Research Article

Adversity Quotient (AQ) and its Correlation with the Types Fingerprints of Kinh, Thai, H'mong Students Living in Thuan Chau District, Son La Province

Tran Thi Minh[1] and Mai Van Hung[2]*

[1]*Tay Bac University, Vietnam*

[2]*Research Center for Anthropology and Mind Development, VNU University of Education, Vietnam*

*Corresponding Author: Mai Van Hung, Research Center for Anthropology and Mind Development, VNU University of Education, Vietnam.

Abstract

The study was conducted on 784 students aged 14 to 17 (383 male students and 401 female students), who were randomly selected, in Son La province. Following the standards of morphological and anthropological studies, this study aims to investigate AQ and find out the correlation between AQ and the fingerprint patterns of these teenagers. The results show that the average AQ of 14-17 year-old students is 118.26 points, with an annual increase of about 3.55 per year. The highest average AQ goes to the Kinh male students with 123.21 points, whereas the lowest goes to the H'Mong male students (110.34 points). For female students, the highest average AQ is of Kinh ethnic group with 123.5 points while the lowest is for those of Thai ethnic group with 117.57 points. The pearson correlation value between AQ and fingerprint patterns where L^U is -0.02, L^R is -0.09, W^c is -0.01, W^S is -0.01 and W^{cp} is -0.02 is a negative correlation with a weak correlation value. On the contrary, the pearson correlation value between AQ and the remaining fingerprints where A^S is 0.06, A^T is 0.05 and W^{dl} is 0.05 is a positive correlation but it is still a weak correlation value.

Keywords: AQ; Fingerprints; Son La

Introduction

An adversity quotient (AQ) is a score that measures the ability of an individual to deal with changes, pressures and adversities in their life. AQ is one of the main indicators which are useful for predicting attitude, stress level, perseverance, learning attitude and response to environmental changes [10].

AQ plays an important role in the learning and working processes; identification of this indicator will help us to have an overview of individual capacity, to choose suitable educational methods as well as to propose future career orientations. For these reasons, it is necessary to identify the correlation between AQ and genetic biological indicators.

As one of the most mysterious innate human traits, fingerprints is unique, highly individual, and do not change throughout a person's life [6,7]. During the formation process, the individual characteristics of the fingerprints have been specified in the genotype, but there is no regular inheritance from one generation to the next. It has been confirmed by scientists that there is no complete similarity of fingerprints between two people, even identical twins. With such high individuality, fingerprints are now being applied in various fields such as: tracing criminals, early identification of some diseases, brain fingerprinting, etc. [6].

Son La is a mountainous province in the northwest of Vietnam with 12 ethnic groups living together [8]. Chieng Ly, Thom Mon, Chu Van An, and Co Ma secondary schools in Thuan Chau district, Son

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La province are choosen to collect data. Students in these schools are mostly ethnic minorities (99%) from upland communes of the district like Thom Mon, Chieng Ly, Tong Lanh, Co Ma, Long He, Pa Long, etc. People in these communes are disadvantaged in terms of economic conditions and educational attainment; families and students themselves lack knowledge about nutrition and daily activities for comprehensive physical development. All of these factors lead to much lower stature and nutritional status of students compared to the average [1,2,8]. In recent years, the quality of life and education have been invested and promoted in order to create a high-quality labor force that can meet the need of the continuously developing economy and society [2].

The understanding of biological and intellectual indicators and the discovery of the relation between them (if any) are important in that they can help to make reasonable adjustments in the educational process and children's development orientation, from that, improve their life quality.

Research Subjects and Method

The study was conducted on 784 students of Thai, Kinh, and H'Mong ethnic groups in Son La province, of which 383 were male and 401 were female. The research subjects were randomly selected and the study followed all the standards of morphological and anthropological studies.

sThe study lasted from September 2019 to October 2020.

The investigated anthropometric index is the fingerprints of the Thai, Kinh and H'Mong ethnic minority students aged 14, 15, 16, 17. The study applied the descriptive epidemiological design through a cross-sectional study combined with a retrospective study.

The data analysis was carried out at the "Anthropology lab" at the Center for Anthropology Research and Intellectual Development, University of Education, Vietnam National University, Hanoi. The data were processed using Excel 2010 and SPSS 2.0 software.

AQ determination method

AQ index is determined through the AQ profile, created by Dr. Paul Stoltz - President and CEO of The Peak Academy – A research and consulting firm in San Luis Oispo. AQ consists of 4 dimensions C, O, R, E. The whole test consists of 20 questions. Each question has different response levels, from 1 to 5 points. The AQ profile needs to be formed within 8 to 10 minutes [10].

Four dimensions of Adversity Quotient include: C, O, R, E

Dimension C means Control. It measures the degree of control that a person perceives of having over adverse events. Those with higher C simply perceive greater control over life's events than do those with lower C. People can examine and control their own behavior at different degrees.

Dimension O means Ownership. It measures the extent to which a person holds himself accountable for improving a situation. It is a strong gauge of accountability and likelihood to take action. The higher the ownership score, the more the individual owns the outcome, regardless of the cause. The lower the ownership score, the more the individual feel lonely and need help

Dimension R (Reach) is the perception of how far-reaching events will be. It is a strong gauge of perspective, burden and stress level. The higher the R score, the more the individual have a sense of accepting failures and facing challenges, not letting them affect their lives. On the other hand, the lower the R score, the more likely the individual will feel tired when they fail, tend to have negative thoughts and often regard events as catastrophic.

Dimension E (Endurance): is a strong gauge of hope or optimism. This dimension measures the duration of bad situations. People with a high score on this dimension may consider adversity and its causes to be fleeting and temporary. Therefore, they always face difficulties with an optimistic attitude and hold on to hope and faith. On the contrary, those with a low E score are often pessimistic, depressed, and see obstacles as insurmountable difficulties.

AQ is determined by the following fomular:

AQ = (C + O + R + E) x 2

The average point is 147.5. The higher, the better.

C	O	R	E
1	2	3	4
7	6	5	8
13	11	9	10
15	16	12	14
17	18	20	19
Sum:	Sum:	Sum:	Sum:

Table 1: AQ component indexes' classification.

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Fingerprint identification method

There are 3 basic patterns for the outermost phalange ridges: Arch (A), Loop (L), Whorl (W). Furthermore, the 10 fingerprints is classified according to the Galton – Henry system [6].

Proceed with 10 fingers. First, based on the above basic patterns of fingerprint, we use symbol letter for fingerprint boxes. Rules for writing letters in boxes are as followed:

+ The arch fingerprint is denoted by letter A (Arch)

- Symbol letter for simple arch is A^S

- Tented arch is A^T

+ Loop is denoted by letter L

- The loop that opens toward the ulna side of the hand (toward the pinkie) is symboled as L^u.

- The loop that flows in the direction of the radius bone is symboled as L^r

+ Whorl (W) is divided into 4 types based on morphology [6].

- Concentric whorl (W^c)

- Spiral whorl (W^s)

- Central pocket whorl (W^{cp})

- Double loop whorl (W^{dl})

+ DL_{10}: delta.

Research ethics

- To get the best participation and cooperation from the participants during the research process, all research subjects and their parents were explained in detail about the purpose and content of the research. They also have the right to refuse to be part of the study.

Figure 1: Basic types of fingerprints.

+ Arch-Loop index is calculated by formula: (A x 100)/L

+ Arch– Whorl index is calculated by formula: (A x 100)/W

+ Whorl– Loop index is calculated by formula: (W x 100)/L

- All information of the subject is kept confidential and the collected data is used for research purposes only. All information can only be accessed by the researchers;

- Results of the study are fully communicated to the participants.

- The study was approved by the leadership of Chieng Ly, Thom Mon and Co Ma secondary schools, Thuan Chau district, Son La province.

Findings and Discussions

(Adversity Quotient – AQ)

As part of the investigation of biological indicators in 2020, an adversity test was carried out for the group of students from 3 ethnic groups: Thai, Kinh, and H'Mong in Thuan Chau district, Son La province in order to assess their AQ.

The results of the IQ scores of 784 students from 3 ethnic groups from 14 to 17 years old are presented in table 2.

Age	AQ							p
	Male		**Female**		$\overline{X_1} - \overline{X_2}$	**Both**		
	n	$\overline{X}$ ± SD	**n**	$\overline{X}$ ± SD		**n**	$\overline{X}$ ± SD	
14	90	110.29 ± 14.67	98	115.54 ± 17.03	0.09	188	112.91 ± 15.85	<0.05
15	102	114.50 ± 18.39	97	119.34 ± 15.47	1.02	199	116.92 ± 16.93	<0.05
16	90	116.81± 10.85	99	122.55 ± 15.23	0.19	189	119.68 ± 13.04	<0.05
17	101	121.85 ± 14.71	107	125.25 ± 13.32	0.12	208	123.55 ± 14.02	>0.05
Both	83	115.86 ± 14.65	401	120.67 ± 15.26	0.31	784	118.26 ± 14.96	<0.05

Table 2: Student's AQ by age.

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The study results show that the average AQ of students from 14 to 17 years old is around 118.26 points. Students' AQ increase with age, with an increase of 2.00 points/year on average, and the growth is fastest in the period from 16-17 years old with an increase of 3.55 points/year. In general, the AQ of students from 14 to 17 years old increased unevenly, and the annual increase is neither considerable nor statistically significant ($p > 0.05$).

Synchronous adversity tests were applied for all 3 groups of students from Thai, Kinh, and H'Mong ethnic groups. The results show that there are differences in AQ among the three ethnic groups. The AQ scores of the 3 ethnic groups are presented in table 3.

Age	Male						p(1,2)	p(1,3)	p(2,3)
	Thai (1)		**Kinh (2)**		**H'Mong (3)**				
	N	$\overline{X} \pm$ SD	**n**	$\overline{X} \pm$ SD	**n**	$\overline{X} \pm$ SD			
14	30	110.07 ± 14.37	30	119.13 ± 14.89	30	101.67 ± 14.73	<0.05	<0.05	<0.05
15	32	111.94 ± 20.80	30	123.20 ± 14.02	40	108.35 ± 20.35	<0.05	>0.05	<0.05
16	31	114.00 ± 10.19	31	124.52 ± 13.04	28	111.93 ± 9.33	<0.05	>0.05	<0.05
17	37	119.78 ± 19.25	31	126.00 ± 11.20	33	119.76 ± 13.70	>0.05	>0.05	>0.05
Female									
14	32	113.19 ± 15.53	30	118.87 ± 13.77	36	114.56 ± 21.80	>0.05	>0.05	>0.05
15	30	117.20 ± 16.23	32	122.75 ± 15.94	35	118.06 ± 14.23	>0.05	>0.05	>0.05
16	31	119.03 ± 12.20	33	124.79 ± 20.30	35	123.83 ± 13.18	>0.05	>0.05	>0.05
17	44	120.86 ± 12.57	30	127.60 ± 14.73	33	127.27 ± 12.66	<0.05	<0.05	>0.05

Table 3: IQ of students by ethnicity and age.

The AQ of all 3 ethnic groups increases with age, and the sharpest increase is in the period of 16-17 years old. The average increase of all is 3.54/year/The AQ in all 3 ethnic groups is lowest at the age of 14 (Thai group: 110.07 for male and 113.19 for female; Kinh group: 119.13 for male and 118.87 for female; H'mong group: 101.67 for male and 114.56 for female) and highest when they reach 17 years old (Thai group: 119.78 for male, and 120.86 for female; Kinh group: 126.00 for male, and 127.60 for for female; H'Mong group: 119.76 for male, and 127.27 for female). Kinh students have the highest AQ with 123.36 points while the lowest AQ goes to H'Mong students with 115.68 points. The T-test reveals that most of the differences in AQ among ethnic groups are not statistically significant ($p > 0.05$).

Figure 2 shows the mean AQ values of the students under study by ethnicity and sex.

Figure 2 shows that, of the male students, the average AQ of the Kinh is highest with 123.21 points, and the lowest is for H'Mong
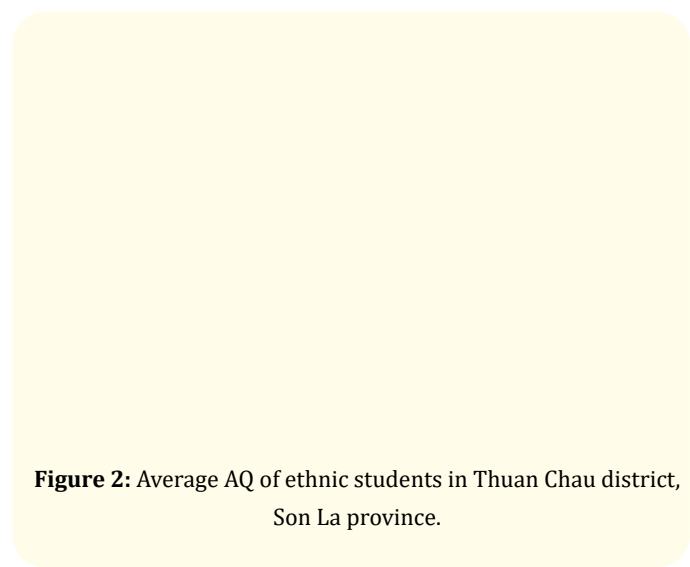
Figure 2: Average AQ of ethnic students in Thuan Chau district, Son La province.

students with 120.43 points. For female students, the highest average IQ is of Kinh ethnic group (123.50 points), while the lowest

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is for those of Thai ethnic group with 127.57 points. Research data also indicate that female students have higher AQ than male students in all 3 ethnic groups.

Correlation between one adversity indicator and finger prints

Pearson's correlation analysis method is used to evaluate the correlation between AQ score and the distribution of finger patterns. The results are presented in table 4.

Index		AQ
N		784
$\overline{X}$		118.30
SD		15.10
A^s	Cov(x,y)	1.024
	p	<0.05
	(r)	0.06
A^t	Cov(x,y)	0.70
	p	<0.05
	(r)	0.05
L^u	Cov(x,y)	-0.91
	p	<0.05
	(r)	-0.02
L^r	Cov(x,y)	-0.6
	p	<0.05
	(r)	-0.09
W^c	Cov(x,y)	-0.46
	p	<0.05
	(r)	-0.01
W^s	Cov(x,y)	-0.16
	p	<0.05
	(r)	-0.01
W^{dl}	Cov(x,y)	0.56
	p	<0.05
	(r)	0.05
W^{cp}	Cov(x,y)	-0.22
	p	<0.05
	(r)	-0.02

Table 4: Correlation between AQ and the distribution of finger prints.

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In which:

n: Sample Size;

Cov (x,y): Covariance of Two Compared Sets

$\overline{X}$: Average Value

r: Pearson Correlation Coefficient

SD: Standard Deviation;

p: Statistical Value.

Correlation between AQ index and types of fingerprints

Table 4 shows the pearson correlation coefficient between AQ and fingerprint types: A^s is 0.06, A^t is 0.05. This is a positive but weak correlation. Meanwhile, pearson correlation between AQ and the remaining fingerprint types, with L^u equals -0.02, L^r equals -0.09, W^c equals -0.01 and W^s equals -0.01, W^{dl} equals -0.22, W^{cp} equals -0.02, is a negative correlation, and the correlation value is weak.

AQ index has a linear correlation with the distribution of different types of fingerprints, with the reliability of 95%, $p < 0.05$.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.13	0.02	0.01	16.64

Table 5: Linear regression analysis with AQ as dependent variable and fingerprint patterns as the independent variables.

The correlation coefficient $r = 0.13$ shows that this is a weak correlation, the coefficient of determination of multiple $R^2 = 0.02$ infers that the fingerprints as independent variables only affect 2% of the change of AQ. The rest is due to random error. Adjusted $R^2 = 0.01 < 0.5$.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3460.50	8	432.56	1.56	0.13
Residual	214463.25	775	276.73		
Total	217923.75	783			

Table 6: ANOVA Analysis.

Value F = 1.56, with $p > 0.05$, shows that AQ does depend on the distribution of different fingerprint types.

	Regression coefficient		t	p	95%CI	
	B	Std. Error			Lower Bound	Upper Bound
Constant	122.94	16.32	7.53	0,00	90,91	154,97
A^S	0.47	1.73	0.27	0,79	-2,93	3,88
A^t	0.36	1.76	0.20	0.84	-3.09	3.80
L^u	-0.51	1.64	-0.31	0.75	-3.73	2.70
L^R	-3.95	2.19	-1.80	0.07	-8.26	0.36
W^c	-0.44	1.64	-0.27	0.79	-3.66	2.78
W^s	-0.58	1.71	-0.34	0.73	-3.93	2.77
W^{dl}	0.61	1.83	0.33	0.74	-2.98	4.20
W^{cp}	-0.99	1.90	-0.52	0.60	-4.72	2.74

Table 7: Regression coefficient with AQ as dependent variable.

From the above results, the form of the regression equation including 8 independent variables A^S, A^t, L^u, L^R, W^c, W^S, W^{dl}, W^{cp} and one dependent variable (AQ) will be:
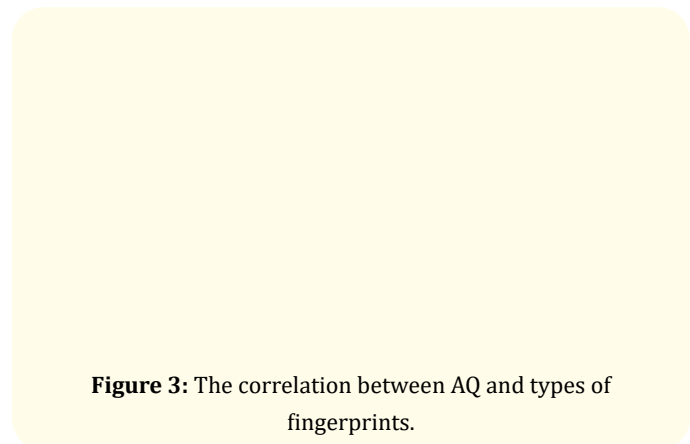
$$y = a_1*x_1 + a_2* x_2 + a_3*x_3 + a_4*x_4 + a_5*x_5 + a_6*x_6 + a_7*x_7 + a_8 + b$$

Substituting parameters into the form, we'll get the following equation:

AQ = $0.477*A^s + 0.36*A^t -0.51*L^u – 3.5*L^r – 0.44*W^c – 0.58*W^s + 0.61*W^{dl} – 0.99*W^{cp} + 122.94$

Scatter Plot chart examines the hypythesis of linear correlation.

The correlation between AQ and types of fingerprints.

Figure 3: The correlation between AQ and types of fingerprints.

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Figure 3 shows that the correlation between AQ and fingerprint types is a linear correlation, though this correlation is not close (r = 0.13). It is clear form the figure that most of the students with high AQ are likely to have a high number of fingerprint types L^U and W^{dl}. However, AQ is not entirely dependent on the number of fingerprint patterns appearing at the tip of fingers, or in other words, genetic factors. Physical condition, social relationships, and appropriate learning environment can also help improve students' AQ.

Discussion

The result of the train is compatible with the research on the wisdom of other researchers

The findings are consistent with prior studies on intelligence or AQ? by other authors such as Le Thi Thu Diem (2018), "The impact of AQ on learning efficiency and university life quality of students majoring in economics, Tra Vinh University" [3]; Mai Van Hung (2003), Research on some biological indicators and intellectual capacity of students at some Northern universities, PhD thesis in Biology, Hanoi National University of Education [5]; Paul G. Stoltz (1997), "Adversity Quotient: Turning Obstacles into Opportunities, Printed in the United States of America [10]; Nguyen Thac, Le Van Hong (1993), "A diagnostic research on the intellectual development of students", Educational research, [4]; Tran Anh Tuan (2014), Research on morphology, emotions and AQ of students in two secondary schools, Yen Mo district, Ninh Binh province, Master of Science Thesis, University of Natural Sciences, which all confirmed that the AQ of adolescents increases with age. Thus, our conclusion about characteristics of AQ are consistent with that of previous studies from other researchers.

This is also the first study of its kind that focuses on analyzing the relationship between AQ and fingerprint patterns.

Conclusion

In conclusion, there is no significant difference in the overall AQ of all participants and the AQ of each student by age and gender. However, students' AQ scores vary by region and ethnicity. Kinh students (both male and female) have higher AQ compared to the other two ethnic groups and this difference is statistically significant.

The correlation between AQ and fingerprint patterns is a linear one, but this correlation is not strong. The study shows that most students with a high AQ are likely to have a high number of W^c, W^s and W^{cp} fingerprints. However, genes is not the only factor affecting AQ index. Other factors like physical condition, social relationships, or appropriate learning environment also play their roles in improving students' AQ.

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