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Factorial Structure of the Anxiety Control Questionnaire in Chinese Adolescents

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This article examines the psychometric structure of the Anxiety Control Questionnaire (ACQ) in Chinese adolescents. With the data collected from 212 senior high school students (94 females, 110 males, 8 unknown), seven models are tested using confirmatory factor analyses in the framework of the multitrait–multimethod strategy. Results indicate that the structure of the ACQ based on Chinese adolescents data is different from the one proposed by R. M. Rapee, M. G. Craske, T. A. Brown, and D. H. Barlow (1996). Method effects are found and the ACQ is organized according to three factors, one substantive factor and two method factors associated with the positive- and negative-worded items, respectively. The implication of the method effect is discussed.

Keywords: *anxiety control; ACQ; method effect; wording effect; response style; CFA*

Anxiety is one of the most significant factors affecting people's mental health. Whether one has the sense of control over anxiety reflects the level of one's mental health. In recent years more and more people have become interested in the perception of control as a mediator of psychological distress (e.g., Rapee, Craske, Brown, & Barlow, 1996; Zebb & Moore, 1999). Researchers have discussed a lot about the definition of control, its influence on anxiety, and its relation to similar constructs (e.g., Biglan, 1987; Minor, Dess, & Overmier, 1991). Chorpita and Barlow (1998) defined control as the ability to personally influence events and outcomes in one's environment, especially those related to positive or negative reinforcement. This definition of control implicitly allows prediction of when something will happen and develop. Researches show that an immediate sense of diminished control is commonly associated with the immediate expression of anxiety (Barlow, 1991; Beck & Emery, 1985; Rapee & Barlow, 1989).

From the perspective of development, Chorpita and Barlow (1998) argued that if one has a history of lack of control, the idea may put him or her at eventual risk to experience

chronic anxiety or related negative emotional states. The development of a psychological vulnerability and sufficient early experience with uncontrollable events may eventually lead to an increased generalized tendency to perceive or process events as not within one's control.

Other studies have focused on the structure of Rotter's (1975) Locus of Control and his Internal–External (I-E) Locus of Control scale. In Rotter's understanding, the term *locus of control* describes the way an individual makes attributions about events and his or her own feelings. Internal locus of control refers to viewing events as controlled by one's own behavior or personal attributes, whereas external locus of control describes the tendency to view events as the result of chance or fate, or as being unpredictable (Rotter, 1975).

Abundant research has been conducted about the topic of locus of control. For example, Klockars and Varnum (1975) argued that control and locus of control is a very general topic, and it might be better to conceptualize locus of control as a multidimensional construct and link it to the particular aspects of a specific affair. Based on Rotter's (1975) I-E Locus of Control Scale, Rapee et al. (1996) developed the Anxiety Control Questionnaire (ACQ), because they thought that locus of control may be somewhat different from the perceptions of control related to anxiety, in that locus of control is general and therefore less representative of the aspects of control that may be directly relevant to negative emotions. Thus, they divided the perceived control over anxiety into two factors: internal emotional reactions and externally threatening events. Now this questionnaire is a very popular instrument to investigate the perceived control of anxiety.

The ACQ is a 30-item self-report inventory with about half of the items reverse-worded and scored. A 6-point Likert-type rating scale (0-5) was used to induce respondents to make some judgment as to whether they agree or disagree with the items. The factor structure of the ACQ was examined through a principal components factor analysis. And a two-factor solution was determined about the questionnaire. The two factors were perceived control over external events (external events) and perceived control over internal emotional reactions (internal reactions).

After the ACQ was published, many people used this questionnaire in their studies (e.g., Feldner & Hekmat, 2001; Forsyth, Parker, & Finlay, 2003). Some researchers examined its structure with other samples. Zebb and Moore (1999) found that the ACQ was best explained by a three-factor solution in nonclinical samples. Zebb and Moore (1999) used a sample of 316 students enrolled in introductory psychology courses at Texas Tech University. Prior to the analysis, the data were screened for normality. Because some of the items (18 of 30) were not normal-distributed, the authors split the data into two parallel sets, one of which was composed of nontransformed scores and the other used square root. Twelve solutions were examined through exploratory factor analyses (EFAs): The two sets of data and three factor models (2, 3, and 4 factors extracted). The results indicated that a three-factor solution was the most appropriate. Among the three factors, one underlay 12 positively worded and scored items referring to control over threatening internal and external events. The second factor underlay 9 negatively worded and reverse-scored items reflecting a perceived lack of control over anxiety-related reactions. And the third factor contains 9 negatively worded and reverse-scored items assessing a perceived lack of control over external threatening events.

In Zebb and Moore's study (1999), the second and third factors were used as indexes of a perceived lack of control over internal and external events. At first glance, Zebb and Moore's study seems beyond criticism. However, after carefully examining their results, we found that the first factor includes all of the positively worded items of the initial questionnaire and the other two factors all the negatively worded ones. Consequently, we could not exclude the possibility of a method effect in their study, which often happens in methodology of data analysis, usually in confirmatory factor analysis (CFA).

Schriesheim and Eisenbach (1995) pointed out that researchers who use items with different wording formats should routinely test item wording effects through CFA procedures before any further analyses. It is commonly considered that wording effects exist when shared methods of measurement are a source of covariance among traits (Becker & Cote, 1994). In self-report questionnaires and scales using rating scales, both positively and negatively worded items often test the same content. When all the positively worded and the negatively worded items cluster respectively into two factors, a wording effect can be suspected.

Many studies about the wording effects have been conducted in the area of self-esteem, most of which used the Rosenberg Self-Esteem Scale (Gana, Alaphilippe & Bailly, 2005; Horan, DiStefano & Motl, 2003; Marsh, 1996; Tomás & Oliver, 1999). Tomás and Oliver (1999) tested nine models—three models consisting of substantive factors only, three models using correlated traits–correlated uniquenesses (CTCU), and three models using correlated traits–correlated methods (CTCM)—to test the wording effect. Their results indicated that the model with the substantive trait factors and two method factors fit the data best, which means the CTCM achieved the best fit indexes. Other researchers have found that method effects associate more often with negatively worded items than with positively worded ones (Gana et al., 2005).

In the present study, we investigate two questions: First, we examine the properties of the ACQ, testing its structure in two studies, checking a method effect or a wording effect, using the CFA-CTCM models in the framework of multitrait–multimethod (MTMM) analysis. Second, we test the appropriateness of the English version of the ACQ in a Chinese sample.

Method

Participants

A total of 219 senior high school students in a middle school in Beijing participated in the study. They were tested in a familiar data collection investigation. After elimination of 7 protocols that contained missing and/or incorrect data (i.e., out of range on the Likert-type scale) and one multivariate outlier, the final sample size was 212 (94 females, 110 males, 8 unknown). The average age of the participants was 15 years 10 months (±10 months).

Materials

The Chinese version of the Anxiety Control Questionnaire (ACQ; Rapee et al., 1996, p. 279). As described above, the questionnaire is a 30-item scale designed to measure

perceived control over anxiety-related events and feelings. The Chinese version of the ACQ was adapted by a two-stage process of translation and back-translation. Participants indicate their degree of disagreement or agreement with each item using a 6-point Likert-type scale (0, *strongly disagree*, to 5, *strongly agree*), with higher scores indicating greater perceived control. The ACQ contains two independent subscales, external events (14 items) and internal reactions (16 items), and appears to have quite strong psychometric properties with internal consistency in clinical and nonclinical populations (total scale α = .87) and good test–retest reliability (r = .88 for 1 week to r = .82 for 1 month; Rapee et al., 1996). In addition, the ACQ has convergent validity in relation to other measures of anxiety and fear (Rapee et al., 1996).

The Chinese version of the anxiety, depression and body symptoms subscales of the Symptom Check List-90 (SCL-90; Derogatis, 1975). The three subscales are composed of 35 items and each is tested using a 5-point Likert-type scale (1, *never*, to 5, *severe*). The total and three subscales' scores were obtained as indicators of the symptoms.

Procedure

The sample completed the ACQ as part of their initial intake evaluation (consisting of the anxiety, depression, and somatic subscales of the SCL-90 and a questionnaire battery). The questionnaires were administered in class with a teacher trained for the study as supervisor.

Data Analysis

With the basic model used by Rapee et al. (1996) and Zebb and Moore (1999), six CFA models were tested. The choice of these models was based on recommendations from studies on method effects in the area of self-esteem (Horan et al., 2003; Marsh, 1996; Tomás & Oliver, 1999). Model 1 is a base model, that is, Rapee's initial two-factor model, assuming all the variables are divided into two parts: one being the perceived control of external events and the other one being perceived control of internal feelings. Model 2, confirming Zebb's three-factor model, dividing all of the variables into three parts: The first factor consists of all the positively scored items. People getting high scores in this part are considered to have a sense of self-efficacy over both external events and internal reactions and an ability to cope with anxious thoughts and situations. The second factor includes part of the negatively scored items, encompassing a sense of helplessness over internal stress and emotional reactions. And the third factor includes the rest of the negatively scored items, measuring people's sense of helplessness over external events. Models 1 and 2 both assume that method variance does not have an effect on the variables. Model 3 assumes that the whole variance can be explained by wording factors. This model, therefore, hypothesizes that the items are divided into two method factors related respectively to positively and negatively worded items. Model 4 includes two substantive factors similar to Rapee's original ones, plus a positively worded item factor. Model 5 is very similar to Model 4, with the negatively worded item factor replacing the one that is positively worded. Model 6 assumes a balance between wording factors, that is, the same two substantive factors as above and two method factors with, respectively, positively and negatively worded items, both substantive and method factors accounting for a significant amount of variance. Model 6

hypothesizes both correlated substantive factors and correlated method factors. As recommended by Harris (1991), Widaman (1985), and Williams, Cote, and Buckley (1989), models with a method effect assume that substantive and method factors are not correlated with one another, and these parameters are fixed at zero.

Chi-square discrepancy tests and the comparative fit index (CFI), incremental fit index (IFI), nonnormal fit index (NNFI), and adjusted goodness-of-fit index (AGFI) were used to test and compare alternative models (Williams & James, 1994). CFI, IFI, and NNFI are all comparative fit indexes. The minimum acceptable value for each of them is 0.9 in an acceptable model (Huang, 2005). The AGFI and the root mean square error of approximation (RMSEA) are absolute fit indexes. The acceptable value for AGFI is usually 0.9. But when the sample size is different, the effect of the index is not very stable: with small sample sizes, it is easier to refuse the real model with a value of 0.9 (Hu & Bentler, 1995). An acceptable RMSEA is usually below 0.08, with smaller values better (Hu & Bentler, 1995).

Model 1 and Models 4 to 6 are nested, whereas Models 1 to 3 are not nested. In the structural equation model (SEM), the likelihood ratio test is usually used for selecting nested models. That is, through the changes in the goodness-of-fit indexes of the models and in the degrees of freedom, one can determine the statistical variables and their degree of freedom (or the chi-square discrepancy test). If the change in chi-square is bigger than the change in the degrees of freedom, the improvement from one model to another is considered significant. When the models are not nested, AIC is one of the most widely used indexes for comparing models. The smaller the index, the better the model, irrespective of whether the models are nested (Li, 2004). In this article, AIC was also used as the main index to compare the competitive models.

LISREL 8.72 was used to analyze the data. Because there are double loadings for the items in Models 3 and 4, negative error variances are analyzed, which frequently occurs in MTMM analyses (Harris & Schaubroeck, 1990; Rindskopf, 1984). Maximum likelihood estimation was used for all analyses. The covariance matrix was used in each case because correlation matrices may produce misleading parameter estimates (Cudeck, 1989).

Results

Results of CFA

The fit indexes of each model are summarized in Table 1 and the comparison indexes are listed in Table 2. As indicated by the AGFI, NNFI, and CFI values, the goodness-of-fit indexes for each model were acceptable, except for Model 1. The indexes were therefore better for models incorporating method effects (Models 3 to 6).

The correlation of the two substantial factors in Model 6 was very high, reaching .99. Consequently, another model was created (Model 7) where the two factors were merged. The goodness-of-fit statistics for Models 6 and 7 were quite similar. Both reflected an improvement in most of the fit indexes over other models. In Table 2, it can be seen that Model 6 is significantly improved compared with other nested models. The chi-square discrepancy test between Models 6 and 7 was not significant. However, Model 7 showed

Table 1
Fit Indexes for Factor Validation of the Chinese
Version of the Anxiety Control Questionnaire

Model	χ^2	df	χ^2/df	CFI	IFI	NNFI	AGFI	RMSEA	AIC
1	915.78	404	2.27	0.82	0.82	0.81	0.68	0.098	1336.19
2	658.48	402	1.63	0.91	0.92	0.91	0.80	0.055	778.94
3	677.24	404	1.68	0.91	0.91	0.90	0.80	0.057	796.60
4	618.05	390	1.58	0.93	0.93	0.92	0.81	0.053	768.05
5	627.1	384	1.63	0.92	0.92	0.91	0.81	0.055	789.10
6	544.39	374	1.46	0.94	0.94	0.93	0.82	0.069	736.66
7	549.14	376	1.46	0.94	0.94	0.93	0.82	0.047	719.27

Note: CFI = comparative fit index; IFI = incremental fit index; NNFI = nonnormal fit index; AGFI = adjusted goodness-of-fit index; RMSEA = root mean square error of approximation.

Table 2
Comparison of the Discrepancies of the Nested Models

Model	Discrepancy of χ^2	Discrepancy of df	p
1 and 4	297.72	14	.005**
1 and 5	288.68	20	.005**
4 and 6	123.66	16	.005**
5 and 6	82.71	10	.005**
6 and 7	4.75	2	.05

**$P < .01$

the smallest AIC, which means the two substantive factors in Model 6 could be combined. Consequently, Model 7 provided the best fit to our data.

The aim of Models 4 and 5 was to test the positive-wording and negative-wording effects. Previous studies reported contradictory results about the two kinds of wording effects, and the majority reported negative-wording effects (Marsh, 1996; Motl & Conroy, 2000; Tomás & Oliver, 1999). They found better fitting models for scales containing both positively and negatively worded items. However, Wang et al. (2000) reported a better fitting self-esteem model with only positive-wording effects. His sample was crack-cocaine users. In our study, the fit indexes of Model 4 were very similar to those of Model 5, and no improvement was observed for Model 5. And both the indexes of Models 4 and 5 were not better than those of Models 6 and 7. This means the wording effects in our sample were more pronounced with the two kinds of wording directions.

Internal Consistency

On the basis of the results of the CFA, we tested the reliability and validity of the questionnaire. In other studies (Rapee et al., 1996; Zebb & Moore, 1999), to assess internal consistency, corrected item–scale and corrected item–total correlations, as well as

Table 3
Item–Total Correlations for the Anxiety Control Questionnaire

Item	Item–Total r
1. I am usually able to avoid threat quite easily.	.50**
2. How well I cope with difficult situations depends on whether I have outside help.	.45**
3. When I am put under stress, I am likely to lose control.	.57**
4. I can usually stop my anxiety from showing.	.18**
5. When I am frightened by something, there is generally nothing I can do.	.48**
6. My emotions seem to have a life of their own.	.09
7. There is little I can do to influence people's judgments of me.	.25**
8. Whether I can successfully escape a frightening situation is always a matter of chance with me.	.55**
9. I often shake uncontrollably.	.57**
10. I can usually put worrisome thoughts out of my mind easily.	.27**
11. When I am in a stressful situation, I am able to stop myself from breathing too hard.	.48**
12. I can usually influence the degree to which a situation is potentially threatening to me.	.54**
13. I am able to control my level of anxiety.	.32**
14. There is little I can do to change frightening events.	.52**
15. The extent to which a difficult situation resolves itself has nothing to do with my actions.	.53**
16. If something is going to hurt me, it will happen no matter what I do.	.43**
17. I can usually relax when I want.	.34**
18. When I am under stress, I am not always sure how I will react.	.33**
19. I can usually make sure people like me if I work at it.	.39**
20. Most events that make me anxious are outside my control.	.39**
21. I always know exactly how I will react to difficult situations.	.45**
22. I am unconcerned if I become anxious in a difficult situation because I am confident in my ability to cope with my symptoms.	.48**
23. What people think of me is largely outside my control.	.39**
24. I usually find it hard to deal with difficult problems.	.56**
25. When I hear that someone has a serious illness, I worry that I am next.	.47**
26. When I am anxious, I find it difficult to focus on anything other than my anxiety.	.41**
27. I am able to cope as effectively with unexpected anxiety as I am with anxiety that I expect to occur.	.39**
28. I sometimes think, "Why even bother to try to cope with my anxiety when nothing I do seems to affect how frequently or intensely I experience it?"	.39**
29. I often have the ability to get along with "difficult" people.	.29**
30. I will avoid conflict due to my inability to successfully resolve it.	.31**

**$p < .001$.

Cronbach's alpha, were reported. However, because there is only one substantive factor in our model, item–scale and item–total correlation are similar. The item–total correlation is reported in Table 3. Corrected item–total correlations assess the strength of relationship between an item and the total scale score.

The item–total correlations are statistically significant, ranging from .18 to .57. The only exception is observed with item 6, the correlation being very low (.09). Cronbach's alpha was .82. The results indicated a rather high internal consistency of the scale.

Table 4
Correlations Between the ACQ Total Score and Other
Measures of Anxiety and Depression

	Anxiety	Depression	Body Symptoms
ACQ	−.413**	−.391**	−0.373**

Note: ACQ = Anxiety Control Questionnaire.
**$p < .001$.

Criterion-Related Validity

The correlations between the ACQ total score and the subscales of anxiety, depression, and body symptoms of SCL-90 were examined to assess the criterion-related validity of the ACQ. As shown in Table 4, the ACQ total score was significantly related to the independent measures of depression and anxiety, with correlations ranging from −.373 to −.413. These results indicated that a greater perception of control was associated with less anxiety, depression, and body symptoms. These results are consistent with Rapee et al.'s (1996) original study and Zebb and Moore's study, which means the original goal of the ACQ has been reached to some extent.

To test the external validity, we conducted an SEM with LISREL 8.72, constructing a constrained model of the covariance between ACQ and the three other measures. When doing this, we constrained the method effect of ACQ, leaving the positive-worded factor and the negative-worded factor independent, and allowing the substantive factor to be correlated with the three SCL-90 factors. The fit indexes for this model are presented in Table 5. We can see that the fit indexes are quite good, indicating that the Chinese version of the scale has a good external validity.

Discussion

The main conclusion of this research is that a method effect is found in the ACQ. One substantive factor and two method factors underlay the questionnaire. After controlling the method effects, only one factor underlay the ACQ, which means that the ACQ has a single-dimension structure, with high scores indicating more controlling ability over anxiety and low scores indicating less controlling ability (with the negatively scored items reversely coded).

The observation of method effects in the ACQ, which includes items that are both positively and negatively worded, is consistent with other research on questionnaires with positively and negatively worded items (e.g., Horan et al., 2003; Kaufman, Rasinski, Lee, & West, 1991; Marsh, 1996). Horan et al.'s study (2003) of Rosenberg's Self-Esteem Scale and the Attitude Toward School and Locus of Control scales indicated comparable wording effects for positively and negatively worded items. These authors also investigated the wording effects in longitudinal data to check the wording effects over time. The results indicated stability in wording effects over time.

How should we interpret the method factors in the ACQ? Researchers have tried to answer such a question for a long time. In Marsh's (1996) research, the effects associated

Table 5
CFA Indexes of the External Validity of the
Anxiety Control Questionnaire

Model	χ^2	df	χ^2/df	CFI	IFI	NNFI	AGFI	RMSEA
M	3707.58	1980	1.84	0.94	0.94	0.94	0.62	0.062

Note: CFA = confirmatory factor analysis; CFI = comparative fit index; IFI = incremental fit index; NNFI = nonnormal fit index; AGFI = adjusted goodness-of-fit index; RMSEA = root mean square error of approximation.

with negatively worded items were considered to be substantively irrelevant, consisting of a systematic bias that should be identified and removed. Tomás and Oliver (1999) raised the question of whether the wording effect associated with positively and negatively worded items has a substantive importance or should simply be considered as a methodological artifact. Much research has addressed this question (e.g., Carmines & Zeller, 1979; Kaufman et al., 1991; Marsh, 1996). In Horan et al.'s study (2003), the systematic bias of the wording effect was linked to the concept of "response style," that is, "a behavioral consistency operating across measures of several conceptually distinct content traits" (Horan et al., 2003, p. 438). They verified the wording effect as one of the response styles using the CTCU method in the framework of the MTMM model. They conducted four analyses of the responses to the Rosenberg Self-Esteem Scale and two other questionnaires. They found that these wording effects in self-reported surveys should be considered as a type of response style rather than a substantively irrelevant artifact. They insisted that the presentation of response style as a latent variable that is represented in systematic patterns of response across a set of items represent some other content. Thus, the theory of response style "as a personality trait provides one a conceptual basis for interpreting systematic effects associated with item wording" (Horan et al., 2003, p. 440). Therefore, the current trend is to consider the wording effect as a kind of personality trait.

In this study, the method effect of the questionnaire is reflected in two separate latent factors associated respectively with the positively and negatively worded items. Further studies are needed to understand what kind of response style is associated with this method effect. Previous studies investigated the effect of the negatively worded items, considering that the positively worded items are not associated with a wording effect. In our research, the results indicated that the wording effects only manifested when both wording items were considered.

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