



Latent profile analysis of personal values among Chinese college students: associations with mental health disorders and life satisfaction

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Abstract

Interindividual differences in personal values are prevalent both within and across societies. Interindividual differences in personal value and the relationships with mental health disorders and life satisfaction remain to be holistically considered, especially in China. The present study aims to characterize personal value profiles based on Schwartz's theory model and to examine differences in several mental health-related disorders and life satisfaction potentially across these profiles. Using convenience sampling, a sample of 8,540 Chinese college students ($M_{\text{age}} = 18.89$, $SD_{\text{age}} = 2.02$, 57.7% male) from three universities completed a questionnaire assessing personal values, internalizing problems, externalizing problems, substance disorders, crime/violence, and life satisfaction. The latent profile analysis identified five personal value profiles, which were labelled as traditional social orientation, open personal orientation, open social orientation, moderate traditional social orientation, and average. Chinese college students in the three social orientation profiles reported low mental health disorders and high life satisfaction. In contrast, students in the personal orientation profile reported high mental health disorders and low life satisfaction. The results indicate the heterogeneity of Chinese college students' personal values and the positive relationship of social-oriented values with mental health and life satisfaction in collectivist cultures.

Keywords Personal values · Mental health disorders · Life satisfaction · College students · Latent profile analysis

Introduction

Social scientists use the concept of values to describe both individuals (e.g., personal values) and cultures or societies (e.g., cultural values). By definition, values are cognitive beliefs about what is important, good, and worthwhile for individuals or societies, and what is not (Sagiv et al., 2017). This study focuses on values as characteristics of individuals. Personal values, as a core aspect of identity (Hitlin, 2003), express what is important to a person and serve as broad guiding principles in people's life, and are formed by reflecting upon widely shared cultural elements, norms, beliefs, and values in society (Ahn & Reeve, 2020; Sagiv & Schwartz, 2022; Sagiv et al., 2017). Interindividual differences in personal value are prevalent both within and across societies, reflecting unique genetic heritage, personal experiences, social structure, and culture (Brosch et al., 2011; Sagiv & Schwartz, 2022). For instance, self-direction may be highly prioritized in Western cultures but not in Eastern cultures. It may be at the top of the value hierarchy of some individuals but not others. Thus, focusing on the relative

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disparities in the importance of values is more psychologically meaningful than on the importance of any single value alone when it comes to explaining the fundamental differences between individuals and social groups (Zacharopoulos et al., 2018).

Schwartz's personal value theory, which occupies a central position in psychology, holds that values exist as a circular motivational continuum (Schwartz et al., 2012). In the past 25 years of refinement and reconstruction, the theory has evolved from the original 7 basic personal values (Schwartz & Bilsky, 1987) to the expanded 10 (Schwartz, 1992) and finally to the refined 19 personal values (Schwartz et al., 2012): self-direction-thought, self-direction-action, stimulation, hedonism, achievement, power-dominance, power-resources, face, security-personal, security-societal, tradition, conformity-rules, conformity-interpersonal, humility, benevolence-caring, benevolence-dependability, universalism-concern, universalism-nature, and universalism-tolerance. These values form a circle structure (see Fig. 1) based on the degree of compatibility or conflict between the goals expressed. The array of values represents a motivational continuum, i.e., values placed next to each other

have more compatible motivations (e.g., benevolence and universalism), whereas those placed further apart are more conflicting (e.g., power and universalism). Above those first-tier values, there is a second-tier value dimension: openness to change (readiness for new ideas, actions, and experiences) versus conservation (self-restriction, order, and avoiding change), self-enhancement (pursuing one's own interests) versus self-transcendence (transcending one's own interests for the sake of others), social focus (concern outcomes of society) versus personal focus (concern outcomes of self) and growth (freedom from anxiety) versus self-protection (avoiding anxiety) (Schwartz et al., 2012).

There has been a long-standing interest in the associations of personal values with mental health disorders and life satisfaction. Overall, the literature reported significant but inconsistent findings. With regard to mental health disorders, a theoretical review study concluded that no consistent correlation patterns between personal values and internalizing problems became evident (Heim et al., 2019). For example, achievement was positively associated with depression in the German student sample (Hanel & Wolfradt, 2016) but negatively in the Chinese student sample (Maercker et al., 2015);

Fig. 1 Circular motivational continuum of 19 values (Schwartz, 2012 [p 669])



a negative association between self-transcendence and depression was found in the Russian and Chinese student samples (Maercker et al., 2015), but not in the other samples; a negative association between hedonism and depression was found in New Zealand adults (Jarden, 2010), but not in the Native American adolescents (Mousseau et al., 2014). The association of personal values with mental health disorders also differed across mental disorders. For instance, higher power, achievement, tradition, and conformity priorities and lower hedonism priorities were observed in patients with affective disorders, neurotic disorders, reaction to severe stress, adjustment disorders, and personality disorders as compared to the general population (Arens et al., 2022). A study of German soldiers after military deployment found that hedonism and power were negatively associated with posttraumatic stress disorder, while tradition and universalism were positively associated with posttraumatic stress disorder (Zimmermann et al., 2014). Relatively consistent association patterns of personal values with externalizing problems and violent crime have been documented in the literature. Benish-Weisman et al. (2017) found that aggressive behavior was positively related to self-enhancement while negatively related to self-transcendence across different cultures (e.g., Germany, Italy, Israel, and the United States). This relationship was also found in homophobic bullying (Bacchini et al., 2020), interpersonal violence (Rossi et al., 2019), and lawbreaking behavior (Borg & Hermann, 2020). Aggressive behavior was found to have weak relationships with openness to change and conservation values, varying across studies and contexts (Benish-Weisman et al., 2017). There are few studies on the relationship between personal values and substance abuse. A survey of European middle school students found that conformity and traditional values were associated with lower cannabis intention and use, whereas hedonism and power values were associated with higher cannabis intention and use (Morell-Gomis et al., 2018).

As a cognitive component of subjective well-being, life satisfaction refers to a cognitive assessment of one's life according to subjectively shaped standards of appropriate circumstances (Diener et al., 1985). Personal values, as a cognitive representation of goals to be pursued (Sagiv & Schwartz, 2022), may influence such subjective criteria and, in turn, life satisfaction. Researchers distinguished between “healthy” (e.g., self-direction and universalism) and “unhealthy” (e.g., conformity and power) values, and predicted that “healthy” values would be positively associated with life satisfaction, whereas “unhealthy” values would be negatively associated (Sagiv & Schwartz, 2000, 2022; Sortheix & Schwartz, 2017). While the empirical findings for “healthy” values are consistent with predictions, those for “unhealthy” values have been more varied (Fetvadjev & He, 2019). Cross-national studies consistently found

positive associations of open to change values and negative associations of power values with life satisfaction (Sortheix & Lönnqvist, 2013; Sortheix & Schwartz, 2017), while the association of conservation values with life satisfaction was moderated by cultural egalitarianism, with conservation values being positively associated with life satisfaction in more egalitarian countries (Sortheix & Schwartz, 2017). A Dutch longitudinal study found that at the within-person level, self-direction value elevations were positively associated with life satisfaction after one year, but elevations in conformity and security values were not negatively but positively associated with subsequent life satisfaction, which challenges the “unhealthy” values predicted (Fetvadjev & He, 2019). Similarly, Grosz et al. (2021) observed a 6-month cross-lagged effect between open to change values and life satisfaction but little evidence for cross-lagged effects between other value types and life satisfaction.

The inconclusive correlation of personal value with mental health disorders and life satisfaction may arise because of cultural differences and analytical differences across studies. On the one hand, cultural contexts seem to moderate individual-level associations between personal values and psychological outcome variables (Heim et al., 2019; Sortheix & Lönnqvist, 2013; Sortheix & Schwartz, 2017). Previous studies have found that value-environment fit has positive implications for individual mental health and well-being (Hanel et al., 2020). Researchers have identified four potential pathways through which contexts influence the link between personal values and well-being: social sanctions, environmental affordances, internal conflict, and shared realities (Edwards & Cable, 2009; Fulmer et al., 2010; Sagiv & Schwartz, 2000). For example, if an individual's country supports and encourages achievement values, then those who hold such values may feel supported by a sense of common purpose. In contrast, individuals may be pressured by social norms, resulting in internal conflicts that in turn reduce life satisfaction and increase mental health disorders. The influence of value-environment fit on individual mental health disorders and life satisfaction may be more prominent in collectivist cultures than in individualistic cultures. Personal values, as the core part of identity, are rather situation-dependent and influenced by social roles in collectivistic cultures, whereas in individualistic cultures, personal values are rather stable and coherent across contexts (Oyserman & Lee, 2008). Therefore, the correlation of personal value with mental health disorders and life satisfaction may be different in various cultural contexts. In view of previous studies carried out in the context of individualist cultures, research conducted in the context of collectivist cultures will contribute to the theory of research in this field.

On the other hand, the most common way to examine personal value orientation is to ask individuals to self-report the importance of each value type to them and to examine

the relationships of each value with mental health disorders and life satisfaction. This analytic approach reflects a *variable-centred* strategy in which the relations between each value and other variables are revealed on the premise of sample homogeneity (Howard & Hoffman, 2018). However, such an approach does not consider the possibility that individuals may attach importance to multiple values simultaneously, especially in contemporary China. The personal values of Chinese young adults are pluralistic, owing to the near-simultaneous socioeconomic development, urbanization, and globalization, compressing the traditional, modern, and postmodern into the same space and time (Gao et al., 2022). This pluralistic construction of value hierarchy has been observed in empirical studies. For instance, a cross-cultural empirical study found that, compared to the Russian and German youth, the Chinese youth scored higher in the four dimensions of openness to change, conservation, self-enhancement, and self-transcendence (Heim et al., 2019). Adding to this complexity, the *variable-centred* strategy “ignores the fact that participants may come from different subpopulations in which the observed relations between variables may differ, quantitatively and qualitatively” (Morin et al., 2011). This implies that sample heterogeneity may contribute to the correlations of personal value with mental health disorders and life satisfaction in the overall sample, which may differ markedly from such correlations within some or all subgroups. One superior alternative approach is latent profile analysis (LPA), a *person-centred* strategy for identifying latent homogenous subgroups based on probability distributions (Marsh et al., 2009), allowing the analysis of the relationship between subpopulation membership and a variety of outcome variables (Lubke & Muthén, 2005). Additionally, LPA possesses several advantages over the related techniques of k-means or hierarchical cluster analysis, including non-reliance on common assumptions such as normality and linearity that are easily violated (Vaughn et al., 2007).

In sum, despite the long-standing interest in personal values, empirical studies on interindividual differences in personal values and their relationship with mental health disorders and life satisfaction, especially in Eastern cultures, are far fewer than one might expect. To narrow these research gaps, this study aims to characterize personal value profiles and to examine differences in several mental health-related disorders and life satisfaction potentially across these profiles, theoretically drawing on Schwartz’s value theory and methodologically using LPA. There are some key theoretical and practical necessities. Theoretically, this study sheds light on how different value types are related to mental health disorders and life satisfaction in novel or more complex ways in Chinese youth groups and also helps clarify potential inconsistent findings in the literature. Practically, this knowledge may also allow the identification of particularly

problematic personal value profiles, which could be used to prevent and intervene in the emergence and development of college mental health disorders.

Method

Study design

This study used data from cross-sectional online surveys carried out in China. Data was gathered beginning on September 2 and was finished on October 10, 2020. After being advertised on students’ social media groups at the three universities, the surveys were carried out online using SOJUMP (<http://www.sojump.com>), a popular online survey platform in China. After reading the objectives and design of the study, participants willingly clicked the link in the announcement to access the survey platform. By asking each participant to read the terms and conditions and click “agree,” we were able to gain their informed consent online. After that, they answered questions about sociodemographic characteristics, personal values, mental health disorders, and life satisfaction.

Participants

Using convenience sampling, a total of 8,700 undergraduates were recruited from colleges in Southwest China. Participant inclusion criteria were (a) undergraduates who lived in China and (b) were between 14 and 30 years old. There were no exclusion standards, and all undergraduates were included. 160 college students dropped out of the survey, and 8,540 ($M_{\text{age}} = 18.89$, $SD_{\text{age}} = 2.02$, 57.7% male) valid questionnaires were obtained, for a response rate of 98.17%. Universities attract students from across China, and participants originate from a wide variety of cities nationally. The participants were from diverse academic disciplines (67.9% natural sciences, 32.1% social sciences).

Measures

Sociodemographic characteristics

Sociodemographic information was reported by participants, including age, gender, one-child family, left-behind experience, parents’ education, parents’ marital status (divorced or married), and perceived family income level (upper, middle, lower). The participants’ left-behind experiences before 18 years old included three situations: both parents left home for more than 6 months at a time (completely left behind), one parent left home for more than 6 months at a time (half left behind), and both parents were at home (not left behind).

Parental education was divided into three levels: parents completed a high academic degree (e.g., bachelor's degree or more), parents completed compulsory education (e.g., junior and high school), parents have no education or have completed elementary education (low).

Personal values

The Personal Values Questionnaire (PVQ) by Schwartz et al (2012) was used to assess personal values using 48 items relating to self-direction (6 items), stimulation (3 items), hedonism (2 items), achievement (3 items), power (4 items), face (2 items), security (5 items), tradition (3 items), conformity (5 items), humility (2 items), benevolence (5 items), universalism (8 items). We specifically considered four bipolar value dimensions: openness to change (self-direction, stimulation) vs. conservation (security, tradition, conformity), self-transcendence (humility, benevolence, universalism) vs. self-enhancement (hedonism, achievement, power, face), personal focus (self-direction, stimulation, hedonism, achievement, power, face, security-personal) vs. social focus (security, tradition, conformity, humility, benevolence, universalism, security-societal), and growth (self-direction, stimulation, humility, benevolence, universalism, hedonism) vs. self-protection (achievement, power, face, security, tradition, conformity). The 48 items each offer verbal portraits of different people, and respondents were asked to evaluate how similar they are to the portrait using a six-point Likert scale, ranging from 1 = very much like me to 6 = not like me at all. According to Schwartz, we interpret these degrees of subjective similarity as indicators of the importance of the corresponding values. A sample item was “he/she wants people to do what he/she says.” In this sample, the Cronbach's alpha coefficients of each higher-order dimension ranged from 0.86 for conservation to 0.95 for personal focus.

Mental health disorders

In this study, four mental health disorders in the past 12 months were assessed using the Global Appraisal of Individual Needs Short Screener (GAIN-SS) (Dennis et al., 2006). This instrument consists of four sub-screeners: internalizing disorder screener (depression, anxiety, sleep problems, post-traumatic stress, and suicidal ideation), externalizing disorder screener (attention deficit, hyperactivity/impulsivity, and conduct problems), substance disorder screener (abuse and dependence symptoms), and crime/violence screener (drug, property, and interpersonal crime). This instrument has been well-validated in adolescent and adult populations. Respondents are requested to state when they experienced such behaviours or emotional states for the last time using a five-point Likert scale, ranging from 0 = never to 4 = past month. A representative item

was “When was the last time that you had significant problems with feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future?” The four sub-screeners show good internal consistency (Cronbach $\alpha = 0.83, 0.75, 0.90,$ and $0.87,$ respectively).

Life satisfaction

The Satisfaction with Life Scale (SWLS) is a 5-item measure designed to assess global life satisfaction (Diener et al., 1985). Participants responded on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). A higher score indicated a higher level of life satisfaction. A representative item was “In most ways, my life is close to my ideal.” Reliability was good in our sample (Cronbach's $\alpha = 0.81$).

Statistical analysis

Firstly, outliers and missing data were checked. After z-scoring, scores outside ± 3 standard deviations were considered outliers and recorded as missing, given the potential for extreme scores to skew the means of the latent classes, as well as possibly distorting the p-value of the BLRT (Nylund et al., 2007). A missing value analysis was performed using SPSS 22. The MCAR test (Little & Rubin, 2019), $\chi^2 = 1754.54, df = 2122, p > 0.05,$ indicated that the missing data were missing (completely) at random. Missing data was handled using the full Information Maximum Likelihood estimation, which yields unbiased estimates when the pattern of missing data is completely at random (Yuan & Bentler, 2000). Linearity and normality checks were not performed because the LPA did not rely on linearity and normality assumptions.

Then, we calculated the mean scores for the four bipolar dimensions of personal values, four sub-dimensions of mental health disorders, and life satisfaction. Considering that the individual bias of the participants (for example, some respondents' scoring range is basically only 4–6 or only 1–3) may lead to the deviation in the ranking of value importance, we converted the absolute importance score of each value item to the relative importance score as suggested by Schwartz (1992) to control this deviation. We calculated the average score across the 48 items and subtracted it from each of the 48 original raw scores, before calculating the scores for the four bipolar dimensions of personal values.

Next, LPA was used to investigate the optimal number of latent classes (profiles) that describe the students' scores in different types of personal values among a sample of Chinese students. We used maximum likelihood estimation with robust standard errors in Mplus 8.3, which is robust to non-normality and non-independence when estimating

standard errors and chi-square statistics. One to six class solutions of LPA models were evaluated and compared based on fit indices, parsimony, and interpretability. We adopted the Akaike Information Criterion (AIC) (Akaike, 1987), Bayesian Information Criterion (BIC) (Schwarz, 1978), sample-size-adjusted Bayesian Information Criterion (aBIC) (Sclove, 1987), entropy, Lo-Mendell-Rubin test (LMR), and Bootstrap Likelihood Ratio Test (BLRT) (Nylund et al., 2007). Lower AIC, BIC and ABIC values indicate optimal model fit to the data (Nylund et al., 2007). Significant p -values ($p < 0.05$) of LMRT indicate that the target (e.g., k -class) model fits the data better than the one with fewer classes (e.g., $k-1$ class) (Lo et al., 2001). A higher value of the entropy was indicative that the class solution has better goodness of fit, with values equal to or greater than 0.80, demonstrating a more accurate classification (Clark, 2010). We estimated the random sets of starting values with 2000 seeds and 500 iterations to avoid local maxima.

Finally, we tested the predictors and outcomes of class membership. An analysis by cross-tabulation was conducted to test the relations between the predictors (gender, number of siblings, parents' marriage status, father's education level, mother's education level, subjective family economic situation, and left-behind type) and the likelihood of class membership. Student age was analysed using analysis of variance (ANOVA) because of the continuous nature of the variable. All analyses were based on $\alpha = 0.05$, and all tests were corrected for multiple comparisons using the Bonferroni correction. Outcomes were also incorporated into the final solution. We tested the differences in outcome variables (mental health disorders and life satisfaction) using the BCH method in Mplus, taking the measurement error of classification error into account.

Results

Latent profile models

Based on the four second-tier value dimensions of self-protection versus growth, individual orientation versus social focus, openness versus conservation, and self-enhancement versus self-transcendence, latent profile

analyses (LPA) were conducted in Mplus 8.3 to identify meaningful classes that differentiated personal values. Model fit statistics for the proposed latent profile models are presented in Table 1. As shown, the six-profile model had lower AIC, BIC, and aBIC values than previous models with fewer classes, but the LMR test was not statistically significant. The non-significant LMR ($p = 0.57$) supported opting for the five-profile solution rather than the six-profile solution. Additionally, the entropy value in the five-class solution was acceptable (entropy = 0.877). Thus, we selected the five-class solution as the optimal solution.

Figure 2 displays the latent profile sizes and mean scores for the five-class model of personal values. Class 1 (traditional social orientation: scored higher on social focus, self-transcendence, and conservation) represented individuals with a low level of individualistic values but a high level of collectivistic values. This is a pattern of traditional values in Chinese culture. This class comprised 8.6% of the entire sample. In contrast, Class 2 (open personal orientation: scored higher on personal focus, self-enhancement, growth, and openness) represented 13.1% of the entire sample, who scored higher on individualistic values than collectivistic values. Considering that these individuals had high individualistic values and below-average social value levels, Class 2 can be thought of as a type of Western values. Class 3 (open social orientation: scored higher on social focus, self-transcendence, growth, and openness) included 15.0% of the participants, who were characterized by the coexistence of traditional Chinese collectivism values and modern values. Participants in Class 4 were characterized by high conservative, low openness, and moderate social orientation and included 21.5% of the entire sample. Thus, Class 4 can be thought of as having a moderate traditional social orientation. Class 5 (average: moderate for all values) was the largest class, comprising 41.7% of the entire sample. Because individuals in Class 5 exhibited an average level of all 10 values, Class 5 can be thought of as lacking priority value orientations. In sum, one subpopulation showed developmental patterns of individualistic values, other classes showed relatively traditional patterns, and the last subpopulation showed neither.

Table 1 Model fit indices for one- to six-profile patterns of personal values ($N = 8,540$)

Model	k	N	AIC	BIC	aBIC	entropy	LMR	BLRT
1-class	16	8540	49,868.021	49,980.861	49,930.016	–	–	–
2-class	25	8540	34,760.253	34,936.566	34,857.121	0.830	<0.0001	<0.0001
3-class	34	8540	24,600.029	24,839.814	24,731.768	0.887	<0.0001	<0.0001
4-class	43	8540	18,422.916	18,726.174	18,589.528	0.881	<0.0001	<0.0001
5-class	52	8540	14,697.701	15,064.432	14,899.186	0.877	0.0003	<0.0001
6-class	61	8540	11,190.346	11,620.549	11,426.702	0.884	0.5699	<0.0001

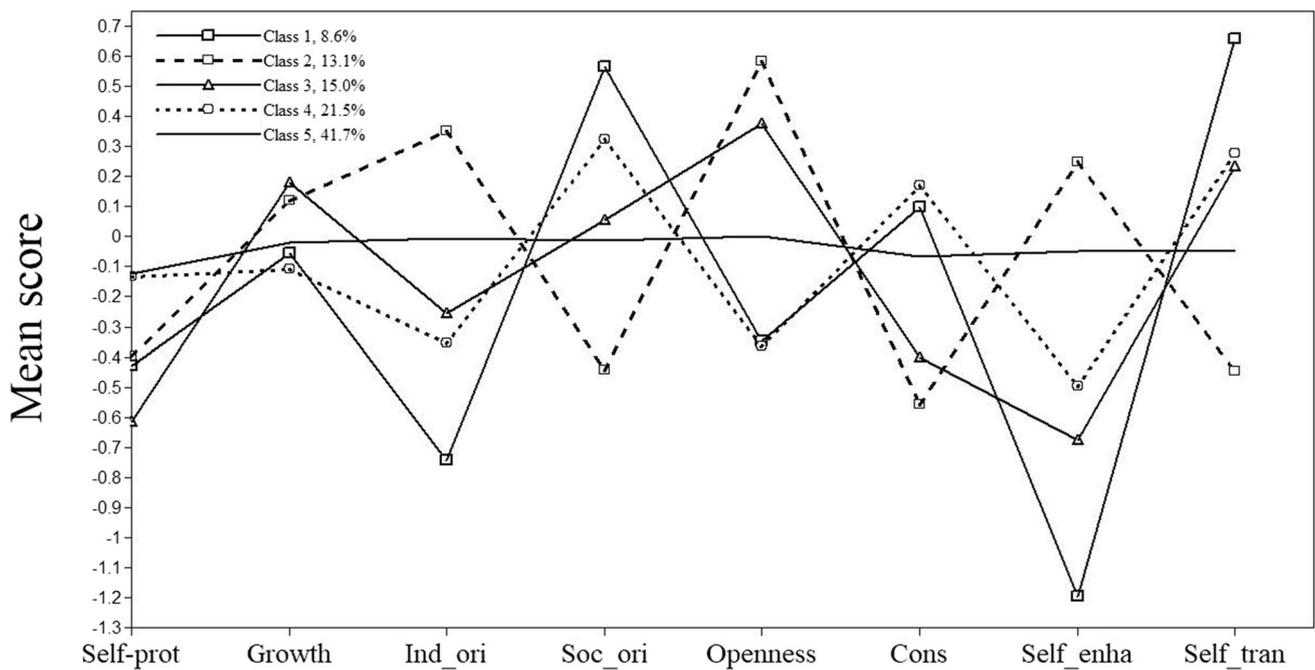


Fig. 2 latent profiles of personal values. Note: Self-prot = self-protection; Ind-ori = personal focus; Soc-ori = social focus; Sons = conservation; Self-enha = self-enhancement; Self-tran = self-transcendence

Association between sociodemographic variables and latent classes

Cross tabulation analysis found significant differences on all demographic variables among the five latent profiles, except for subjective economic status. As shown in Table 2, the majority of the sample were male, individuals without left-behind experience (71.5%), had married parents (88.4%) and had parents with a middle education level (for fathers: 52.2%; for mothers: 51.4%), and were students who perceived their family to belong to the middle economic level (64.4). Compared to Class 2 (individual focused), students in other classes were older. Females were more likely to belong to Class 1, Class 4 and Class 5 relative to Class 2. In terms of the number of children, children with siblings were less likely to be Class 4 than Class 2. Moreover, compared to Class 2, individuals having fathers with middle educational attainment (relative to high education) were less likely to belong to Class 5, and individuals having mothers with middle education were less likely to belong to Class 3. Finally, individuals who perceived that their family had a rich economic condition were more likely to be in Class 4 relative to Class 2.

Between-class differences in mental health disorders and life satisfaction

Table 3 shows the mean differences in auxiliary variables across the classes. There were significant differences in

life satisfaction, internal and external problems, crime and substance abuse across five classes.

Internalizing problems Participants in Class 1 (Traditional social orientation) had the lowest level of internalizing problems compared to any other class (all Wald > 12.43, $p < 0.001$), while Class 2 (Open personal orientation) had the greatest level of internalizing problems compared to other classes (all Wald > 26.64, $p < 0.001$). The differences for Classes 3 (open social orientation), 4 (moderate traditional social orientation) and 5 (average) were not significant (all Wald < 4.11, $p \geq 0.043$).

Externalizing problems Class 1 had the lowest level of externalizing problems (all Wald > 23.17, $p < 0.001$), and Class 2 had the greatest level of externalizing problems among these five classes (all Wald > 14.31, $p < 0.001$). Participants in Class 5 had a greater level of externalizing problems than those in Classes 3 (Wald = 23.71, $p < 0.001$) or 4 (Wald = 33.12, $p < 0.001$). No difference was found between classes 3 and 4 (Wald = 1.30, $p = 0.254$).

Substance disorders Class 5 had the highest level of substance abuse disorders compared to the other classes (all Wald > 8.19, $p < 0.001$). Participants in Class 1, Class 3, and Class 4 had lower levels of substance abuse disorders than those in Classes 2 and Class 5 (all Wald > 10.42, $p < 0.001$).

Table 2 Distribution of sociodemographic characteristics by class

Variable	Class 1 (n = 733; 8.6%)		Class 2 ^a (n = 1112; 13.1%)		Class 3 (n = 1265; 15.0%)		Class 4 (n = 1838; 21.5%)		Class 5 (n = 3592; 41.7%)		F	p
	M (SD)	OR (95% CI)	M (SD)	OR (95% CI)	M (SD)	OR (95% CI)	M (SD)	OR (95% CI)	M (SD)	OR (95% CI)		
Age ^b 18.89 (SD=2.02)	18.98 (2.18)	1.14*** (1.09, 1.20)	18.53 (1.64)	0 (Ref)	18.73 (1.93)	1.07* (1.02, 1.12)	19.06 (2.13)	1.16*** (1.12, 1.22)	18.95 (2.06)	1.14** (1.09, 1.18)	0.92	0.449
Gender	No (%)	OR (95% CI)	No (%)	OR (95% CI)	No (%)	OR (95% CI)	No (%)	OR (95% CI)	No (%)	OR (95% CI)	χ^2	p
Female n = 3611 (42.3%)	311 (42.4)	1.25* (1.04, 1.51)	535 (48.1)	1 (Ref)	585 (46.2)	1.07 (0.91, 1.26)	793 (43.1)	1.22* (1.04, 1.41)	1387 (38.6)	1.46*** (1.27, 1.67)	44.00	<0.001
One-child	363 (49.5)	0.89 (0.72, 1.10)	500 (45.0)	1 (Ref)	640 (50.6)	0.88 (0.73, 1.06)	1019 (55.4)	0.77** (0.65, 0.91)	1742 (48.5)	0.98 (0.84, 1.14)	36.52	<0.001
left-behind experience	123 (16.8)	0.87 (0.66, 1.15)	166 (14.9)	1 (Ref)	226 (17.9)	0.87 (0.69, 1.10)	334 (18.2)	0.87 (0.70, 1.08)	576 (16.0)	0.96 (0.78, 1.17)	16.26	0.039
Half left behind n = 1425 (16.7%)	84 (11.8)	0.90 (0.65, 1.25)	112 (10.1)	1 (Ref)	113 (10.5)	1.05 (0.79, 1.41)	229 (12.5)	0.94 (0.73, 1.23)	448 (12.5)	0.87 (0.68, 1.10)	2.16	0.706
Parents marital status	78 (10.6)	1.17 (0.86, 1.58)	136 (12.2)	1 (Ref)	154 (12.2)	1.03 (0.80, 1.33)	202 (11.0)	1.17 (.92, 1.48)	418 (11.6)	1.07 (0.87, 1.33)	33.97	<0.001
Divorced n = 988 (11.6%)	378 (51.6)	1.14 (0.77, 1.68)	539 (48.5)	1 (Ref)	645 (51.0)	1.07 (0.76, 1.49)	954 (51.9)	0.94 (0.69, 1.28)	1940 (54.0)	0.85 (0.64, 1.13)		
Father education	265 (36.2)	0.99 (0.76, 1.28)	441 (33.4)	1 (Ref)	447 (35.5)	1.07 (0.86, 1.34)	588 (32.0)	1.01 (0.82, 1.24)	1166 (32.5)	0.82* (0.68, 0.99)		
Mother education	361 (49.2)	0.73 (0.50, 1.05)	550 (49.5)	1 (Ref)	667 (52.7)	0.73 (0.53, 1.01)	939 (51.1)	0.69 (0.51, .93)	1870 (52.1)	0.87 (0.66, 1.14)	41.19	<0.001
Low n = 1796 (21.0%)	214 (29.2)	0.92 (0.71, 1.21)	371 (33.4)	1 (Ref)	338 (26.7)	0.78* (0.62, 0.99)	451 (24.5)	0.82 (0.66, 1.02)	983 (27.4)	0.93 (0.77, 1.13)		
Middle n = 4387 (51.4%)	488 (66.6)	0.87 (0.69, 1.10)	728 (65.5)	1 (Ref)	812 (64.2)	1.02 (0.83, 1.24)	1140 (62.0)	1.03 (0.86, 1.24)	2296 (63.9)	0.10 (0.85, 1.18)	24.38	0.002
Family income level	Upper n = 329 (3.9%)	31 (4.2)	1.07 (0.65, 1.75)	61 (5.5)	43 (3.4)	1.48 (0.95, 2.29)	55 (3.0)	1.58* (1.05, 2.37)	139 (3.9)	1.24 (0.88, 1.76)		

^a Class 2 was used as reference group. OR Odds Ratio, CI Confidence Interval

^b N = 73 did not report their age, resulting in C1: n = 728, C2: n = 1101; C3: n = 1256; C4: n = 1822; C5: n = 3560

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 3 Mean comparisons across latent class on mental health disorders and life satisfaction

	Class 1 (<i>n</i> = 733; 8.6%) <i>M</i> (<i>SD</i>)	Class 2 (<i>n</i> = 1112; 13.1%) <i>M</i> (<i>SD</i>)	Class 3 (<i>n</i> = 1265; 15.0%) <i>M</i> (<i>SD</i>)	Class 4 (<i>n</i> = 1838; 21.5%) <i>M</i> (<i>SD</i>)	Class 5 (<i>n</i> = 3592; 41.7%) <i>M</i> (<i>SD</i>)	Total (<i>n</i> = 8540) <i>M</i> (<i>SD</i>)	χ^2	<i>p</i>	Direction
Internalizing problems	2.19 (0.98)	2.64 (1.01)	2.37 (0.99)	2.39 (0.99)	2.45 (1.06)	2.43 (1.03)	90.39	<0.001	2 > 5 = 4 = 3 > 1
Externalizing problems	1.62 (0.61)	2.03 (0.76)	1.74 (0.66)	1.77 (0.69)	1.89 (0.81)	1.84 (0.75)	195.40	<0.001	2 > 5 > 4 = 3 > 1
Substance disorders	1.04 (0.27)	1.11 (0.46)	1.04 (0.27)	1.06 (0.34)	1.17 (0.58)	1.10 (0.46)	109.90	<0.001	5 > 2 > 4 = 3 = 1
Crime/violence	1.05 (0.23)	1.13 (0.37)	1.06 (0.23)	1.08 (0.31)	1.18 (0.54)	1.12 (0.42)	128.89	<0.001	5 > 2 > 4 = 3 = 1
Life Satisfaction	3.43 (0.79)	2.89 (0.81)	3.23 (0.76)	3.19 (0.75)	3.20 (0.81)	3.18 (0.80)	196.19	<0.001	1 > 3 = 5 = 4 > 2

No difference was found between classes 1, 3 and 4 (all Wald < 2.75, $p > 0.097$).

Crime/violence Class 5 had the most crime problems compared to the other classes (Wald > 9.86, $p < 0.01$). Participants in Class 1, Class 3, and Class 4 (with social orientation) had fewer crime problems than other classes (all Wald > 13.65, $p < 0.001$). No difference was found between classes 1, 3 and 4 (all Wald < 3.91, $p > 0.048$).

Life satisfaction Class 1 had a greater level of life satisfaction than the other classes (all Wald > 26.38, $p < 0.001$), and Class 2 had the lowest level of life satisfaction than the other classes (all Wald > 85.09, $p < 0.001$). There was no difference between classes 3, 4 and 5 (all Wald < 1.38, $p > 0.239$).

Discussion

Based on an individual-centred perspective, this study characterized the personal value profiles among Chinese college students using the LPA method and analysed the association of these value profiles with mental health disorders and life satisfaction. The results indicate the heterogeneity of Chinese college students' personal values and the negative relationship of social-oriented values with their mental health disorders, and the positive relationship of social-oriented values with life satisfaction under collectivist culture.

There are three social orientations (Class 1, Class 3, and Class 4), accounting for 45.1% of the entire sample. Individuals in Class 1 and Class 4 both value self-transcendence values (such as benevolence and universalism) as well as conservative values (such as humility, tradition, conformity, and security) but to varying degrees. Both classes have the characteristics of traditional Chinese collective orientation, that is, adhering to the core of Confucianism, emphasizing

collective belonging and harmonious relationships, and advocating introverted and modest behaviour (King & Bond, 1985). Individuals in Class 3 also valued self-transcendence values, but different from those in Class 1 and Class 4, they also valued open values (such as self-direction-thought, self-direction-action, stimulation), showing the characteristics of the coexistence of traditional and modern values. This is in line with the pluralist-constructive view proposed by Chen (2015), which emphasizes that in global social change, human values may develop towards the coexistence and integration of diverse values. Massive social change in China has made people pay increasing attention to the realization of individual goals (Chen et al., 2005; Su & Ren, 2014). Schools and parents also began to encourage students to develop independence, self-expression, and self-exploration, which were ignored in traditional Chinese culture (Way et al., 2013). However, these values do not completely replace collective values with robust cultural roots, but coexist and integrate with them.

The LPA analysis found that Class 2 (13%) can be considered a typical individualistic orientation common in Western countries. Individuals belonging to this class value self-enhancement values (such as achievement and power), as well as open values (such as self-direction and stimulation). This is consistent with the research findings from Zeng and Greenfield (2015) that individualist values were continuously enhanced by analysing the frequency of Chinese individualist words used by Chinese people during 1970–2008. According to the theory of social change and human development by Greenfield (2009), urbanization and modernization may lead to the transformation of cultural values in an individualistic direction. Researchers suggest that Chinese society has become increasingly market-oriented and modernized, and individual-oriented values have gradually been accepted by people, especially the younger generation (Chen & Chen, 2010; Zeng & Greenfield, 2015).

The LPA analysis found that the largest group (41.7%) showed no priority value orientations. This is not consistent with Schwartz's theoretical hypothesis that the more two distant values are in either direction in the value circle, the more antagonistic they are. Some individuals have low absolute scores in all value types, which may reflect that they are in a period of disorientation and lack or possess frail value orientations. In addition, individuals with high absolute scores in all value types in Class 5 may reflect the significant dialectical thinking characteristics of Chinese personal values. Previous empirical studies have found that Chinese people tend to have a dialectical thinking style (Peng & Nisbett, 1999; Zhou et al., 2012). Jin et al. (2019) proposed a "dialectical focus" to emphasize the integration of individual and social orientation and traditional and modern value orientation among Chinese people and further pointed out that this originated from the Chinese Confucian doctrine of the Mean.

The current study found that Chinese college students in the three social orientation profiles reported low mental health disorders and high life satisfaction. In contrast, students in the personal orientation profile reported high mental health disorders and low life satisfaction. This was consistent with previous findings that collectivism predicted more happiness and less illness in collectivist countries such as China (Du et al., 2014; Fischer & Boer, 2011). Researchers believe that individuals with a social orientation are more empathetic (Ardenghi et al., 2021; Tittler et al., 2020), more likely to establish positive interpersonal relationships with others (Reed, 2008), obtain high levels of social support to cope with negative life events (Jibeen et al., 2018), and display fewer mental health disorders such as depression and anxiety (Mousseau et al., 2014; Watanabe et al., 2020). In contrast, individuals with a personal orientation pay too much attention to their own interests and achievements, may suffer more pressure (Hanel & Wolfradt, 2016), and have a higher risk of internalizing problems (Mousseau et al., 2014). In addition, reputation enhancement theory believes that hostile behaviour is the intentional result of projecting a certain self-image or status to others (Emler & Reicher, 1995). Therefore, individuals with personal orientation are more likely to have externalizing problems, such as aggression, bullying, and violence, to control or dominate others and resources and show their high status (Aquilar et al., 2018).

Notably, individuals in Class 5 reported higher levels of substance disorders and crime/violence. As we mentioned earlier, there may be individuals in Class 5 who lack value orientations. In China, a new concept, the "hollow disease", has been put forward by educators and psychologists to describe psychological disorders caused by value disorientation (Cui, 2018). The reason may be that Chinese high school students' goals are mostly shaped

according to the wishes of their parents rather than themselves (Liu & Lu, 2011). Therefore, some students begin to explore self-development and self-identity only after they reach their parents' expectations and enter university (Cui, 2018). The identity moratorium defined by Marcia (1980) can encapsulate the continuation of the task of self-identity development that should be completed in adolescence into early adulthood. Previous studies have found that students in the moratorium experienced an unclear sense of self, and this uncertainty may be a source of developing anxiety, depression, and other forms of psychopathology (Schwartz et al., 2009).

Limitations

We are aware of several limitations of our study. First, our large sample allowed us to test the associations of heterogeneous profiles of personal values with mental health disorders and life satisfaction among Chinese college students. However, a relatively high intelligence sample of college students means that the generalization of the findings obtained from this study is limited. Therefore, future studies with other samples (such as adolescents) are recommended to explore whether these results can be applied to different subgroups. Second, the data was all self-reported and cross-sectional in design. The relational nature of these data means that any assertions regarding causality should be made with caution. Further research is needed to collect responses from other sources (e.g., teachers and peers) as well as by other methods (e.g., structured interviews or longitudinal study designs). Third, the COVID-19 pandemic has significantly increased mental health disorder risks (Ettman et al., 2020; Li et al., 2020), decreased life satisfaction (Brooks et al., 2020), and shaped personal values (Brooks et al., 2020; Ettman et al., 2020; Li et al., 2020; Vazquez et al., 2021). Although the current study was conducted after the peak of the COVID-19 epidemic in China, the epidemic may still have an influence on the study results. Therefore, studies comparing the associations of personal values with mental health disorders and life satisfaction at different stages of the COVID-19 pandemic are encouraged to add insights into the effect of specific contexts on the association. Finally, personal values are readily linked to personality traits (e.g., Parks-Leduc et al., 2015) that are important predictors of mental health (e.g., Ettman et al., 2020), attitudes toward discipline (e.g., Chiesi & Bruno, 2021), achievement (e.g., Meyer et al., 2019), and life satisfaction (e.g., Jovanovic, 2019). Therefore, personality traits should be taken into more consideration in future studies investigating the relationships of personal value profiles with mental health and life satisfaction.

Implications

Despite the limitations of this study, we believe these findings offer novel insights into the associations of personal values with mental health disorders and life satisfaction from a more culturally oriented research agenda. The use of a person-centred approach helped to reveal previously unidentified classes of personal value orientation that were also correlated with mental health disorders and life satisfaction in a collectivist culture. In addition, this study has important practical implications. As we continue to refine our understanding of factors that place people at risk for mental health disorders, the ability to identify personal value profiles and develop personal value orientations that contribute to individuals' adjustment may play a key role in developing prevention and treatment for mental health disorders and enhancing life satisfaction.

Authors' contributions Jia-Qiong Xie: conceptualization, methodology, formal analysis, investigation, writing—original draft, and writing—editing. Xue-Qin Yin: formal analysis and writing—review & editing. Jiang Qiu: conceptualization, methodology, and writing—review & editing. Ke Chen: conceptualization, resources, funding acquisition, supervision, and writing—review & editing. Jian-Ru Xiong: conceptualization, methodology, investigation, and resources. Jing Yang: investigation. Mei Li: investigation. Yuan-Yuan Huang: investigation.

Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Consent to participate Informed consent was obtained from all individual participants included in the study.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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