

Individual differences in importance ratings of Chinese values and their associations with the Big Five of personality in Western and Eastern populations

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Abstract

Given the worldwide importance of Chinese culture, the present work revisited a questionnaire assessing individual differences in importance ratings of Chinese values and their associations with well-established personality traits in Western and Eastern populations.

Three samples were recruited and completed German ($N=813$), English ($N=404$), and Taiwanese/Chinese ($N=331$) language versions of the Chinese Value Survey (CVS) and the Big Five Inventory. After examining the factorial structure of the CVS in the three samples, we came up with a shortened—and although better than other factor models, still not optimal—version of the CVS consisting of 29 items and two factors. The factors were named *Chinese Traditionalism* and *Moral Integrity/Striving for Harmony*. Openness, Conscientiousness, and Agreeableness were positively linked to *Moral Integrity/Striving for Harmony* in each sample. Conscientiousness was positively linked to *Chinese Traditionalism* in all samples. Openness was inversely associated with *Chinese Traditionalism* in the two Western samples only. Frequently, effect sizes of correlations of Big Five domains with the *Moral Integrity/Striving for Harmony* scale were stronger than those with the *Chinese Traditionalism* scale.

In summary, across culturally diverse samples, the present study demonstrates a novel factorial structure of the CVS. However, the psychometric properties of the new-found CVS factor structure are not satisfactory. Given the heterogeneous findings on the CVS-factor structure across this and other studies, we suggest using other measures in future research to receive more in-depth knowledge on individual differences in importance ratings of Chinese values. Beyond discussing issues related to the CVS factorial structure, we provide first insights into associations between Big Five personality traits and importance ratings of Chinese values.

Keywords Chinese value survey · CVS · Big Five · Confucian values · Cross-cultural · Personality · Eastern · Western

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1 Introduction

Currently, Han-Chinese ethnicity represents the largest group of humankind with 1.3 billion individuals. Beyond China, Han-Chinese individuals live in other areas of the world, such as Taiwan¹ and Singapore. (Han-)Chinese culture, which is shaped by different ethnic groups in global human societies, is of growing importance worldwide. However, many individuals in the Western world still do not know much about values related to Chinese (and related) culture; or simplified: the Chinese ways of thinking (e.g., see literature on examples from Germany: Baron and Yin-Baron [1]; Klaus [2]). The lack of knowledge presents a tremendous issue because it is likely that the Western world will become more Chinese in terms of politics, economics, and cultural values in the course of the twenty-first century [3]. A good example of this is the road and belt initiative exporting Chinese thinking and values to the world [4]. Thus, there is a growing need to learn about Chinese culture and Chinese psychological approaches in the West. This is also true for Western psychologists, who mostly still rely on psychological constructs being designed by Western psychologists with research mainly based on Western samples [5]. Such an approach focusing on Western samples and models is problematic because if psychologists want to understand human thinking and behavior in its full variation, all ethnic groups and cultures must be taken into account in psychological research. We refer to this point later again in the context of the WEIRD-discussion [6].

Based on the aforementioned considerations, the main purpose of the present work is two-fold: To begin with, we want to better understand Chinese values by testing the applicability of a well-known measure of individuals' importance ratings of Chinese values in Western samples. In addition, by linking importance ratings of Chinese values to the prominent (Western) Five-Factor-Model of Personality/Big Five of personality, we want to unravel which (Western) personality traits are linked to embracing Chinese values. By investigating if there are links and how strong such links are between the (Western) Big Five personality traits and embracing Chinese values, similarities and differences between those constructs will become clearer.

1.1 Background

A prominent model derived from (Western) personality psychology is the Five-Factor Model of personality stating that human personality can be described based on five broad domains. This model is closely linked to the Big Five personality traits: Openness (to Experience), Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The Big Five are applied in many settings to understand the psychological basis of relevant life variables such as health outcomes [7], longevity [8, 9], or job performance [10]. Although the Big Five have been shown to be valid in several countries [11], recent research suggests that this might be restricted to WEIRD samples [12], hence, individuals from *Western, Educated, Industrialized, Rich, and Democratic* populations [6, 13]. In the context of the present work, it is of relevance to stress that especially the Big Five factor "Openness to Experience" does not seem to correlate with Chinese personality inventories. This lack of relations indicates that this personality domain does not represent an important factor in explaining personality in a Chinese cultural context [14]. Cheung et al. [15] summarize "that Openness is not commonly used as a distinct dimension in the taxonomy of personality traits in Chinese culture." (p. 103). Based on those discrepancies and the aforementioned conclusion, Western researchers need to learn about Asian approaches to assessing personality and related values to deal with the WEIRD problem.

One existing approach to assessing personality and related values in the Chinese context is the prominent measure *Chinese Personality Assessment Inventory* (CPAI) [16]. In addition, Monkhouse et al. [17] provided a self-report measure assessing core constructs of Confucian thought operationalized as person variables (*Face Saving, Humility, Group Orientation, Hierarchy, Reciprocity*). Kǒng Fūzǐ (孔夫子) lived about 2500 years ago in China. He came up with perhaps the most important Eastern philosophy on how to establish harmony in society [18]. Although the interpretation of Confucian philosophy changed strongly over the centuries [19], it still plays a pivotal role in modern China and other Chinese imprinted places such as Taiwan and Singapore. In line with this, it is not surprising that individual differences in embracing Confucian values can also be assessed via different self-report measures, like the one by Monkhouse et al. [17].

¹ Against the evolving conflict between China and Taiwan, we mention that we mostly use the term "Chinese" in this paper to describe "classic" Chinese values. This also applies to the questionnaire called "Chinese Value Survey" used in the present work to assess Chinese values. Those Chinese values also happen to be prevalent in places aside from Mainland China. Moreover, Chinese values can also be lived by non-Han-Chinese ethnic groups inside and outside of Mainland China. In line with that, we use the term "Chinese" independently of current geographical conflicts. Further, we do not want "Chinese values" to be reduced to a certain ethnic group because values are among others shaped by environmental influences.

Aside from the CPAI and Monkhouse's inventory, there is the Chinese Value Survey (CVS). This survey measure can be administered to assess individual differences in individuals' importance ratings of Chinese values [20]. In the initial publication, the CVS was reported to comprise four factors labeled *Integration*, *Confucian Work Dynamism*, *Human-Heartedness*, and *Moral Discipline*. *Integration* relates to valuing factors stabilizing social relationships. *Confucian Work Dynamism* relates to valuing power distance and acting without hurting others' feelings ("saving face"). *Human-Heartedness* is related to values related to being kind, righteous, and patient. Finally, *Moral Discipline* is associated with valuing being prudent, having a tight grip on one's own desires (self-control), and being modest. In a later work by Matthews [21], a different factorial structure of the CVS than the one originally proposed by the Chinese Culture Connection [20] was reported. Specifically, Matthews [21] identified four factors labeled *Integrity and Tolerance*, *Confucian Ethos*, *Loyalty to Ideals and Humanity*, and *Moderation and Moral Discipline*. Moreover, the CVS has been further investigated: Lo [22] used the same measure as the Chinese Culture Connection [20] and Matthews [21] but found again another factorial structure: Five factors labeled *Trustworthiness*, *Purity and Order*, *Confucian Tradition*, *Status*, and *Social Harmony* were proposed. Lo [22] mentioned that the "CVS may benefit from further validation and testing of its psychometric properties" (p. 5).

For the present work, we chose to apply the CVS. This is because the tool assesses individual differences in importance ratings of Chinese values taking a broader look at Chinese values without too narrowly focusing on Confucian philosophy only. Such a view will be supplemented in the present work by also studying the Big Five of personality, which have been originally carved out in Western populations. Please note that we investigate associations between the Big Five personality traits and CVS, instead of investigating Big Five associations with Chinese personality questionnaires in the present work, because it has been put forward that personality and value ratings might overlap (see more details in the next section).

1.2 Aims of the present study

In line with the aforementioned issues related to its factorial structure [20–22], the first aim of this work was to test the factorial structure of the CVS. At first, the structure should be examined in a sample closely related to Chinese culture and speaking Chinese, which is the original language of the CVS; we chose a Taiwanese sample. The generalizability (i.e., measurement invariance) of the CVS factorial structure was additionally planned to be tested in Western samples (German- and English-speaking). Such an analysis supports an understanding of whether the same importance of Chinese values ratings structure can be found when using the CVS in Eastern and Western samples.

The second aim of the present work was to investigate associations of the CVS with the Big Five personality traits in both an Eastern and Western samples. This investigation can support an understanding of putative relations and overlaps between importance ratings of Chinese values and the Western Big Five personality traits. To the best of our knowledge, no previous work has investigated the links between the Big Five and the CVS. A study by Ishibashi and Kottke [23] administered both a Big Five measure and the CVS, but (a) the Big Five were assessed to describe the "perfect" leader in work and organizational settings, and (b) the Big Five were not correlated with the CVS in this previous work. Moreover, this previous paper had a focus on Japanese vs. Chinese culture and is, therefore, not discussed further at this point. We believe a study on the associations between the Big Five and the CVS to be of high relevance. Aside from our main research objectives discussed above, the present results can inform human-resources departments about which kind of Big Five personality trait constellations are associated with a higher importance rating of classic Chinese values. This can be crucial to choose the right personnel as expats to work in a Chinese cultural setting or to negotiate business deals with Chinese colleagues. Beyond this, establishing correlations between the Big Five and individual importance ratings of Chinese values can support informing Western researchers more about the actual meaning of Chinese values by understanding their overlap with a prominent Western personality model. Also conceptually the study of relations between the Big Five and the importance of (Chinese) values seems crucial because earlier work demonstrates that these constructs might be (a) overlapping [24] and (b) both possess a trait-like character in terms of stability [25].

2 Methods

2.1 Procedure

Data collection for the present work was implemented in German, English, and Taiwanese (i.e., Chinese) language. The German and English data collection was conducted via openly available online platforms investigating among others

technology use and the inventories of interest in the present work. Based on that, diverse populations in terms of age, gender, and education were recruited. These German and English samples (with mixed cultural backgrounds) were chosen as exemplary Western samples. In Taiwan, the study was an online questionnaire being advertised in a university setting where mostly students participated.

The study's procedure was in accordance with the latest revision of the Declaration of Helsinki. Asking for demographic information, applying the Big Five Inventory (BFI) and the CVS (see paragraph on self-report measures) in two online surveys (German and English) was approved by the local ethics committee at Ulm University, Ulm, Germany as part of a larger research project; see overlaps with other publications mentioned in the Supplementary Material (SM). For the Taiwanese survey, an extra IRB procedure was not deemed necessary. This was because of the already existing IRB approval for the German and English language surveys and because we followed procedures in line with the latest revision of the Declaration of Helsinki. All participants gave informed electronic consent prior to participation.

2.2 Participants

After data cleaning (see SM for further information), a final sample of $N = 813$ ($n = 365$ males, $n = 448$ females) German-speaking participants remained for final analyses. The mean age of this sample was 33.63 years ($SD = 11.52$) with a median of 31 years and a range from 18 to 81 years. Most of the participants stated A-Level/High School Diploma (from German "Abitur"; $n = 188$) or university (including university of applied sciences) degree ($n = 504$) as their highest educational degree. Most participants stated to be from Germany ($n = 785$).

For the English-language sample, a final sample size of $N = 404$ ($n = 299$ males, $n = 105$ females) participants remained for the analyses after data cleaning (see SM). The mean age of this sample was 26.44 years ($SD = 7.68$) with a median of 24 years and an age range from 18 to 55 years. Most of the participants stated High School Diploma ($n = 124$) or a university degree (Bachelor's or Master's; $n = 190$) as their highest educational degree. Most participants were from (country of residence) France ($n = 91$), followed by Poland ($n = 30$), Austria ($n = 28$), and Spain ($n = 27$).

For the analyses of the Taiwanese (i.e., Chinese language) part of the study, a final sample of $N = 331$ ($n = 118$ males, $n = 213$ females) Taiwanese participants remained after data cleaning (see SM). The mean age of this sample was 20.16 years ($SD = 2.27$) with a median of 20 years and an age range from 18 to 37 years. Most of the participants were college students ($n = 313$) and most were Han-Chinese ($n = 323$).

2.3 Self-report measures

2.3.1 Chinese Value Survey

The CVS [20] was used to assess individual differences in the Chinese value system via importance ratings. For the German-language survey, the introduction and items were translated into German by the research team. More specifically, the text was translated from English to German and from German back to English by two independent researchers. Afterward, the original English version and the retranslated version were checked for compatibility and discussed. Changes were implemented in the translated German items wherever necessary. For the English-language survey, the English version [20, 21] was used. In the Taiwanese survey, the original Chinese version (adjusted by using Taiwanese characters) published by the Chinese Culture Connection [20] was applied. The questionnaire consists of 40 items answered on a 9-point rating scale ranging from 1 = "of no importance to me at all" to 9 = "of supreme importance to me".

2.3.2 Big Five Inventory

The German [26], English [27], and Chinese [28] versions of the Big Five Inventory (BFI) were used in the present German-, English-, and Taiwanese-language surveys to assess the Big Five of personality. The questionnaire consists of 44 items answered on a 5-point Likert scale from 1 = "disagree strongly", to 5 = "agree strongly". The German version includes one additional 45th item. This item is not included in the present analyses for closer comparability. Moreover, sub-scales can be built for each of the broad Big Five domains but are not of interest for the present work. Cronbach's α 's of the scales were: 0.80/0.76/0.82, 0.83/0.80/0.80, 0.87/0.84/0.75, 0.72/0.74/0.69, 0.84/0.86/0.76, for Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism in the German-, English-, and Taiwanese-language samples, respectively.

2.4 Statistical analyses

All statistical analyses were implemented in R version 4.1.0 [29] and R-Studio version 1.4.1106 [30]. Among others, the following packages were used: readxl [31], dplyr [32], psych [33], Hmisc [34], lsr [35], careless [36], ppcor [37], lavaan [38], and semTools [39].

2.4.1 First research aim: investigating the underlying structure of the Chinese Value Survey

To investigate the factorial structure of the CVS, first, confirmatory factor analyses (CFA) in the samples derived from the German, English, and Taiwanese surveys were conducted. In detail, the models as proposed by the Chinese Culture Connection [20], Matthews [21], as well as by Lo [22] were tested for their fit in the present samples. The exact methods and results are presented in the SM. None of the models proposed in these earlier works showed an adequate fit in any of the samples of the present work.

Based on those findings, we conducted an exploratory factor analysis (EFA) on data of the Taiwanese sample and tested the derived structure in the German- and English-language samples via CFA. The factorial structure was examined in the Taiwanese sample first because it reflects the cultural background from which the CVS stems most closely. Thus, finding a structure fitting to the data of this sample seemed most important. The fit values observed in the German and English-language samples were non-satisfactory. Details on the methodological approach and results are presented in the SM.

Finally, we conducted principal component analyses (PCA) in each sample separately and searched for items loading together on the same component throughout all samples. Screeplots were used to detect the number of components to extract. Because more than one component was extracted, a promax rotation was used based on the work by Lo [22]. Based on the PCA, in each sample the highest absolute loading of each item was used to assign the item to one component. If an item showed loadings of similar size on more than one component (difference in highest loadings ≤ 0.05), an assignment to all those components was deemed possible. Further, based on the loadings of the items in each of the three samples, clusters of items were selected, that loaded together on one component in the same direction in all samples. The items, which showed similar highest absolute loadings on two components in one of the samples were assigned to the component, to which the item was classified in the other two samples, if possible. This led to two clusters of items which consistently loaded on the same component in all samples.

Finally, this two-cluster structure derived from the PCA was tested via CFA which led to unsatisfactory fit values in each sample, again. Nevertheless, the model fit was still slightly better than, for example, the model fit of the model derived from the EFA-built model mentioned above. Moreover, the components were interpretable. Therefore, we decided to proceed with the two scales derived from the PCA but want to mention that results need to be interpreted cautiously given the non-satisfactory fit values.

2.4.2 Second research aim: analyses on the newly derived scales of the Chinese Value Survey in relation to individual differences variables

2.4.2.1 Descriptive statistics, associations with age and gender All distributions of the scales under investigation, except the CVS I: *Moral Integrity/Striving for Harmony*, showed a skewness and kurtosis of less than ± 1 in each of the three samples; even when additionally splitting the samples by gender. Accordingly and in line with the rule of thumb by Miles and Shevlin [40], normality was not assumed for the CVS scale I: *Moral Integrity/Striving for Harmony*. The scores in this scale were Blom transformed in the samples of the German, English, and Chinese language parts of the study, separately. This led to skewness and kurtosis below ± 1 and the histograms revealed an approximate normal distribution of these transformed scores. Given that normality could be assumed for all scales except the CVS scale I: *Moral Integrity/Striving for Harmony* (but for the respective transformed scale), parametric tests were performed. Results of the CVS scale I: *Moral Integrity/Striving for Harmony* based on the transformed scores are presented alongside the results of the original scale. All statistical tests for significance were implemented two-sided.

Descriptive statistics are presented in the main manuscript, but methods applied, and results found for associations with age and gender as well as results related to comparing the three samples are detailed for the interested reader in the SM.

2.4.2.2 Associations with the Big Five Inventory Lastly, correlations between BFI and CVS scales were calculated by means of Pearson correlations in each sample. As there were only slight differences in the correlations depending on whether age was included as a covariate or not, it was decided to present zero-order Pearson correlations.

3 Results

3.1 First research aim: the underlying structure of the Chinese Value Survey

The analysis in course of the PCA revealed that in the German-language sample, 9 components had an eigenvalue exceeding 1; 10 and 7 components had an eigenvalue exceeding 1 on the English- and Taiwanese-language samples, respectively. Because the screeplots derived from each of the three samples allowed for a two-component solution (one time also a one- and one time a three-component solution was possible), a two-component solution was forced in further analyses. The results are presented in Table 1.

Based on the loadings, two clusters of items could be identified. These were labelled I: *Moral Integrity/Striving for Harmony* (items 04, 05, 09, 10, 11, 13, 18, 19, 21, 24, 25, 28, 29, 30, 32, 36), and II: *Chinese Traditionalism* (items 01, 06, 14, 16, 20, 23, 26, 27, 34, 35, 37, 38, 39); items not included in these two dimensions did not load strongly on the same component across all three samples.

Testing the model fit of the model including the newly proposed two clusters (*Moral Integrity/Striving for Harmony*, *Chinese Traditionalism*) derived from the PCA by means of CFAs on the present samples did still not yield a satisfactory model fit (see Table 2); although the model was built based on the data of the present samples.

In summary, it was decided to conduct further analyses using the novel structure with two scales labelled *Moral Integrity/Striving for Harmony* and *Chinese Traditionalism* because the model fit was better than for other models (see SM). However, it was still non-satisfactory in any of the samples.

3.2 Second research aim: results on the Chinese Value Survey scales in relation to individual differences variables

3.2.1 Descriptive statistics, associations with age, and differences between genders and study samples

Descriptive statistics of all variables of interest in all samples are presented in Table 3. Statistical results on relations with age, gender, and personality in the different study samples are presented in the SM.

3.3 Correlations between the Chinese Value Survey and the Big Five Inventory scales

Correlations between the BFI and CVS scales (including the Blom transformed scale) are presented in Table 4. CVS scale I: *Moral Integrity/Striving for Harmony* correlated significantly positively with Openness, Conscientiousness, and Agreeableness across all three samples (even after Bonferroni correction). Of these associations, only the correlation of CVS scale I: *Moral Integrity/Striving for Harmony* with Agreeableness differed significantly between samples: the correlation found in the English-language sample was significantly higher than in the other two samples (p 's < 0.001). CVS scale II: *Chinese Traditionalism* correlated significantly negatively with Conscientiousness across all three samples (even after Bonferroni correction). This correlation did not significantly differ between groups.

4 Discussion

The present study aimed at (i) reinvestigating the structure of a classic self-report measure assessing individual differences in importance ratings of Chinese values and (ii) associating scales of this measure with the Big Five personality traits. Considering the growing importance of Chinese culture in economic and political settings worldwide, such a measure is of relevance for understanding whether individuals with certain psychological characteristics (e.g., personality traits) might embrace classic Chinese cultural values more than others. To the best of our knowledge, this is

Table 1 Results of the principal component analyses

	<i>I: Moral Integrity/Striving for Harmony</i>			<i>II: Chinese Traditionalism</i>		
	GER	ENGL	TAIW	GER	ENGL	TAIW
CVS 01	-0.027	0.120	0.095	0.610	0.523	0.483
CVS 02	0.158	0.154	0.647	0.463	0.375	0.060
CVS 03	0.722	0.752	0.240	-0.337	-0.318	0.467
CVS 04	0.459	0.815	0.340	0.088	-0.219	0.239
CVS 05	0.397	0.635	0.567	0.184	-0.018	0.156
CVS 06	0.150	0.173	0.007	0.583	0.526	0.663
CVS 07	-0.056	0.114	0.635	0.635	0.454	0.096
CVS 08	0.228	0.187	0.600	0.446	0.320	0.099
CVS 09	0.652	0.752	0.424	-0.123	-0.142	0.329
CVS 10	0.540	0.475	0.531	-0.136	-0.101	0.080
CVS 11	0.648	0.709	0.443	-0.246	-0.177	0.289
CVS 12	0.472	0.457	0.338	0.057	0.139	0.421
CVS 13	0.293	0.459	0.694	0.162	-0.011	0.024
CVS 14	-0.278	-0.122	0.141	0.634	0.603	0.636
CVS 15	0.601	0.263	0.289	-0.178	0.297	0.384
CVS 16	0.185	0.273	0.231	0.493	0.265	0.513
CVS 17	0.374	0.310	-0.199	-0.142	-0.092	0.691
CVS 18	0.400	0.492	0.755	0.247	0.114	-0.052
CVS 19	0.671	0.625	0.575	-0.257	-0.152	0.153
CVS 20	-0.144	-0.119	0.124	0.739	0.683	0.535
CVS 21	0.662	0.623	0.650	-0.113	-0.018	0.029
CVS 22	0.439	0.179	0.173	0.131	0.414	0.547
CVS 23	0.184	0.118	0.302	0.364	0.338	0.422
CVS 24	0.462	0.412	0.876	0.220	0.236	-0.216
CVS 25	0.515	0.618	0.940	-0.001	0.026	-0.270
CVS 26	-0.117	-0.030	0.143	0.526	0.390	0.423
CVS 27	-0.330	-0.309	-0.177	0.662	0.619	0.701
CVS 28	0.322	0.552	0.790	0.178	-0.075	-0.216
CVS 29	0.579	0.351	0.699	0.064	0.341	0.041
CVS 30	0.681	0.504	0.872	0.008	0.060	-0.269
CVS 31	0.054	0.143	0.412	0.491	0.339	0.242
CVS 32	0.417	0.560	0.773	0.361	0.198	-0.036
CVS 33	0.394	0.221	0.098	0.123	0.180	0.656
CVS 34	-0.275	-0.251	-0.277	0.754	0.777	0.906
CVS 35	-0.071	-0.194	-0.492	0.662	0.644	0.811
CVS 36	0.526	0.426	0.502	-0.067	-0.002	0.103
CVS 37	-0.293	-0.204	0.001	0.518	0.683	0.728
CVS 38	0.039	-0.123	-0.153	0.221	0.463	0.739
CVS 39	0.029	-0.073	-0.167	0.569	0.734	0.778
CVS 40	-0.017	-0.145	0.339	0.452	0.344	-0.076
Eigenvalue	7.30	8.20	14.31	5.25	3.86	3.27

GER German, ENGL English, TAIW Taiwanese study sample

Bolded numbers indicate the strongest loading of the respective item on the component (promax rotation; standardized loadings based on pattern matrix)

If an item loaded high on two components with similar size (difference ≤ 0.050), both loadings are written in bold letters

Underlined loadings indicate items loading high on the same component in all samples; these items were chosen to build the scale score of the respective dimension

Eigenvalues are derived from non-rotated results

Table 2 Fit values (derived from confirmatory factorial analyses) and internal consistency estimates (Cronbach's alphas) of the newly proposed model/scales

	German	English	Taiwanese
Model based on principal component analyses	CFI=0.735 TLI=0.714 RMSEA=0.072 SRMR=0.091 α I: 0.83, α II: 0.82	CFI=0.753 TLI=0.733 RMSEA=0.072 SRMR=0.082 α I: 0.87, α II: 0.81	CFI=0.796 TLI=0.780 RMSEA=0.086 SRMR=0.080 α I: 0.92, α II: 0.88

α I refers to Cronbach's alphas of the scale I: *Moral Integrity/Striving for Harmony*

α II refers to Cronbach's alphas of the scale II: *Chinese Traditionalism*

CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

the first investigation of these associations. To specify the most important research objectives in more detail: We were interested to understand if the same factor structure would appear when Western samples and an Eastern sample completed the CVS. Such an analysis supports an understanding of how universal Chinese values and associated importance ratings are; in the context of the Big Five, it has been put forward that they cannot be easily captured in all non-WEIRD samples [12]. Beyond this, we were interested to investigate how strong the relations, i.e., overlaps, between the CVS scales and the Big Five are, in order to investigate the convergence versus differences of importance ratings of Chinese values and the Western Big Five.

We recruited three samples to complete the CVS to investigate its structure across different cultures. Given that earlier works by the Chinese Culture Connection [20], by Matthews [21], and by Lo [22] revealed inconsistencies with regard to the factorial structure, we aimed to find a valid solution by comparing the factorial structure of the CVS among German-, English-, and Taiwanese- (i.e., Chinese) speaking samples (administered in the respective languages). Such a cross-cultural strategy enables researchers to search for a factorial structure of the CVS being valid across the investigated samples stemming from diverse cultural backgrounds.

The results of factor analyses across the different language versions of the CVS in the present data sets revealed that none of the previously found structures could be replicated in any of the present samples [20–22]. When searching for consistency across the data sets of our recruited samples (of note, also being much larger than the samples in previous works) by means of PCA, we observed a two-component structure including a subset of 29 out of originally 40 items. We labelled these two components *Moral Integrity/Striving for Harmony* (sixteen items) and *Traditionalism* (thirteen items). This structure was further tested in additional statistical analyses, i.e., confirmatory factor analyses. The observed fit indices for the novel two-factorial structure were non-satisfactory in any of the samples; but still better than the fit values of models found in previous works. Given the non-satisfactory fit values, no measurement invariance was assessed. Overall, the structure of the CVS seems to be vastly different across samples. Therefore, we clearly draw attention to the fact, that the discussion of the following results needs to be interpreted carefully and the low fit values need to be considered. We also argue already at this point that the heterogeneity in factor structures across samples of studies and the insufficient model fits speak against the use of the CVS in the future.

Despite these psychometric issues, we calculated further analyses including the newly proposed two factors: the *Chinese Traditionalism* factor of the CVS deals with the attitude of a person towards (accepting) power distance and Chinese traditional values. As has been prominently discussed in Hofstede's work, Western societies differ from Eastern (e.g., Chinese and Taiwanese) societies in terms of power distance [41]. This can result in higher acceptance of greater power distance in the realm of government to people, scholar to the student, and father to son in Eastern societies in individuals. In this context, we explicitly mention the necessity to also take a closer look at normative and evaluative views on this complex topic [42]. In light of the construct of power distance, it is important to note that Confucian philosophy aims to uphold harmony in society by obedience [18]. This in turn could be a driving force toward higher acceptance of power distance in Chinese society and individuals. Support for this notion comes from our data, where higher scores in the factor *Chinese Traditionalism* could be observed in the Taiwanese sample compared to both samples from the Western hemisphere (see also statistical comparison in the SM). Given the differences in sociodemographic variables and issues with the model fit including lack of measurement invariance (see above) across the investigated samples, we do not want to overinterpret these findings, though. Mean value comparisons between study samples need to be interpreted cautiously, here. As power distance is a part of classic Chinese traditional values it does not come as a surprise that items linked to power distance (e.g., loyalty to superiors) load on the same factor as items linked to Chinese tradition (e.g., protecting one's face). The second factor found in the present work includes items reflecting attitudes

Table 3 Descriptive statistics of all scales under investigation in the German, English, and Taiwanese (i.e., Chinese) language study samples

	German			English			Taiwanese		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
BFI									
Openness	3.69 (0.61)	3.72 (0.61)	3.66 (0.61)	3.69 (0.61)	3.64 (0.58)	3.83 (0.67)	3.43 (0.64)	3.39 (0.61)	3.45 (0.65)
Conscientiousness	3.54 (0.66)	3.39 (0.68)	3.66 (0.62)	3.24 (0.71)	3.26 (0.72)	3.17 (0.65)	3.15 (0.61)	3.09 (0.57)	3.19 (0.63)
Extraversion	3.42 (0.79)	3.28 (0.80)	3.54 (0.76)	2.87 (0.83)	2.84 (0.82)	2.94 (0.84)	2.99 (0.65)	2.96 (0.60)	3.01 (0.67)
Agreeableness	3.56 (0.55)	3.48 (0.54)	3.62 (0.55)	3.62 (0.64)	3.62 (0.62)	3.64 (0.70)	3.62 (0.54)	3.55 (0.53)	3.66 (0.55)
Neuroticism	2.88 (0.76)	2.67 (0.75)	3.06 (0.72)	2.93 (0.89)	2.78 (0.88)	3.35 (0.76)	3.21 (0.67)	3.15 (0.65)	3.25 (0.69)
CVS									
I: Moral Integrity/Striving for Harmony	7.18 (0.76)	7.13 (0.79)	7.22 (0.74)	7.05 (1.04)	7.03 (1.05)	7.11 (1.00)	7.15 (0.99)	7.03 (1.10)	7.22 (0.91)
II: Moral Integrity/Striving for Harmony (blom transformed)	0.00 (1.00)	-0.08 (1.01)	0.06 (0.99)	0.00 (1.00)	-0.02 (1.01)	0.06 (0.96)	0.00 (0.99)	-0.12 (1.11)	0.06 (0.91)
III: Chinese Traditionalism	4.01 (1.09)	3.99 (1.05)	4.03 (1.13)	4.79 (1.30)	4.90 (1.28)	4.48 (1.32)	5.77 (1.20)	5.80 (1.23)	5.76 (1.18)

Table 4 Zero-order bivariate Pearson correlations between Big Five Inventory and the Chinese Value Survey scales

	I: Moral integrity/striving for harmony	I: Moral integrity/striving for harmony (Blom transformed)	II: Chinese traditionalism
German-language sample			
Openness	$r=0.18$, $p<0.001$	$r=0.20$, $p<0.001$	$r=-0.17$, $p<0.001$
Conscientiousness	$r=0.23$, $p<0.001$	$r=0.23$, $p<0.001$	$r=0.15$, $p<0.001$
Extraversion	$r=0.14$, $p<0.001$	$r=0.15$, $p<0.001$	$r=0.04$, $p=0.281$
Agreeableness	$r=0.17$, $p<0.001$	$r=0.19$, $p<0.001$	$r=-0.07$, $p=0.054$
Neuroticism	$r=-0.03$, $p=0.335$	$r=-0.04$, $p=0.202$	$r=0.04$, $p=0.218$
English-language sample			
Openness	$r=0.22$, $p<0.001$	$r=0.21$, $p<0.001$	$r=-0.012$, $p=0.017$
Conscientiousness	$r=0.23$, $p<0.001$	$r=0.25$, $p<0.001$	$r=0.20$, $p<0.001$
Extraversion	$r=0.15$, $p=0.003$	$r=0.15$, $p=0.002$	$r=0.04$, $p=0.378$
Agreeableness	$r=0.48$, $p<0.001$	$r=0.49$, $p<0.001$	$r=0.07$, $p=0.154$
Neuroticism	$r=-0.13$, $p=0.007$	$r=-0.13$, $p=0.008$	$r=-0.01$, $p=0.781$
Taiwanese-language sample			
Openness	$r=0.16$, $p=0.003$	$r=0.16$, $p=0.003$	$r=0.05$, $p=0.397$
Conscientiousness	$r=0.21$, $p<0.001$	$r=0.22$, $p<0.001$	$r=0.22$, $p<0.001$
Extraversion	$r=0.08$, $p=0.135$	$r=0.08$, $p=0.133$	$r=0.06$, $p=0.304$
Agreeableness	$r=0.29$, $p<0.001$	$r=0.28$, $p<0.001$	$r=0.18$, $p<0.001$
Neuroticism	$r=-0.08$, $p=0.160$	$r=-0.08$, $p=0.165$	$r=-0.10$, $p=0.059$

After Bonferroni correction ($0.050/(3 \times 5) = 0.0033$), not all significant associations remain significant

toward moral discipline and being a reliable person. This factor might be less “typically Chinese”, because differences in the scores underlying this factor between our investigated culturally diverse samples are less pronounced. But again, given the differences in sociodemographic variables and lack of measurement invariance across samples, this result should be interpreted cautiously.

A second aim of the study was to investigate how the Big Five personality traits would map onto the novel version of the CVS. Both in the German and English study samples scoring high on Conscientiousness and low on Openness to Experience (but see multiple testing issues) was associated with higher scores on the CVS scale *Chinese Traditionalism*. In the Taiwanese sample, a positive relation between Conscientiousness and Chinese Traditionalism was observed as well. Although highly significant, these associations were weak in terms of their effect sizes in both samples. Therefore, the Big Five only play a minor role in detecting individuals with positive attitudes to the concept of power distance and Chinese tradition. Interestingly, in the Taiwanese sample only, Agreeableness was positively linked to higher importance ratings of *Chinese Traditionalism*. However, regarding *Chinese Traditionalism*, both higher Conscientiousness and lower Openness to Experience might be the most relevant predictors of a positive attitude toward traditional Chinese values, as indicated by several observed correlations (but see no association between Openness to Experience and *Chinese Traditionalism* in the Taiwanese sample). Nevertheless, the mostly small associations found between the CVS and the Big Five suggest large differences between the two approaches to assessing Chinese values versus grasping Western Big Five personality traits.

Higher scores on the CVS scale *Moral Integrity/Striving for Harmony* were associated with higher Conscientiousness (as has been seen with the CVS scale *Chinese Traditionalism*) and with higher Openness to Experience and higher Agreeableness scores in all samples. Following this, the personality dimension Openness to Experience might pose problems for psychodiagnosticians, because contrary effects are observed for its associations with the two CVS scales in Western samples (positive with the *Moral Integrity/Striving for Harmony* factor, negative with the *Chinese Traditionalism* factor).

In line with those findings, choosing an individual with lower scores in Openness to Experience might or might not come with costs when recruiting individuals to work in a Chinese cultural setting. This is because high scores in Openness to Experience have been positively associated with adjustment in international assignments (hence getting better along abroad; Huang et al. [43]). Therefore, on the one hand, Openness to Experience is judged positively considering a better adjustment to international assignments. On the other hand, high scores in Openness to Experience might also come at costs in Chinese settings, because it seems to be associated with less acceptance of *Chinese Traditionalism* in Western individuals. Such a trade-off needs to be carefully considered in applied contexts. With respect to *Moral Integrity/Striving for Harmony*, it is of interest that Trustworthiness (a facet of the aforementioned factor, but different inventory) has been associated with higher scores in Agreeableness and Conscientiousness in a work by Evans and Revelle [44]. As mentioned before, in the present work not only a positive association between *Moral Integrity/Striving for Harmony* and Conscientiousness and Openness to Experience could be observed, but also a positive association between *Moral Integrity/Striving for Harmony* and Agreeableness in all samples. Interestingly, this association was more than twice as large in the English-language sample compared to the German-speaking sample (0.48 vs. 0.17) and also substantially higher in the English-language sample compared to the Taiwanese (0.48 vs. 0.29). Therefore, this finding should be followed up in future research to seek replication.

Limitations of the present study should also be mentioned. First, the study used self-report measures. Such measures are prone to bias but are important to ask individuals about their subjective value propositions. Second, the study is of correlational nature and no causal conclusions can be drawn. Third, the English-speaking sample was a culturally-mixed sample and future studies should focus on countries such as USA or UK exclusively; hence, culturally more tightly defined samples. Fourth, the Taiwanese sample is smaller than the other samples. Although the sample size provided sufficient power to answer our research questions, future studies might want to aim for larger and more heterogeneous samples. In addition, in the context of the Big Five, it would be interesting to also apply measures such as the CPAI in both Western and Eastern samples to carve out similarities and differences in future works.

The next step for future research is to recruit samples from mainland China. Though Taiwan and Mainland China share the same cultural and historical background, both have developed their own unique social and political system. Mainland China has been ruled by the Communist Party since 1949, whereas Taiwan has developed a democratic political system [45]. Confucianism had been seriously attacked in Mainland China during the Cultural Revolution occurring between 1966 and 1976, which influenced all aspects of life. Of note and in line with this, studies showed significant differences in some aspects of moral and work values of adolescents and college students between Mainland China and Taiwan [46, 47]. Nevertheless, the influence of Confucianism is still strongly felt in Modern Mainland China. As for Taiwan, Confucianism has also been playing an important role in shaping people's values and behaviors until this day [48].

In addition, it is worth noting that beyond the focus on the CVS and the Big Five in the present work, other interesting frameworks exist, which can be studied in the future. For instance, it would be highly interesting to study Schwartz's value theory also in the context of the Chinese value system. It seems interesting to investigate how Schwartz's value dimensions such as stimulation, hedonism, conformity, and benevolence map onto the Chinese values (see also an interesting work applying Schwartz's values in a Chinese sample by Li [49]). Finally, we mention again that the present findings must be interpreted considering the insufficient psychometric properties of the CVS.

5 Conclusion

The present study proposes a new factorial structure of the CVS, which has been derived from the study of three samples with different cultural backgrounds. Unfortunately, however, even this factorial structure is not satisfying according to CFA results. Based on our findings, we propose using other measures in the future to get insights into Chinese values, but it is also true that alternatives to do so are rare for now. Beyond that, we sum up that meaningful associations between the Big Five and CVS could be carved out (but with small effect sizes speaking for large differences between Western and Eastern investigated constructs), which might guide research with the aim to link Big Five with attitudes towards Chinese values.

But again, the associations between Chinese values and the Big Five need to be reinvestigated with a psychometrically more appropriate measure for assessing Chinese values (perhaps the measure put forward by Monkhouse et al. [17]).

Author contributions CM designed the present study. CS drafted the first version of the method and results section, whereas CM wrote the first draft of the introduction and discussion section. CS ran the statistical analysis. The German version of the CVS was back- and forth-translated by CM and CS (see methods). The German- and English-speaking samples were recruited by CM, whereas the Taiwanese samples were recruited by HCK. All authors read and approved the final manuscript.

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Data availability The data is available here: <https://osf.io/e7gb3>.

Declarations

Ethics approval and consent to participate The German- and English-language parts of study were approved by the local ethics committee at Ulm University, Ulm, Germany as part of a larger research project. For the Taiwanese survey an extra IRB procedure was not deemed necessary given the already existing IRB approval for the German and English surveys and following procedures in line with the latest revision of the Declaration of Helsinki. All participants gave informed electronic consent prior to participation.

Competing interests The authors declare no competing interests.

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