

## Original Article

# Correlation analysis of anxiety status and sub-health status among students of 13-26 years old

Yingshui Yao<sup>1</sup>, Linghong Wang<sup>1</sup>, Yan Chen<sup>1</sup>, Yaowen Kang<sup>2</sup>, Qinjun Gu<sup>1</sup>, Wenhua Fang<sup>1</sup>, Rui Qing<sup>1</sup>, Wei Lu<sup>1</sup>, Yuelong Jin<sup>1</sup>, Xiaohua Ren<sup>1</sup>, Lianping He<sup>1</sup>, Daoxia Guo<sup>1</sup>

<sup>1</sup>School of Public Health, Wannan Medical College, Wuhu 241002, Anhui, China; <sup>2</sup>Fushun Administrative College, Fushun 113000, Liaoning, China

Received January 24, 2015; Accepted April 28, 2015; Epub June 15, 2015; Published June 30, 2015

**Abstract:** The purpose of the survey is to investigate the relationship between anxiety statuses and suboptimal health status among students from south of Anhui in china. Our study was a population-based, cluster sampling method survey with a sample consisting of 5249 students, who come from a university, four high schools and four middle schools in Wannan Area in China. Sub-health status was measured by multidimensional sub-health questionnaire of adolescents, and anxious status was assessed using anxiety self-assessment scale. A total of 538 (10.25%) of the students were detected with anxiety status, the prevalence of anxiety status for boy and girl students were 11.8% and 16.5%, respectively, there are no significant difference between urban and rural for the anxiety score in physical and mental sub-health status ( $P > 0.05$ ). The boys living in urban have a lower anxiety score than that of the girls, the no-only child and child living in rural in different sub-health status ( $P < 0.05$ ). The results indicate that sub-health status and anxiety status are prevalent among students, especially in girls, no-only child and students who living in rural area, the school heads should pay more attention to the mental health of students.

**Keywords:** China, sub-health, anxiety, students, mental health, self-reported health

## Introduction

Adolescent mental and subjective health has become a public health concern in China [1] and worldwide [2]. Sub-health status was first proposed by the former Soviet scholars N Buchman professor in the mid-1980s [3], being not health but disease states, which refers to the human body being in the third kinds of state, also known as latent symptoms State, subclinical, gray state. Because sub-health status is a dynamic change in a short stage, thus, sub-health will become health if handled well, otherwise, it will turn to the disease. With the change of the living environment, especially, the Accelerated urbanize in China, the sub-health state has widely spread among adolescent population. One study documented that 14.22% of the 'left behind' students were in sub-health condition [4]. Anxiety has become a common mental health problems among young people, moderate anxiety has positive significance in the general life of the scene, but sus-

tained severe anxiety will lead to reduced immune function, weariness due to endocrine regulation disorders, which caused serious harm to adolescents, also harm to the physical and mental development.

Previous study found that the overall rate of anxiety status among students was 14.1% [5]. This purpose of the study was to investigate the anxious status of adolescents with suboptimal health status in south of Anhui in of China, and provide the basis for the intervention of adolescent anxiety.

## Methods

### *Study setting and procedure*

Cluster sampling method was used to select participants who come from south of Anhui in China. The setting is Anhui Province in east of China with about 70000000 inhabitants, there are both public middle school, university and

## Anxiety status and sub-health status

**Table 1.** Characteristics of participants

Variables	n	%
Gender		
Boys	2703	51.5
Girls	2546	48.5
Grade		
Grade one in junior middle school	806	15.4
Grade two in junior middle school	1221	23.3
Grade one in high middle school	1443	27.5
Grade two in high middle school	1010	19.2
Junior	361	6.9
Sophomore	408	7.8
Location		
Rural	2850	54.3
Urban	2399	45.7
Whether only child family		
Yes	2468	47.0
No	2781	53.0

private middle school. This study was conducted in close cooperation with the main heads of school, when they granted permission for the classroom survey, then, a classroom survey was conducted in four middle schools and one university, all primary teachers at each educational class were informed and invited to participate with their respective class. Before participation, students received written and oral information about the study, including information about confidentiality and the right not to participate. The survey was supervised by a member of our research team who also answered questions from the students. The questionnaire took about 45 minutes to complete, and was finished during a school lesson. At the same time, the questionnaire was anonymous and no records or codes were obtained.

### Questionnaire

The classroom questionnaire completed by participants had three sections: (1) socio-demographic background, (2) the Multidimensional Sub-health Questionnaire of Adolescents (MSQA) [6], (3) anxiety self-assessment scale (SAS) [7].

### Socio-demographics

Socio-demographic background was described by sex, grade, family type, location. The questionnaire comprised more areas than the present study.

### Assessment of sub-health status and anxiety score

Psychosomatic symptoms were measured using the MSQA, which is a multidimensional, self-report symptom inventory developed by Tao et al [6] in China. MSQA consists of 71 items in total, every item contain one or more questions, each question score 1-6 represents "more lasting time" to "less lasting time", for example, 1 = lasts for more than 3 months, 2 = last two months or more, 3 = for more than 1 month, 4 = lasting two weeks or more, 5 = lasting one week or more, 6 = no or for less than one week, the higher level ticked by represents the more duration of the symptoms of sub-health status. Evaluation index using the number of sub-health symptoms, namely, the total number of items in the sub-health symptoms persist for more than more than one month, the criteria of sub-healthy is defined as the number of sub-health symptoms over the 90% of the National Youth number of sub-health symptoms, body sub-health, psychological sub-health and body with psychological sub-health were defined when the number of sub-health symptoms reached to three, eight and eleven, respectively. The validity and reliability of the MSQA has been confirmed [8] and its test-retest reliability, Cronbach alpha ( $\alpha$ ) coefficient and split-half reliability coefficient were 0.87, 0.96 and 0.94, respectively. The anxiety status was measured by SAS [7].

### Statistics

Data were analyzed with the R software programming language [9]. Differences in proportions were evaluated using the Chi-squared test. Independent sample t-tests were used to compare mean values between groups. A  $P$ -value  $\leq 0.05$  was considered significant.

### Ethics statement

All respondents agreed to take part in this study. According to local and international guidelines on ethics considerations in research involving human participants, this study was approved by ethics committee of Wannan medical College.

### Results

#### Socio-demographics

Group socio-demographics are described in **Table 1**. In this study, the respondent rate was

## Anxiety status and sub-health status

**Table 2.** Comparison of anxiety score of students with sub-health status between boy and girl

Gender	Physical sub-health	Mental sub-health	Physical and mental sub-health
Boy	47.406 ± 9.840 (320)	48.806 ± 10.176 (245)	49.913 ± 9.835 (244)
Girl	51.072 ± 11.046 (351)	51.718 ± 11.057 (315)	52.383 ± 10.711 (330)
<i>t</i>	4.546	3.210	2.827
<i>P</i>	0.000	0.001	0.005

Note: **Tables 2-4** (n) for the sample size of students with sub-health status.

**Table 3.** Comparison of anxiety score of students between living in urban area and rural area in different sub-health status

Location	Physical sub-health (n)	Mental sub-health (n)	Physical and mental sub-health (n)
Countryside	50.187 ± 10.576 (374)	51.311 ± 10.569 (307)	52.070 ± 10.405 (320)
Urban	48.237 ± 10.636 (297)	49.392 ± 10.935 (253)	50.404 ± 10.364 (254)
<i>t</i>	2.367	2.105	1.910
<i>P</i>	0.018	0.036	0.057

**Table 4.** Comparison of adolescent anxiety score between only child family and no-onlynot in different sub-health status

Whether only child	Physical sub-health (n)	Mental sub-health (n)	Physical and mental sub-health (n)
Only child	47.483 ± 10.629 (291)	49.039 ± 10.372 (234)	50.021 ± 10.209 (235)
More child	50.734 ± 10.443 (380)	51.453 ± 10.949 (326)	52.242 ± 10.467 (339)
<i>t</i>	3.956	2.654	2.525
<i>P</i>	0.000	0.009	0.012

97.89% (5249/5362). Of the 5249 students participating, 48.5% were girls age in 13-26 years and 51.5% were boys age in 13-26 years; the average age of boys and girls were  $19.31 \pm 2.47$  and  $19.16 \pm 2.40$ , respectively. The majority of respondents were middle school students (85.3%); 54.3% living in rural and 45.7% living in urban, respectively. 47% were only child family and 53% were not, and 14.1% of the subjects with anxiety status. No significant differences were found between girls and boys in socio-demographic characteristics except for anxiety.

### *Comparison of anxiety score of students between boy and girl*

Our results showed that anxiety score of the girls was higher than that of boys in different sub-health status ( $P < 0.05$ ), as shown in **Table 2**.

### *Comparison of anxiety score of students between living in urban area and rural area in different sub-health status*

Significantly rural students adolescent anxiety score was higher than that of urban students in

the body sub-health, mental sub-health ( $P < 0.05$ ), however, there are no statistically difference in anxiety score between urban and rural, as shown in **Table 3**.

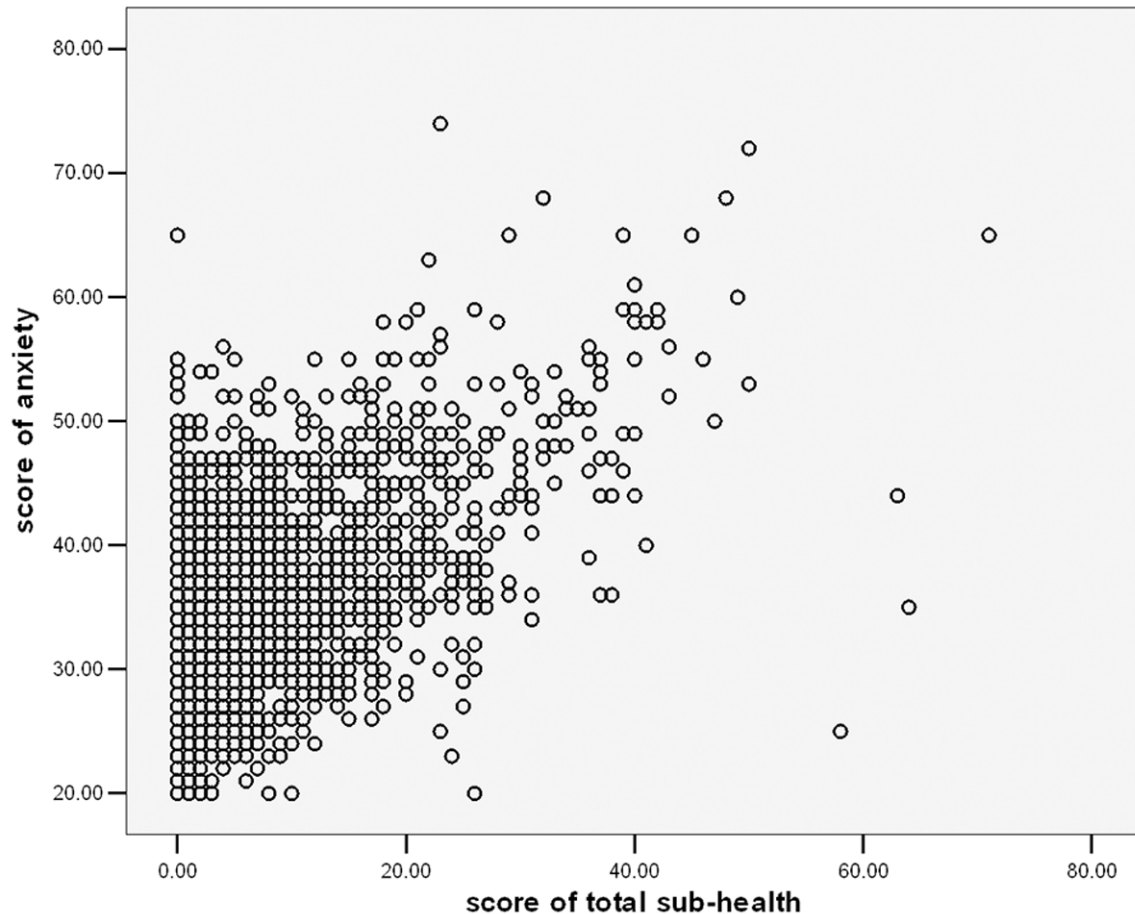
### *Comparison of adolescent anxiety score between families of only child and no-only child in different sub-health status*

Overall, the anxiety score of the only child was lower than that of no-only child in different sub-health status ( $P < 0.05$ ). As shown in **Table 4**. Relationship between anxiety score and total score of sub-health among the whole subjects is showed in **Figure 1**.

## Discussion

In the study we found a high prevalence of sub-health and anxiety among adolescents, especially in girls, rural students and the no-only child. At the same time, a higher anxiety score was also found, the reason may be that there are gender difference in coping press and with anxiety. The result of our study is consistent with previous national and international studies [10-12].

## Anxiety status and sub-health status



**Figure 1.** Relationship between anxiety score and total score of sub-health.

One striking result was the high prevalence of anxiety among adolescents, although this was more pronounced among girls. In the status of physical sub health, mental sub-health, physical and mental sub-health, the girls in our study had a higher mean value of anxiety than that of boys, increased levels of anxiety, may be an aspect of high stress arousal, reporting common psychosomatic symptoms are shared risk factors of later suicidal and self-injurious behaviors [1, 6]. Therefore, schools should focus on guidance the girls' physical exercise and psychological counseling, so as to improve their physical and mental health development.

In this study, there are statistically significant differences for anxiety between the rural students and urban students in the sub-health status ( $P < 0.05$ ). No difference was found in the physical and mental sub-health. One reason may be the economy development of urban was rapidly, urban students have more opportunity to get knowledge than rural students, and have less emotions troubleshooting;

Secondly, they could have different style and family background.

This study, the only child have lower anxiety score than non-only child in body sub-health, mental sub-health and body and mental sub-health ( $P < 0.05$ ). And the cause may be the only child have better the family status, the other family members always pay attention too much to them. In addition, the only child could get more spiritual care and have less economic burden, but it is different for non-only child.

### *Limitations and strengths*

This study has both a number of limitations, and strengths that are relevant to the interpretation and robustness of the results. The present results do not explain whether sub-health caused anxiety. Instead, this study shows significant differences in anxiety score between boy and girl. Which to be potential predictors for development of sub-health.

However, even given these weaknesses, the participating students represented a relatively large sample. Strength of the study may be connected to the class-room procedure and have a high response rate. An additional strength is that the questionnaire covered a wide range of physical and mental question, including perceived stress, sleep, pain, anxiety and depression-symptoms that are found problems [13, 14]. The use of an established instrument for measuring anxiety contributed to the value of the knowledge derived.

### Conclusions

In conclusion, the results indicate that sub-health and anxiety are prevalent among adolescents, especially in girls, rural students and the no-only child, the school heads should pay more attention to the mental education among students.

### Acknowledgements

This research was supported by Humanities and social science research project of the Education Department of Anhui (No. 2011-sk257), National Training Programs of Innovation and Entrepreneurship for Undergraduates (AH201310368002 and AH2014-10368082), Open foundation project of key research base for Humanities and Social Sciences (Center of Mental Health Education Research for College Students) (No. SJD-201306), and Anhui College of Humanities and Social Sciences Key Research Base Project (No. SK2014A110).

### Disclosure of conflict of interest

None.

**Address correspondence to:** Yingshui Yao, School of Public Health, Wannan Medical College, No. 22 Road Wenchangxi, Yijiang District, Wuhu City, Anhui Province. Tel: 86-553-3932651; Fax: +86-553-3932651; E-mail: yingshuiyao@163.com

### References

[1] Liu L, Long Y, Zhang T, Niu XH, Sun W, Shan GL and Wang ZZ. Sub-health status of the young and middle-aged populations and the relationships among sub-health, sleep ness and personality in Hubei province, China. *Zhonghua Liu Xing Bing Xue Za Zhi* 2010; 31: 970-974.

- [2] Ravens-Sieberer U, Torsheim T, Hetland J, Vollebergh W, Cavallo F, Jericek H, Alikasifoglu M, Valimaa R, Ottova V and Erhart M. Subjective health, symptom load and quality of life of children and adolescents in Europe. *Int J Public Health* 2009; 54 Suppl 2: 151-159.
- [3] Castelnuovo C, Olie JP and Loo H. Subthreshold depressive disorders: description and importance for secondary prevention in psychiatry. *Encephale* 1998; 24: 405-414.
- [4] Yao YS, Kang YW, Jin YL, Chen Y, Gong WZ, Zheng L, An Z, Tao FB and Hao JH. Analysis on physical and mental health and related influential factors among those 'left behind' adolescents in Anhui province. *Zhonghua Liu Xing Bing Xue Za Zhi* 2012; 33: 681-684.
- [5] Jin Y, He L, Kang Y, Chen Y, Lu W, Ren X, Song X, Wang L, Nie Z, Guo D and Yao Y. Prevalence and risk factors of anxiety status among students aged 13-26 years. *Int J Clin Exp Med* 2014; 7: 4420-4426.
- [6] Cao H, Tao FB, Huang L, Wan YH, Sun Y, Su PY and Hao JH. Situation of common psychosomatic symptom in adolescent and its influence on 6 months later suicide and self-injurious behavior. *Zhonghua Yu Fang Yi Xue Za Zhi* 2012; 46: 202-208.
- [7] Zung WW. A rating instrument for anxiety disorders. *Psychosomatics* 1971; 12: 371-379.
- [8] Cao H, Sun Y, Wan Y, Hao J and Tao F. Problematic Internet use in Chinese adolescents and its relation to psychosomatic symptoms and life satisfaction. *BMC Public Health* 2011; 11: 802.
- [9] Johns KA. The Programming Environment for Statistical Tabulation. *Int J Biomed Comput* 1986; 19: 161-173.
- [10] Wiklund M, Malmgren-Olsson EB, Ohman A, Bergstrom E and Fjellman-Wiklund A. Subjective health complaints in older adolescents are related to perceived stress, anxiety and gender - a cross-sectional school study in Northern Sweden. *BMC Public Health* 2012; 12: 993.
- [11] Schraml K, Perski A, Grossi G and Simonsson-Sarnecki M. Stress symptoms among adolescents: the role of subjective psychosocial conditions, lifestyle, and self-esteem. *J Adolesc* 2011; 34: 987-996.
- [12] Hetland J, Torsheim T and Aaro LE. Subjective health complaints in adolescence: dimensional structure and variation across gender and age. *Scand J Public Health* 2002; 30: 223-230.
- [13] Brattberg G. Do pain problems in young school children persist into early adulthood? A 13-year follow-up. *Eur J Pain* 2004; 8: 187-199.
- [14] Danielsson NS, Harvey AG, Macdonald S, Jansson-Frojmark M and Linton SJ. Sleep disturbance and depressive symptoms in adolescence: the role of catastrophic worry. *J Youth Adolesc* 2013; 42: 1223-33.