

## Development and Validation of the Chinese Critical Thinking Disposition Scale among Foreign Language Students

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### Abstract

Although much research acknowledges the positive contributions of CT dispositions to learning a foreign language, less scale development work has focused on the dispositions towards critical thinking of foreign language students in the Chinese language, leading to the limited availability of reliable and valid Chinese critical thinking disposition measurements in foreign language education. The current research aims to develop and validate the Chinese Critical Thinking Disposition Scale using Exploratory Factor Analysis and Confirmatory Factor Analysis (CFA) in two foreign language student samples from China. It filled the gap of limited reliable and valid Chinese scales assessing critical thinking disposition. A total of 538 (103 for EFA and 435 for CFA) foreign language students in China from Zaozhuang University and Jiangxi Normal University participated in the study. Results of the CFA confirmed a five-factor CHCTDS with 17 items on a seven-point Likert scale as an acceptable model fit for the data ( $\chi^2/df= 3.492$ , NFI= .911, CFI= .934, TLI= .918, IFI= .935, and RMSEA= .076) with good reliability and convergent as well as discriminant validity. The Cronbach's  $\alpha$  was .934 for the overall scale, and that of the five subscales ranged from .776 to .851. Therefore, the CHCTDS developed in this paper may be recommended as a valid Chinese scale measuring foreign language learners' critical thinking dispositions. Still, it needs further validation among larger populations and across gender.

*Keywords:* Chinese language, critical thinking disposition, disposition scale, factor analysis, measurement, foreign language students

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## Introduction

With the advent of the information age and the growing influence of the Internet, to survive and thrive in the rapidly changing world, Critical Thinking (CT), composed of skills and dispositions (Cheng & Wan, 2017; Facione, 2000), is believed to be an essential requirement for foreign language study and has obtained paramount attention in foreign language education (Din, 2020). CT skills entail employing conscious and appropriate techniques to attain a specific objective (Halpern, 1998). CT disposition is a tendency, willingness, or inclination to use particular thinking skills (Norris, 1992; Valenzuela et al., 2011), a consistent internal driving force for making decisions about what to do and believe using CT skills (Facione, 2000). CT is of great importance for foreign language learners because CT skills can help them to monitor and evaluate their ways of foreign language learning more successfully (Frovolova et al., 2021), and CT dispositions could contribute to the improvement of foreign language (Xu et al., 2023) by increasing their desire to learn a new language and apply them in practice (Presbitero, 2020). Following Krashen's Affective Filter Hypothesis (1982), learners holding a positive outlook on foreign language learning can achieve better results (Frolova et al., 2021). In that case, enhancement of foreign language learners' CT dispositions can empower them to learn foreign languages, and what effect other CT dispositions have in learning a foreign language could be a core focus of analysis that needs well researching.

Unfortunately, very minimum studies have disclosed the possible influence of CT dispositions in studying a foreign language (Ku & Ho, 2010; Ünaldı & Yüce, 2021) because researchers working in this field face the challenge of a lack of scale development work in CT dispositions (Fan & See, 2022). There are a limited number of CT disposition measurements with acceptable reliability and validity (Quinn et al., 2020; Sosu, 2013). Therefore, this study strived to develop a scale of CT disposition in the Chinese language based on the previously available CT disposition measurements and validate the new instrument using exploratory and confirmatory strategies among Chinese foreign language learners. Developing a measurement of the CT dispositional scale in the Chinese language with high reliability and validity would fill the gap of lacking a CT disposition scale explicitly developed for foreign language learners in the Chinese language. It would also play a critical part in assessing the classes and programs on CT dispositions (Ku, 2009; Kuhn, 1999), thus contributing to the further exploration of how their CT dispositions are related to other individual factors in various domains of life (Quinn et al., 2020), other related constructs like CT skills (Ku & Ho, 2010), and parenting styles (Wang et al., 2020).

## Literature Review

Currently, the Student-Educator Negotiated Critical Thinking Dispositions Scale (SENCTDS; Quinn et al., 2020), the Critical Thinking Disposition Scale (CTDS; Sosu, 2013), and the California Critical Thinking Disposition Inventory (CCTDI; Facione & Facione, 1992) are the three available measurements of CT dispositions. The CCTDI is a scale based on the Delphi Report's definition of CT (Facione & Facione, 1992). It comprises 75 measures that assess open-mindedness, analyticity, maturity, systematicity, inquisitiveness, self-confidence, and truth-

seeking, seven dispositions towards CT. Even though the original published reports showed that the overall scale and its seven subscales were quite reliable (Facione & Facione, 1992), very few researchers have been able to duplicate them (Walsh et al., 2007). Additionally, it has been reported that there was a poor level of internal consistency across dimensions (Ip et al., 2000), significant overlaps between constructs, high cross-factor loadings, and no obvious loadings that were exclusive to a single construct (Walsh et al., 2007).

Considering the overlap of constructs in the CCTDI, Sosu (2013) developed a two-factor instrument called the Critical Thinking Dispositions Scale (CTDS), composed of 11 items measuring critical openness and reflective skepticism. Although research on CTDS is numbered, it is suggested that a model with only one factor may fit the data better (Yockey, 2016).

Resting that most scales of CT dispositions were developed grounded in expert definitions, Quinn et al. (2020) created a CT disposition scale called the Student-Educator Negotiated Critical Thinkg Dispositions Scale (SENCTDS). They have engaged students and teachers in the design using collective intelligence methods to generate scale items, making the SENCTDS more suitable in the educational context (Quinn et al., 2020). However, even though 35 items have been retrieved from the exploratory phase of the study, the sample size used for further validity verification in Confirmatory Factor Analysis (CFA) is only 150, lower than the minimum sample size of 200 (Comrey & Lee, 1992) recommended for CFA. CFA, an SEM category, is an extensive sample approach (Kline, 2015). Small sample sizes are generally acknowledged to cause problems, such as inaccurate parameter estimates and poor model fit statistics (Wang & Wang, 2012). Thus, the small sample size used in CFA for testing the model of the SENCTDS calls into question the reliability and validity of the SENCTDS.

Aside from the concerns about the validity and reliability of scales in CT dispositions, it is also noteworthy that there is presently no measurement available in Chinese language for measuring foreign language students' CT disposition (Fan & See, 2022) as the CCTDI, CTDS, and SENCTDS were developed for samples who were native speakers of English in the U.K. and U.S. Furthermore, the previous scales focused on students majoring in nursing (e.g., CCTDI; Facione & Facione, 1992) or education (e.g., CTDS; Sosu, 2013), minimum scales targeting at foreign language learners. Additionally, Chinese scales of CT disposition, which have taken the cultural differences into account and been validated in the Chinese context, are limited (Wen, 2012). Although the CCTDI in Simplified Chinese exists (e.g., Yeh, 2002), it is only a Chinese version of the original instrument, paying no attention to the cultural differences.

Additionally, starting from the existing available CT disposition measurements, there are dimensions shared by most taxonomies, including open-mindedness, perseverance, reflectiveness, inquisitiveness, and self-confidence. The open-mindedness construct is among the dispositions that gained consensus across researchers (Ennis, 1996; Facione & Facione, 1992; Sosu, 2013) and a component of the overall set of good thinking dispositions for students (Ku & Ho, 2010). It is a personality trait that accounts for a significant incremental effect on CT (Clifford et al., 2004). Perseverance refers to the tendency to persevere through complex language tasks and the associated difficulties and frustration without giving up (Dwyer et al., 2017) in learning a foreign language. Although the perseverance construct is not incorporated in the CTDS or CCTDI, it has been highlighted in the conceptualizations of CT dispositions in Dwyer et al. (2017) and regarded as an essential dimension in the SENTDS (Quinn et al., 2020). Reflectiveness refers to foreign language learners' reorganization of their knowledge limits (Brookfield, 1987) and willingness to

challenge established views, behaviors (McPeck, 1981), and contexts (Quinn et al., 2020) in studying foreign languages, which will facilitate them to find out problems in language learning and trigger their learning interest, thus improving the language learning efficiency. Disposition of inquisitiveness is a prerequisite for foreign language students actively participating in thinking in foreign language study as it is a fascination with or appreciation of thinking (Ku & Ho, 2010). Foreign language learners with inquisitiveness value learning without being rewarded for it (Facione & Facione, 1992). They are motivated by the fascination with new languages and foreign cultures, same as or different from their own. Self-confidence in this study represents faith in one's thinking processes and ability to make decisions (Facione & Facione, 1992). Foreign language learners who possess a disposition of CT self-confidence are confident enough in their reasoning abilities and are more willing to become strong critical thinkers (Facione, 2011), thus leading to a more favorable outcome while learning a foreign language (Tunçel, 2015). Therefore, the urgent need to create a new CT disposition scale has been recognized (e.g., Quinn et al., 2020; Ku, 2009; Norris, 2003), and given the limited availability of Chinese dispositional scale in the Chinese context (Wen, 2012), the present article intends to develop a Chinese scale of CT disposition based on the five constructs mentioned above.

## Method

To propose the Chinese Critical Thinking Disposition Scale (CHCTDS), two separate samples were collected, with Sample One being utilized to assess the factor structure of the initial version with Exploratory Factor Analysis (EFA), and Sample Two to validate the factor structure retrieved from EFA in a larger sample size with Confirmatory Factor Analysis (CFA). The questions in the CHCTDS were set up on Wenjuanxing, a commonly used smartphone-based online investigation tool in China. Then the link was disseminated to foreign language students at Zaozhuang University and Jiangxi Normal University by their teachers. Students filled in the questionnaires by accessing the provided link on their smartphones if they expressed their willingness to participate in our survey. Online consent was obtained by clearly outlining this study's objectives and ensuring the confidentiality of participant data. Then the data were downloaded for analysis employing SPSS 23.0 and AMOS 25.0.

## Participants

Participants in the two samples were Chinese foreign language students of different grades at Jiangxi Normal University, and Zaozhuang University recruited in June, 2022 using cluster sampling and random sampling. Participants in Sample One and Sample Two comprised 103 and 435 foreign language students, respectively. Since the data collection was conducted online and participants were required to complete all the items before submitting, no missing data was found.

## Research Instruments

The instrument of the present research was composed of two parts: a sociodemographic information part collecting information on age, gender, and grade, and the other part for the initial version of the CHCTDS. An exploratory approach was used to construct the initial English items based on available previous scales items on inquisitiveness, open-mindedness, self-confidence, perseverance, and reflectiveness. It generated a pool of 20 English items for translation into Chinese following translation, comparison, back-translation, second-round comparison, linguistic adaptation, and pilot testing (Brislin, 1970), from which the draft version of the CHCTDS was

developed. It took approximately three to five minutes to complete the survey. The format of the CHCTDS's original version was a seven-point Likert scale, the type of Likert scale with the highest accuracy (Johns, 2010), where one meant "Strongly Disagree" and seven represented "Strongly Agree." The higher the score was, the better CT dispositions the respondent was shown.

### ***Statistical Analysis***

EFA using statistical software SPSS and CFA using AMOS were performed to develop and validate the CHCTDS in this study. There were two independent samples in the study. EFA employing principal component analysis with the varimax rotation method (Pallant, 2007) was conducted in Sample One to detect the number of factors and item loadings, which helped ascertain the underlying factor structure of the CHCTDS. The number of extracted factors was based on an eigenvalue  $>1.0$  (Kaiser, 1960), and items were retained based on factor loading above .50 (Worthington & Whittaker, 2006) and commonality above .40 (Hair et al., 2010). Before EFA, the KMO value and the corresponding  $p$ -value of Bartlett's Test were conducted to test the suitability for EFA. The KMO value is greater than .6 (Kaiser, 1974), and a significant result of Bartlett's Test ( $p < .05$ ) (Snedecor & Cochran, 1980) suggested that the data was excellent for an EFA.

Subsequently, an analysis of fit between the hypothesized measurement model and data was examined by performing a CFA employing the robust maximum likelihood estimator (ML) with AMOS 25.0 in Sample Two, aiming to validate the measurement model extracted from EFA in another sample (Brown, 2015). The parameters used to appraise the model were  $\chi^2/df (> 5)$  and several other model fit indicators which included the NFI, CFI, TLI, IFI, and RMSEA, whose values greater than .90 were generally considered acceptable indicators for model fit, and an RMSEA value of .08 or lower indicated good fit (Kline, 2015). Regarding the local adjustment of the model, all standardized factor loadings should be statistically significant ( $p < .05$ ) and larger than or equal to .50 (Hair et al., 2010). To evaluate the scale's convergent validity, both the average variance extracted (AVE) and Composite Reliability (CR) were calculated (Wu, 2013). Generally, a threshold value of  $AVE > 0.5$  and  $CR > 0.7$  indicated good convergent validity. Concerning discriminant validity, the square root of each AVE value associated with each latent variable should be larger than the absolute value of the correlational coefficient between the variable and other latent variables, suggesting a good discriminant validity between latent variables (Fornell & Larcker, 1981).

In the last place, the reliability of the final version of the CHCTDS was assessed. To determine the internal consistency of the entire scale and its dimensions, Cronbach's Alpha, item deleted Cronbach's Alpha, and corrected item-total correlations (CITC) were used. Cronbach's Alpha was deemed to have an acceptable cutoff value of 0.70 for measuring instruments used in research (Hair et al., 2010).

## **Results**

### ***Demographic Information of the Participants***

The sample size and distribution of age, gender, and grade of the two samples were depicted in Table one. The results showed that Sample One for the EFA study consisted of 53 female (51.5%) and 50 males (48.5%), with an average age of 19.56 ( $\pm 1.169$ ) years. Twenty-one of them were from grade one (20.4%), 48 from grade two (46.6%), 27 from grade 3 (26.2%), and seven

from grade four (6.8%). The sample size for the CFA was 435 (Sample Two), which meets the recommendation of the sample size for CFA (Kline, 2015). Participants in Sample Two were on a mean age of 19.25 years old ( $SD = .900$ ;  $Max = 28$ ;  $Min = 18$ ), and the gender distribution was 34% male and 66% females. Most of Sample two were from grade 1 (70.3%) and grade 2 (28.3%).

Table 1. Description of the characteristics of Sample One and Sample Two

	Sample 1 (N= 103)	Sample 2 (N= 435)
Gender		
Female (%)	53 (51.5%)	287 (66%)
Male (%)	50 (48.5%)	148 (34%)
Age (years)		
Mean (SD)	19.56 (1.169)	19.25 (0.900)
Max	22	28
Min	17	18
Grade		
Grade 1 (%)	21 (20.4%)	306 (70.3%)
Grade 2 (%)	48 (46.6%)	123 (28.3%)
Grade 3 (%)	27 (26.2%)	3 (0.7%)
Grade 4 (%)	7 (6.8%)	3 (0.7%)

### Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) was employed to explore the latent structure of the CHCTDS in Sample One. The Kaiser-Meyer-Olkin measure of sampling adequacy was .782 exceeding the recommended value of .60 (Kaiser, 1974), and the significance of Bartlett's Test of Sphericity was met ( $p < 0.001$ ), suggesting the suitability of conducting EFA in Sample one (Snedecor & Cochran, 1980).

EFA (Principal Component Analysis with varimax rotation) was then performed to detect the structure of the initial version of CHCTDS. Based on the EFA results, six factors generated eigenvalues larger than one (Kaiser, 1960), and accounted for 67.857% of the overall variance. The factor loading of Item 16 was -.397, which failed to report the absolute value of factor loading exceeding the criteria of .50 (Hair et al., 2010), and should be excluded from the scale. Additionally, although item eight reported salient loading (.941) on Factor six, only one item was loaded on Factor six. As a result, Factor 6 (and item 20) was not retained due to non-interpretability (Costello & Osborne, 2005). Consequently, EFA in Sample One resulted in the elimination of two items (item eight and item 16) and the retention of five factors consisting of 18 items.

Following that, EFA was re-run after the exclusion of item eight and item 16. The results of the KMO and Bartlett's test were displayed in Table Two, and the results of EFA were shown in Table Three. Table two showed the scale was appropriate for EFA with a KMO value of .800, and the examination of Bartlett's Test of Sphericity was reported to be statistically significant ( $p < 0.01$ ) (see Table two). As Table three indicated, the first factor loadings of all the remaining 18 items exceeded .50 with the lowest communality of .592. The final extracted structure's cumulative variance, which included 18 items, made a contribution to 68.319% of the scale's overall variance, above the required threshold of 60% (Hair et al., 2010). After varimax rotation, Factor 1~5

accounted for 15.713% (eigenvalue= 5.456), 14.667% (eigenvalue= 2.214), 13.483% (eigenvalue= 1.828), 12.834% (eigenvalue= 1.466), and 11.623% (eigenvalue= 1.333) of the overall variance respectively (see Table three). Factor one included four items related to *open-mindedness*; Factor two was related to *inquisitiveness* represented by four items; Factor three was renamed as *self-confidence* and was composed of four items; Factor four was related to *perseverance* and included three items; Factor five consisted of three items related to the *reflectiveness*.

### Confirmatory Factor Analysis

#### Preliminary Data Analyses

A Confirmatory Factor Analysis (CFA) was then employed in Sample Two using AMOS 25.0 to estimate the scale's validity. Before CFA, some preliminary analyses were conducted. Examining the assumptions of multivariate normality and linearity, all items displayed acceptable levels of asymmetry and kurtosis, with skewness values ranging from -.607 to .378 ( $Sk < |3|$ ) and from -.780 to .943 for kurtosis ( $Ku < |10|$ ) (Kline, 2015). The data in this study were mainly self-reported by participants online. Harman's one-factor method was used to detect if a single latent factor explained all of the variables, thus ensuring that any potential common method variance bias (CMV) was controlled for (Podsakoff et al., 2003). With all the variables entered into factor analysis, results showed that the interpretation rate of the first factor was 47.01% (<50%), indicating that CMV in this study was not serious (Podsakoff et al., 2003).

Table 2. *KMO and Bartlett's test*

Kaiser-Meyer-Olkin measure of sampling adequacy		0.800
	Approx. Chi-Square	766.578
Bartlett's test of sphericity	df	153
	Sig.	0.000

Table 3. *The results of Exploratory Factor Analysis*

Rotated component matrix <sup>a</sup>

Item	Component					Communality
	1	2	3	4	5	
Item 3	.843					.751
Item 2	.825					.736
Item 1	.766					.637
Item 4	.704					.681
Item 12		.814				.725
Item 14		.745				.641
Item 13		.695				.755
Item 15		.663				.660
Item 18			.841			.759
Item 17			.759			.620

Item 19			.735			.606
Item 20			.631			.592
Item 6				.842		.774
Item 7				.830		.728
Item 5				.784		.763
Item 9					.785	.644
Item 10					.755	.605
Item 11					.745	.621
Eigenvalues	5.456	2.214	1.828	1.466	1.333	/
Present variance	15.713	14.667	13.483	12.834	11.623	/
Cumulative (%)	15.713	30.380	43.863	56.696	68.319	/

<sup>a</sup> Rotation converged in 6 iterations.

### Model Fit

Using CFA, two models were examined among undergraduate foreign language students in China (Sample two). The first model intended to validate the five-factor structure extracted from EFA. The Standardized Regression Weights of one item loaded on Factor<sub>self-confidence</sub> in Model One was at .464, lower than 0.50, showing weak factor loadings, which was discarded to improve the model fit (Hair et al., 2010). Then the retained 17 items were re-run with CFA in Sample Two, and the results were displayed in Fig. one. As Figure One showed, no negative error variance was found, the covariance matrix was a positive definite matrix, and all factor loadings between the latent variable and its measurement index were substantial (with a minimum of .665 and a maximum of .850) and statistically significant ( $p < .05$ ). These results provided solid support for the 17 items selected to symbolize the constructs (Wu, 2013).

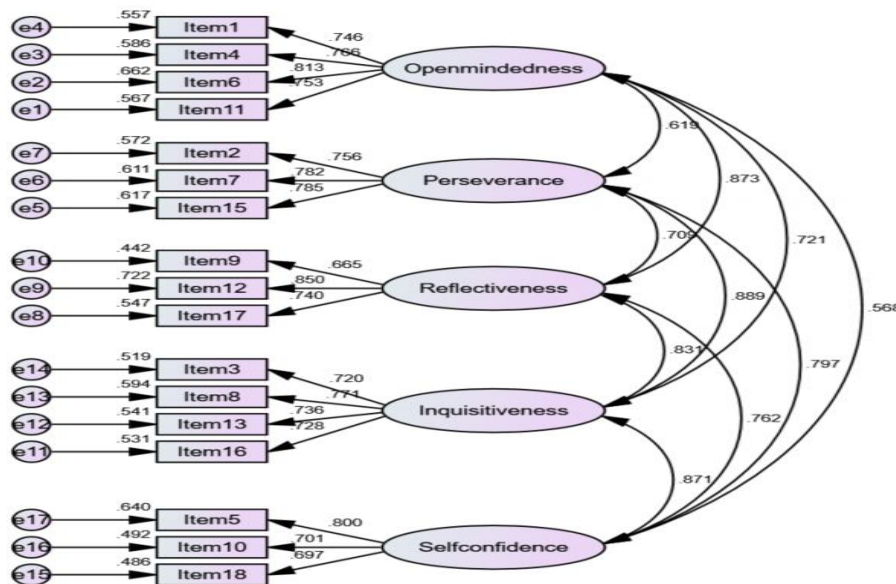


Figure 1. The schematic representation of critical thinking dispositions and the corresponding items

Additionally, the model fit results of the CFA for the CHCTDS were shown in Table four.



Given the size of the model and sample, the findings suggested that it was a model that adequately fitted the data:  $\chi^2/df = 3.492$ , IFI= .935, CFI= .934, NFI= .911, TLI= .918, RMSEA= .076, [90% CI: 0.067 ~ 0.084], and the overall model fit Chi-square value was insignificant,  $\chi^2 (136) = 4266.459, p=1.000 > .05$  (Kline, 2015) (see Table four). Based on the results of CFA, a five-factor model with 17 items was retained for the CHCTDS.

Table 4. Model fit results of confirmatory factor analysis for the CHCTDS (Sample 2; n=435)

Model	$\chi^2$	df	$\chi^2/df$	NFI	IFI	CFI	TLI	RMSEA [90% CI]
Cut value	/	/	< 4	> 0.90	> 0.90	> 0.90	> 0.90	< 0.80
17-item Model	380.588*	109	3.492	0.911	0.935	0.934	0.918	0.076 [0.067 ~0.084]

Default Model:  $\chi^2(136) = 4266.459, p=1.000$

Moreover, the model was evaluated for the Average Variance Extracted (AVE), and Composite Reliability (CR) to assess its convergent validity. The results of the validity assessment were shown in Tables five and six. As Table five showed, AVE values of all five factors were higher than .50 (AVE<sub>open-mindedness</sub> = .593, AVE<sub>perseverance</sub> = .600, AVE<sub>reflectiveness</sub> = .570, AVE<sub>inquisitiveness</sub> = .546, AVE<sub>self-confidence</sub> = .539). The value of CR ranged from .778 to .854, all larger than .70, demonstrating that the five latent factors in the CHCTDS were well explained by its observed variables. Furthermore, according to Table Six, discriminant validity between latent variables of the CHCTDS was confirmed since the absolute value of the correlational coefficient between each construct and the other construct was greater than the square roots of the AVE values of all the latent variables (Wu, 2013).

Table 5. Assessment of construct validity

Factor	AVE	CR
Open-mindedness	0.593	0.854
Perseverance	0.600	0.818
Reflectiveness	0.570	0.797
Inquisitiveness	0.546	0.828
Self-confidence	0.539	0.778

Table 6. Assessment of discriminant validity

	Factor1	Factor2	Factor3	Factor4	Factor5
Factor1	<b>0.770</b>				
Factor2	0.521**	<b>0.775</b>			
Factor3	0.724**	0.569**	<b>0.755</b>		
Factor4	0.616**	0.727**	0.683**	<b>0.739</b>	
Factor5	0.469**	0.628**	0.602**	0.697**	<b>0.734</b>

**Note:** Square roots of AVE values were presented in bold. \*\* Correlation is significant at the 0.01 level (2-tailed). Factor 1= Open-mindedness, Factor 2= Perseverance, Factor 3= Reflectiveness, Factor 4= Inquisitiveness, Factor 5= Self-confidence.

### Reliability

Then the reliability of the CHCTDS was examined, and the results were demonstrated in Table seven. As shown in Table Seven, the overall reliability of the 17-item CHCTDS was rated as very good ( $\alpha = .934$ ). The results of Cronbach’s Alpha test for all sub-scales were acceptable

(ranging from .776 to .851). The corrected item-total correlations (CITC) of all 17 items were larger than .50, and the Cronbach's Alpha of the corresponding item was not significantly improved if any item was deleted, indicating that the final version of the CHCTDS consisting of 17 items had an excellent internal consistency (Hair et al., 2010).

## Discussion

The purpose of the present article was to propose a Chinese scale of critical thinking disposition tailored for foreign language learners, the CHCTDS, and validate it among foreign language students using EFA and CFA on two separate samples. Results from these two analyses indicated that a five-dimensional structure of the CHCTDS presented a good fit with very good overall reliability for the scale ( $\alpha = .934$ ) and five sub-scales ( $\alpha = .776 \sim .851$ ) and validity. The CHCTDS is composed of 17 Chinese positively scored items measuring foreign language learners' five dispositions: open-mindedness, inquisitiveness, reflectiveness, perseverance, and self-confidence.

Table 7. Reliability and item-total statistics ( $n=435$ )

Item	CITC	Cronbach's Alpha if item deleted	Cronbach's Alpha
Open-mindedness ( $\alpha = .851$ )			
Item1	0.598	0.931	
Item4	0.611	0.931	
Item6	0.632	0.930	
Item11	0.649	0.930	
Perseverance ( $\alpha = .819$ )			
Item2	0.639	0.930	
Item7	0.638	0.930	
Item15	0.687	0.929	
Reflectiveness ( $\alpha = .792$ )			
Item9	0.572	0.932	
Item12	0.754	0.928	0.934
Item17	0.685	0.929	
Inquisitiveness ( $\alpha = .826$ )			
Item3	0.688	0.929	
Item8	0.697	0.929	
Item13	0.670	0.929	
Item16	0.687	0.929	
Self-confidence ( $\alpha = .776$ )			
Item5	0.673	0.929	
Item10	0.575	0.932	
Item18	0.597	0.931	

Table 7. Reliability and item-total statistics (n=435)

Item	CITC	Cronbach's Alpha if item deleted	Cronbach's Alpha
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In this paper, Factor One (open-mindedness) comprises four items representing foreign language learners' tendency to be flexible in cognition, not rigid in thinking (Dwyer et al., 2017), and language learning. They should stay open-minded to various points of view existing in different cultures while learning a foreign language, especially when those points of view contradict their own culture. Even though the description of open-mindedness in the current study is similar to the open-minded construct in the Delphi Report (APA, 1990), it is different from the one in Quinn et al. (2020), a multi-faceted construct not only encompassing open-mindedness but also truth-seeking and perseverance (Quinn et al., 2020). However, there is a conceptual overlap between the conceptualization of open-mindedness and the distinct construct of *perseverance* in the SENCTDS developed by Quinn et al. (2020).

Perseverance in the present paper emerges as a distinct construct consisting of three items in the CHCTDS. The inclusion of a perseverance disposition seems reasonable due to the research finding that perseverance was found to entail a drive to learn and work through challenging issues without relying on cognitive heuristics and shortcuts (Quinn et al., 2020), which will facilitate foreign language students to avoid cognitive biases (Willard & Norenzayan, 2013) in foreign language learning and less likely to for unusual beliefs such as belief in the paranormal (Quinn et al., 2020) when coming across exotic culture.

Reflectiveness (Factor three) is considered novel to the CCTDI but a common construct shared in the CTDS and SENCTDS. The element of reflectiveness is implicit in defining CT dispositions (e.g., McPeck, 1981; Sosu, 2013), and is regarded as a requirement for foreign language learners who have a disposition towards CT (Sosu, 2013). In the current paper, reflectiveness comprises three items representing a willingness to reflect on one's actions, attitudes, beliefs, and learning style.

Inquisitiveness in the current paper contains four items referring to a disposition to be curious and a desire to discover the answer to a problem and seek the truth with fair-minded and objective judgments. It shares a conceptual overlap with truth-seeking, an essential personality trait of the ideal critical thinker in the Delphi Report (APA, 1990) due to the truth-seeking attitude. Even though inquisitiveness is named as intrinsic goal motivation in the SENCTDS as it is argued that curious people are motivated by intrinsic goals such as knowledge and understanding (Quinn et al., 2020), Factor 4 in this paper is still called inquisitiveness as what it was in the CCTDI for the reason that intrinsic motivation is a much broader concept which can entail more intrinsic goals apart from gaining knowledge and understanding.

There are three Chinese scale items in the construct CT self-confidence (Factor five). Although it was argued CT self-confidence constituted desirable attributes but may not be characterized as an inclination to CT (Sosu, 2013), foreign language students who lack self-confidence would experience negative emotions such as fear of failure or humiliation and foreign language anxiety (Tunçel, 2015), which will affect their language learning motivation (Bong, 2008) and refrain them from speaking in a foreign language and participating in classroom activities.

## Conclusion

This study intends to report the reliability and validity of the freshly proposed critical thinking dispositional scale named the Chinese Critical Thinking Disposition Scale. It was conducted in the context of undergraduate foreign language learners in China employing exploratory and confirmatory strategies. The results revealed that the Chinese Critical Thinking Disposition Scale, a five-factor structure with 17 scale items, is valid and reliable in the Chinese language for assessing foreign language learners' dispositions towards critical thinking. Furthermore, the conceptualizations of five critical thinking dispositions (open-mindedness, reflectiveness, self-confidence, perseverance, and inquisitiveness) are provided in this paper, which will provide a valuable and suitable tool for advancing CT research in the area of teaching foreign languages.

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