.9)
No		136 (86.1)
Relationship among classmates		
Harmony		101 (63.92)
General or disharmony		57 (36.08)
Internship experience		

Yes	124 (78.48)
No	34 (21.52)
Part-time experience	
Yes	141 (89.24)
No	17 (10.76)
EI (range 84–147)	121.61 ± 10.35
Coping style	
Passive	2.03 ± 0.55
Negative	1.74 ± 0.62
Trend	0.30 ± 0.57
Parents styles	
F 1 (emotional warmth)	2.10 ± 0.65
F 2 (punishment, sternness)	1.40 ± 0.58
F 3 (excessive interference)	1.19 ± 0.40
F 4 (preference)	1.85 ± 0.71
F 5 (refusal, denial)	1.44 ± 0.56
F 6 (excessive protection)	1.46 ± 0.50
M 1 (emotional warmth)	2.47 ± 0.57
M 2 (punishment, sternness)	1.47 ± 0.50
M 3 (excessive interference, excessive protection)	2.04 ± 0.70

M 4 (preference)	2.02 ± 0.70
M 5 (refusal, denial)	1.65 ± 0.61

Note: GPA = grade point average. EI = emotional intelligence. F = father, paternal rearing styles.

M = mother, maternal rearing styles.

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Table 2 The description of scores of AQ total and four dimensions ($n = 158$)

Item	Score range	Range of participants' scores	<i>Mean</i> \pm <i>SD</i>
AQ-total	40–200	87–142	116.72 \pm 11.39
AQ-control	10–50	18–42	30.73 \pm 4.40
AQ-ownership	10–50	22–42	31.38 \pm 3.41
AQ-reach	10–50	15–39	27.49 \pm 5.16
AQ-endurance	10–50	13–39	27.11 \pm 4.96

Note: AQ = adversity quotient

Table 3
Correlation analysis of AQ total and four dimensions

Items	<i>Pearson</i> <i>Correlation (r)</i>	<i>P</i>
AQ-total		
Coping-negative	−0.332	<0.001
M 3 (excessive interference, excessive protection)	−0.167	0.036
AQ-control		
Coping-negative	−0.195	0.014
AQ-ownership		
EI	0.212	0.007
Coping-negative	0.221	0.005
F 5 (refusal, denial)	−0.163	0.042
AQ-reach		
Age	0.194	0.015
Coping-negative	−0.219	0.006
AQ-endurance		
EI	−0.199	0.012
Coping-negative	−0.226	0.004
M 3 (excessive interference, excessive protection)	−0.219	0.006

Note: AQ = adversity quotient. M = mother, maternal rearing styles. EI = emotional intelligence.

F = father, paternal rearing styles

Table 4. Multiple linear regression analysis of AQ total and four dimensions

Item	Variables	<i>B</i>	<i>r</i>	<i>r</i> ²	<i>F</i>	<i>P</i>
AQ-total						
	Constant	127.987			19.154	<0.001
	Coping-negative	-6.377	0.332	0.110		
AQ-control						
	Constant	33.679			6.134	0.014
	Coping-negative	-1.588	0.195	0.038		
AQ-ownership						
	Constant	19.230	0.385	0.149	6.182	0.014
	Gender	2.625				
	EI	0.062				
AQ-reach						
	Constant	18.968	0.302	0.091	7.779	0.001
	Coping-negative	-1.933				
	Age	0.574				
AQ-endurance						
	Constant	40.462	0.340	0.116	10.087	<0.001
	Coping-negative	-2.174				
	EI	-0.079				

Note: AQ = adversity quotient. EI = emotional intelligence.

Conflict of interest

The authors have disclosed no potential conflicts of interest, financial or otherwise.

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