Psychometric Performance of Experiences in Close Relationships Inventory for Medical Undergraduates in Guangdong

BY

Hou Yongmei[1*] Zhong Hongyu[1]

[1]Department of Psychology, School of Humanities and Administration, Guangdong Medical University, Dongguan, Guangdong Province, China

Abstract

Objective To analyze the psychometric performance of Experiences in Close Relationships Inventory (ECR) for medical undergraduates in Guangdong. **Methods** Stratified random sampling method was used to select 855 medical undergraduates from 7 colleges in Guangdong, and ECR was used to investigate them. Cronbach's α coefficient and split-half reliability were used to analyze the internal consistency of the questionnaire. Convergent validity, discriminant validity, and factor analysis were used to evaluate its structural validity. Celling and floor effects were used to evaluate its sensitivity. **Results** Cronbach's α coefficients of the total questionniar, attachment anxiety, and avoidance were 0.822, 0.721, and 0.687 respectively, which met with the requirements of the group comparison. Spearman-Brown split-half coefficients of the total questionniar, attachment anxiety, and avoidance were 0.829, 0.715, and 0.741, respectively. The calibration success rate of convergent validity of attachment anxiety and avoidance were 88.89% and 94.44%, respectively. The calibration success rate of discriminant validity of attachment anxiety and avoidance were both 100%. Two components obtained from 36 items, with a cumulative variance contribution rate of 42.888%, which basically met the theoretical conception of ECR. The scores of attachment anxiety and avoidance were governed by the normal distribution, without any floor or celling effect. **Conclusions** The psychometric performance of ECR for medical undergraduates in Guangdong was valid and reliable.

Key words: ECR; Adult Attachment; Validity; Reliability; Sensitivity; Undergraduates

Introduction

Adult attachment is a stable psychological tendency that urges an individual to approach the specific objects he (or she) believes can provide him (or her) with physiological satisfaction and psychological security and establish a strong, lasting, and close emotional connection with them [1], which is manifested in attachment avoidance and attachment anxiety [2]. Adult attachment is an unconscious memory and internalized psychological representation of individuals' relationship with their parents in childhood. Its core psychological mechanism is the internal working mode, which is established on the basis of mother-infant attachment and runs throughout life [3].

Adult attachment has a profound impact on individuals' mental health, personality, interpersonal relationships (especially with the opposite sex), and even self-realization [4-8]. Generally speaking, because secure attachments have a positive view of themselves and others, and have stronger ability in emotional regulation, they usually have higher mental health [9-11].

At present, the measurement tools commonly used for adult attachment are self-report scale and interview. The adult attachment interview (AAI) developed by George et al. (1985) [12] is a semi-structured interview and is the most influential interview tool in the field of adult attachment research so far. Previous research shows that AAI has good stability, high test-retest reliability, and significant structural validity. The disadvantage of

AAI is that researchers have to understand the characteristics of adult attachment by analyzing respondents' early childhood experience word for word, so they are vulnerable to various external factors. First, the interview time is too long (especially more than 60 minutes); Second, only one-to-one interviews can be conducted by surveyors and visitors, which requires high skill; Third, it may lead the respondents to conceal or change their descriptions of their early childhood experiences out of self-protection; Final, some interviewees could not recall their childhood experiences precisely because of the long time. Meanwhile, self-report scales are easy to operate, can test a large number of subjects in a short time (within 20 minutes), can quickly quantify the test results through computers, and can directly compare the researcher's own survey results with others' research. The commonly used adult attachment questionnaire is Experiences in Close Relationships (ECR). ECR is developed by Brennan. He integrates the existing adult attachment scales, designs a new scale with 323 questions in total, and uses this new scale to measure 1086 college students. Two factors are extracted and named attachment anxiety and attachment avoidance respectively. Each factor is composed of 18 questions [13-14]. Since 2006, ECR has been widely used in China, and has been proved to have good reliability and validity [14-17]. However, as a recognized mental health assessment tool, the reliability and validity of ECR for college students have not been updated in the past 10 years.

Based on the above analysis, this study intends to use a large sample and multi-center investigation to explore the psychometric performance of ECR for medical undergraduates in Guangdong Province.

1. Objects and Methods
1.1 Objects
1.1.1 Sample Estimation
According to the formula $n = (t_{\alpha/2} \cdot s/\delta)^2$, where $t_{\alpha/2}$ is the critical value of $\alpha = 0.05$ in the distribution of t, s is the standard deviation in previous relevant studies, δ is an allowable error. According to previous studies, s ranges from 0.57 to 0.83 [18, 19], with an intermediate value of 0.70, $\delta = 10\%$ [20], $t_{\alpha/2}$ is 1 96, and calculated as n=189.

1.1.2 Sampling
Stratified random was adopted to collect medical undergraduates from 7 colleges in Guangdong Province, i.e. Guangdong Medical University, Southern Medical University, Guangzhou University of Traditional Chinese Medicine, Guangdong Pharmaceutical University, Shantou University School of Medicine, Guangzhou Medical University, and School of Medicine, Sun Yat-sen University. A total of 900 questionnaires were distributed, and 855 valid questionnaires were recovered, with an effective rate of 95.0%. Among them, there were 447 boys and 408 girls; 160 from Guangdong Medical University, 171 from Southern Medical University, 144 from Guangzhou University of Traditional Chinese Medicine, 94 from Guangdong Pharmaceutical University, 77 from School of Medicine, Shantou University, 124 from Guangzhou Medical University, and 85 from School of Medicine, Sun Yat-sen University. 222 freshmen, 188 sophomores, 161 juniors, 146 seniors, and 138 fifth-year students.

1.2 Tools
1.2.1 Experiences in Close Relationships Inventory, ECR
It is complied by Brennan et al. (1998) [13] and revised by Li Tonggui (2006)[14] into Chinese version. There are 36 questions, divided into two dimensions of attachment anxiety and attachment avoidance. Likert 7-point scoring method is used to score from 1 to 7 points corresponding to "completely disagree" to "completely agree". The higher the score, the more obvious the tendency of the item or dimension. Both the two dimensions can be divided into high and low levels by four points, thus forming four types of attachment styles, namely, secure (low anxiety and low avoidance), infatuated (high anxiety and low avoidance), apathy (low anxiety and high avoidance) and phobic (high anxiety and high avoidance).

1.2.2 Self-made personal general information questionnaire
Including 3 aspects of gender, grade, age.

1.3 Collection and arrangement of data
Before the investigation, the researchers who participated in the survey are trained uniformly, and the investigation process and evaluation standard are unified. The consistency test (kappa = 0.81~ 0.90) meets the test requirements. By means of online survey, the investigators issue a questionnaire, which will be filled in by the selected medical undergraduates themselves. The questionnaires with scores of more than 5% of the items missing are eliminated. The missing values of the valid questionnaires are estimated and filled with the average. Two researchers independently input the same data using Epidata3.0 software and conduct a unified logic check to ensure the accuracy of the data.

1.4 Data Processing
Data is exported from epidata3.0 to SPSS 20.0 for statistical analysis. First, the original scores of the total scale and each dimension are calculated. The second step is to get the average score and standard deviation of the total scale and each dimension. In the third step, the floor and ceiling effect are evaluated, and then, Cronbach'a cofficients and split half reliability are calculated. Finally, converage validity, discriminant validity, and principal component factor analysis are conducted.

2. Results
2.1 Score distribution of ECR
Shapiro Wilk significance hypothesis test is used, and the sample distribution is compared with the normal distribution in a statistical sense to determine whether the data shows deviation or agreement with the normal distribution. The test results show that the W values of attachment anxiety and avoidance are 0.989 and 0.967, and the P values are 0.702 and 0.672, respectively, with P>0.05. It is believed that the above 2 variables follow a normal distribution.

The ceiling/floor effect is one of psychological test effect. It refers to the phenomenon that when a task or test is too simple/complex, the scores of most subjects are close to or reach the upper / lower limit of scores, which makes the evaluation and prediction performance of the test decrease [15]. Table 1 shows that the

scores of both dimensions tend to be normally distributed, without any floor or ceiling effect.

Table 1. Descriptive Analysis of ECR (n=855)

Dimension	Number of items	X±s	Min	Max	P25	P50	P75	Floor[n(%)]	Celling[n(%)]
AA1	18	71.16±12.51	36.00	98.00	63.00	74.00	81.00	0(0)	0(0)
AA2	18	73.47±9.15	38.00	93.00	68.00	74.00	80.00	0(0)	0(0)

2.2 Reliability analysis of ECR
2.2.1 Split half reliability

The 36 items of ECR are divided into two parts with each containing 18 items, and the correlation coefficient of these two parts is 0.663 (*P*<0.01). According to Sperman Brown formula, the split-half reliability of the total scale is 0.829. The same method is adopted to find Split half reliability of attachment anxiety and avoidance. The split correlation coefficients of attachment anxiety and avoidance are 0.568 and 0.632 respectively (P<0.01). According to Sperman Brown formula, the split-half reliability of these two dimensions are 0.715 and 0.741 respectively.

2.2.2 Internal consistency reliability

Cronbach's α Coefficient is used to measure the internal consistency reliability. Generally speaking, when Cronbach's α coefficient is greater than 0.7, the internal consistency reliability is better. It can be seen from Table 2 that Cronbach's α coefficient of the total scale is 0.822, and cronbach's α coefficients of attachment anxiety and avoidance are 0.721 and 0.687, respectively. In addition, the correlation between two dimensions is moderate.

Table 2. Cronbach'a Coefficient and Correlation Coefficient of Each Dimension

Dimension	*Cronbach's α*	1	2
1. AA1	.721		
2. AA2	.687	.636[**]	

[**] *P*<0.01

2.3 Validity analysis of ECR
2.3.1 Content validity

The correlation coefficient (R) between each item and the total score of the dimension (factors) to which the item belongs is used to represent the convergent validity. Generally, when the majority of R values are not less than 0.4, it can be considered that the convergent validity is better. Discriminant validity is represented by the correlation coefficients between each item and the dimensions (factors) to which the item does not belong. It is generally believed that if these correlation coefficients are all lower than R, the discrimination validity is better. The results show that 88.89% of the items in attachment anxiety have a R ≥ 0.4, and 94.44% of the items in attachment avoidance have a R ≥ 0.4; the correlation coefficients between each item and dimensions to which the item does not belong are all smaller than R. The success rates of the convergent validity of attachment anxiety and avoidance are 88.89% and 94.44% respectively, and the success rate of discriminant validity of each dimension is 100%. See Table 3.

Table 3. Convergent Validity and Discriminant Validity of ECR

Dimension number of items	Convergent Validity		Discriminant validity		
	range of *R*	success rate (%)	range of *R*	success rate (%)	
AA1 18	.376-.730	16/18 88.89	.009-.423	18/18	100
AA2 18	.332-.651	17/18 94.44	.062-.485	18/18	100

2.3.2 Construct validity

Factor analysis is performed on ECR. As the KMO value is 0.860, and Bartlett's spherical test value is 18009.639 (df = 630), *P*<0.001, the data is suitable for factor analysis. According to the eigenvalue greater than 1, two principal components are extracted, with a cumulative contribution rate of 42.288%, which basically reflects the theoretical concept of the original scale. See Table 3 for loads of various factors and eigenvalues.

Table 4. Principal Component Analysis and Factor Load of 36 Items (> 0.4)

1st principal component		2nd principal component	
item	factor load	item	factor load
1	.419	2	.531
3	.457	4	.486
5	.560	6	.579
7	.434	8	.405
9	.426	10	.496
11	.572	12	.557
13	.671	14	.496
15	.459	16	.434
17	.524	18	.732
19	.411	20	.519
21	.446	22	.483
23	.541	24	.471
25	.400	26	.597
27	.612	28	.638

29	.760	30	.456
31	.517	32	.481
33	.446	34	.404
35	.453	36	.477

3. Discussion

This study finds that the reliability and validity of ECR for medical students in Guangdong Province are good, which is consistent with the results of previous similar literatures [14-19], suggesting that ECR is applicable to medical students in Guangdong Province.

The results of internal consistency reliability, split-half reliability, structural validity (convergent validity, discrimination validity, and principal component analysis), and ceiling/floor effect show that ECR has good psychometric performance. First, the Cronbach'a coefficients of the total scale, attachment anxiety, and attachment avoidance are 0.822, 0.721, and 0.687, respectively; Second, the split-half reliabilities of the total scale, attachment anxiety, and attachment avoidance are 0.829, 0.715 and 0.741 respectively, which is consistent with the results of previous studies [14-17]. It is suggested that when ECR is applied to college students with different demographic characteristics (different regions, genders, and majors), its internal consistency reliability are within an acceptable range, and this conclusion can be verified by different statistical methods.

In this study, the scores of 36 items of ECR are analyzed by factor analysis, and 2 principal components are extracted, with a cumulative contribution rate of 42.888%, which basically reflects the theoretical concept of the original scale [13-14]. At the same time, 88.89% of the items in the dimension of attachment anxiety have a correlation coefficient (R) $\geq$ 0.4 with the score of attachment anxiety, and 94.44% of the items in the dimension of avoidance have a correlation coefficient (R) $\geq$ 0.4 with the score of attachment anxiety; The correlation coefficient between each item and the dimension to which the item does not belong is smaller than R. The success rates of the convergent validity of attachment anxiety and avoidance are 88.89% and 94.44% respectively, and the success rates of the discrimination validity of both dimensions are 100%.

The scores of two dimensions of ECR of this group tend to be normally distributed, without any floor or ceiling effect. It suggests that the content of ECR is reasonable and can reflect the main connotation of adult attachment, and the sample selection of this study is scientific and representative.

4. Conclusions and Recommendations

This study focuses on medical undergraduates in Guangdong Province and tests the psychometric performance of ECR, including its reliability, validity, and responsiveness. The results indicate that the Chinese version of ECR can be used for medical undergraduates in Guangdong Province. The Chinese version of ECR can not only be used to understand the adult attachment status of medical undergraduates in Guangdong Province but also provide direction for cultivating and improving their adult attachment and promoting their mental health. Due to the fact that this study only investigated adult attachment among medical undergraduates in Guangdong Province, the research results may not extend to college students in other places, let alone other groups; At the same time, this study also found that the performance of some items in the Chinese version of ECR, although passing, did not achieve excellence. It is recommended that subsequent studies adopt a large sample and multi-center model to expand the sampling range and further verify the applicability and reliability of the scale.

References

1. Berman WH, Sperling MB. The structure and function of adult attachment [A]. In: MB Sperling, Berman WH (Eds.), Attachment in Adults: Clinical and Developmental Perspectives. New York and London: Guilford Press, 1994:3-28.
2. Bowlby J. Attachment and loss[M]. London: The Hogarth Pressj, 1982: 15-37.
3. Bowlby J. Attachment and loss: Vol. 1. Attachment. New York: Basic Books. 1969.
4. Shaver PR, Papalia D, Clark CJ, et al. Androgyny and attachment security: Two related model of optional personality. Personality and Social Psychology Bulletin, 1998, (22): 582-589.
5. Wokie BA, Osier TJ, Candela K. Attachment styles and inagery in the romantic stories about relationships. Personality and Social Psychology Bulletin, 2001, (22): 1030-1033.
6. Feeney BC. The dependency paradox in close relationships: Accepting dependence promotes Independence [J]. Journal of Personality and Social Psychology, 2007, 92, 268-285.
7. Liu Ying, Zhai Jing, Chen Xu. Cognitive Neural Characteristics of the Emotion Regulation Strategies in Different Attachment Styles [J]. Chinese Journal of Psychological Science, 2016, 39(1): 109-115.
8. Guo Meiying, Zhang Ping, Zhang Yuying. Psychological quality and sleep quality of college students with different attachment types. Chinese Journal of Health Psychology 2014, 22(4): 586-588.
9. Shi Zhanming, Yang Qin, Xue Ying, et al. Adult attachment styles of the depressive disorder patients [J]. Chinese Journal of Clinical Psychology, 2013, 21(4): 616-619.
10. Xue Ying, Yang Yunping. Adult attachment styles of anxiety disorder patients in outpatient department [J]. Chinese Journal of Clinical Psychology, 2013, 21(1): 81-84.
11. Wang Xue-mei, Shi Zhan-ming, Wang Qian, et al. Adult attachment styles and stress perception of obsessive-compulsive disorder [J]. Chinese Journal of Clinical Psychology, 2013, 21 (3): 426-429.
12. George C, Kaplan N, Main M. (1985). Attachment interview for adults [M]. Unpublished manuscript, University of California, Berkeley.

13. Brennan KA, Clark CL, Shaver PR. Self-report measurement of adult attachment: An integrative overvi ew. In Simpson JA, Rholes WS eds. Attachment theory and close relationships [M]. New York: The Guilford Press, 1998: 46-76.

14. Li Tonggui, Kazuo Kato. Measurement of adult attachment: Chinese version of intimate relationship experience scale (ECR) [J]. Acta Psychologica Sinica, 2006, 38(3): 399-406.

15. Lu Xiaohua, Huo Liqin, Gao Wenfeng, et al. Reliability and validity of the revised Experiences in Close Relationships Inventory [J]. Chinese Journal of Mental Health, 2006, 20(11): 716-718+729.

16. Li Xu, Chen Shimin, Zheng Xue. The influence of adult attachment on pathological network use: The mediating effect of social self-efficacy and loneliness [J]. Chinese Journal of Psychological Science, 2015,38(3):721-727.

17. Zhang Hongmei, Liang Wei, Zhu Jinfu. Correlation analysis of attachment patterns, coping styles, depression and anxiety among medical college students [J]. Journal of Xinxiang Medical College, 2012, 29(7): 496-498.

18. Zhou CX, Hu TQ, Chen X. The mediating effect of coping styles on adjustment and result attachment among college students [J]. Journal of Guizhou Normal University (Natural Sciences), 2019, 37(3): 116-120.

19. Xie AN, Yang YP. The Relationship between School Adaptation and Adult Attachment in Freshman Students of University [J]. Chinese Journal of Clinical Psychology, 2015, 23(2): 339-342.

20. Huang YQ. Random error control and sample size determination in medical research [J]. Chinese Journal of Mental Health, 2015, 29(11): 874-880.