

## Research article

# Enhancing the continuing willingness of Chinese college students to engage in volunteer services for older adults

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## ARTICLE INFO

**Keywords:**Volunteer services  
Willingness to engage  
Theory of reasoned action  
Structural equation modelling

## ABSTRACT

**Background:** The ageing population presents a substantial challenge to conventional care services for older adults in China. College students' voluntary service constitutes an integral component of youth volunteerism, and investigating their continuing willingness to engage in volunteer services to benefit older adults holds immense importance for fostering a stable and enduring framework for China's older adults' care team.

**Method:** Drawing on the extended theory of reasoned action, this study establishes an analytical framework to examine the willingness of Chinese college students to engage in volunteer services for older adults. Using micro-survey data, we employ structural equation modelling and the bootstrap mediation effect test method to empirically investigate the influencing mechanism behind this willingness.

**Results:** (1) Attitude has the strongest influence on the continuing willingness of Chinese college students to engage in volunteer services for older adults, and plays a mediating role between subjective norms and continuing willingness to engage in volunteer services, which reveals the special role of attitude in the continuing engagement of Chinese college students in volunteer services for older adults. (2) Personality trait has a substantial positive impact on Chinese college students' willingness to engage continuously in volunteer service for older adults, and subjective norms and attitudes have a chain mediating effect in this influence relationship. (3) The theoretical model constructed in this study is reasonable, reliable and robust.

**Conclusion:** This study elucidates the potential relationship between attitude, subjective norms, personality traits and the willingness to engage in volunteer services, offering a novel perspective for understanding the continuing willingness of Chinese college students to engage in volunteer services for older adults. Furthermore, it highlights the value of incorporating the extended theory of reasoned action into the policy design of college students' engagement in such services.

## 1. Introduction

China's ageing population is reaching a critical volume, creating a growing urgency in terms of the pressures of community governance. It is particularly important to seek new practices to resolve China's problems of older adults' care. China's National Bureau of Statistics reported that the country entered a period of negative population growth in 2022, and its population of older adults aged 60 and above reached 280 million. The National Health Commission of China estimates that the total number of older adults aged

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Received 24 June 2023; Received in revised form 9 May 2024; Accepted 23 May 2024

Available online 24 May 2024

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60 and above will exceed 300 million during the 14th Five-Year Plan period, and will account for more than 20 % of the total population. This number will increase to approximately 420 million in 2035 and will represent more than 30 % of China's total population. Strengthening China's old-age service security is thus urgent.

Currently, many major cities in China are piloting old-age service models such as using artificial intelligence to care for empty-nesters and older adults who live alone and the provision of appropriate services to support them. However, serious problems remain in China, such as an uneven and insufficient supply of effective older adult care services and a shortage of older adult care workers [1]. Youth groups are involved, but their levels of participation are inadequate. The new model of youth power reaching out to serve older groups is still in its infancy [2,3]. College students constitute a large proportion of China's youth population [4], and their active involvement in the establishment of voluntary service programmes for older adults not only exemplifies the 'active ageing' of youth power but also represents an innovative approach towards diversifying social governance entities [5,6]. Consequently, equipping college students to become a driving force behind the development of older adults' service organisations holds immense significance for advancing China's older adults' care initiatives.

The main goal of this study is to explore in depth the key factors that affect the continuing willingness of Chinese college students to engage in volunteer services, to open the 'black box' of Chinese college students' process of providing volunteer services for older adults and provide empirical support for the government to formulate older adults' service policies. The existing research has explored many factors influencing college students' engagement in volunteer service, mainly from the perspectives of volunteer motivation [7, 8], personality traits [9,10], family and social support [11,12], etc. The research results involve management, psychology, sociology and other fields. However, volunteer services for older adults represent a continuous life cycle, and process variables also exist within the antecedent variables and the outcome impact. No effective response has been received to the question, 'What factors would affect the process of tendering volunteer services for older adults?' Moreover, most existing studies are confined to descriptive qualitative analysis, and some quantitative analyses focus solely on the direct impact of independent explanatory variables on older adults' care service engagement decisions, thereby lacking a comprehensive exploration of the underlying mechanisms influencing the willingness to engage in older adults' care services through systematic modelling methods. Therefore, based on existing research results, this study focuses specifically on the variable category of college students' willingness to continue volunteering for older adults in China. Drawing on an extended theory of reasoned action, this analytical framework incorporates variables such as personality traits, subjective norms, attitudes and willingness to participate. Moreover, empirical testing is conducted to explore both direct and indirect pathways through which these influencing factors operate, revealing the underlying mechanisms shaping the continuing willingness of Chinese college students to participate in volunteer services for older adults. Because the theoretical model to be constructed in this study has complex path relations and unavoidable subjective errors in the measurement of latent variables, the structural equation model (SEM) is to be introduced for empirical analysis. This model can simultaneously estimate the factor structure and factor relationship, identify a clear causal chain in the complex combination of causal conditions [13] and assess the degree of fit between the entire model and the sample data to verify the degree of fit of the model as a whole [14]. The findings of this study would contribute to the theoretical understanding of volunteers' decision-making, provide practical implications for volunteer organisations to manage their current and potential volunteers and provide guidance for the public in formulating proactive and implementable policies to address population ageing challenges in China.

## 2. Theoretical basis and research hypotheses

### 2.1. Theoretical basis

Fishbein and Ajzen (1975) proposed the theory of reasoned action (TRA) based on reasoned attitude forces [15]. Its core point is that human beings are rational and the behaviours of individuals are determined to some extent by behavioural will, which is, in turn, restricted by behavioural and subjective norms. This classical theory sought to explain human behaviour and proved the influence of individual behavioural evaluations of surrounding groups and personal judgement on the behavioural willingness of people. Subsequently, the TRA became commonly applied to the elucidation of environmental governance, tax consumption, job hunting, entrepreneurship, volunteer services and other such human activities. Volunteers are prepared to participate in voluntary activities because voluntary organisations offer them benefits that are more substantial than the paybacks other systems can provide. The benefits attained are not measured by economic value but rather, the volunteer services satisfy certain value pursuits and personal preferences of volunteers [16]. The pursuit of value rationality by college students by engaging in volunteer activities determines the occurrence of voluntary behaviours. Conversely, instrumental rationality driven by egoistic preferences promotes the sustainable development of volunteer services [17]. This theory conforms to the logic of social psychology of the participation of college students in volunteer services and delivers a basic framework for the investigation of their continuing volunteering intentions.

However, the practical explanatory power of the TRA has been questioned by some scholars when individual behavioural intentions are difficult to realise due to personal backgrounds, personality traits, resource abilities and other factors. Ajzen (2011) also emphasised in later studies that the TRA is an open model and the introduction of variables exerting an important impact on behavioural intentions or behaviour can make the model more rigorous [18]. Personality traits form the internal neuropsychological structure of individuals and govern their behaviours through certain subjective tendencies. Individuals with discrete personality traits are likely to differ in the formation of attitudes and internalisation of social norms and thus exhibit distinct behavioural intentions [19]. Personality traits reflect stable individual differences in thoughts and emotions but they do not necessarily cause behaviour to occur. The determination of behaviour by personality is also limited by situational pressures, norms and cognitive attitudes. Therefore, personality traits can be employed in combination with the TRA as an important pre-variable that can better predict individual

behaviour. The combined model obtained by modifying the TRA by adding other variables to the model can wield vastly improved predictive power. For example, Poskus and Zukauskienė (2017) attempted such a study of individuals' waste disposal behaviour and found that people with more adaptive personalities displayed more positive attitudes to recycling and participated more in recycling waste than those with less adaptive personalities [20]. Therefore, combining personality traits to explore the internal mechanisms driving the willingness of college students to participate in volunteer services for older adults from the perspective of rational behaviour would help scholars of behavioural public administration to reassess the results of behavioural decision-making in multiple fields.

## 2.2. Research hypotheses

**Personality traits.** Personality traits denote the relatively stable internal emotional and psychological characteristics of an individual and are widely used to explain individual behavioural differences [21]. Zhou and Meis (2018) study found that the personality traits of openness, agreeableness and responsibility exert positive stimulating effects on the behavioural intentions of tourism volunteer services [22]. The research conducted by Huang et al. (2023) demonstrates a positive correlation between conscientious and open personality traits and the health information-sharing behaviour of older adults [23]. Long et al. (2021) focused on the influence of responsible personality traits on young individuals' engagement in volunteer service for older adults, highlighting that positive personality traits contribute to fostering a favourable social environment for older adults' care and establishing a harmonious inter-generational psychological contract [24]. According to Wu et al.'s (2022) research findings, personality traits have a positive correlation with the inclination of the floating population to engage in health volunteer services [25]. Individuals who possess adept interpersonal skills and excel at establishing harmonious relationships are more inclined towards active participation in volunteer service.

Based on the above analysis, this study proposes the following hypotheses.

**Hypothesis 1.** Personality traits have a substantial positive impact on the continuing willingness of college students to participate in volunteer services for older adults.

**Subjective norms.** Subjective norms refer to the external pressure experienced by an individual when making decisions regarding specific behaviours, reflecting the influence exerted by substantial individuals, organisations or institutions on individual decision-making processes. The subjective norm regarding college students' participation in volunteer services for older adults is that before deciding on whether to participate, college students may be restricted or stimulated by encouragement or opposition from family members; recognition or discrimination from classmates, teachers and friends; regulations; systems and the social environment. Huang et al. (2013) conducted a study on the association between subjective norms and residents' participation in pension services savings, revealing that familial support, peer influence and community mobilisation positively incentivise residents' participation in such services and activities [26]. Cui et al. (2023) focused on the inclination of nurses towards volunteer service. The study revealed that the perceived support and encouragement from others positively influenced nurses' commitment to continue participating in volunteer services for older adults [27]. The research conducted by He et al. (2023) on college students' involvement in community volunteer service for older adults demonstrates that subjective norms exert a positive influence on both the willingness and behaviour of college students to engage in such volunteer activities [3]. Consequently, individuals exhibiting higher levels of subjective norms are more inclined to engage in volunteer activities. In addition, Milfont and Sibley's (2012) investigation of environmental governance behaviour found that agreeableness and responsibility traits were important factors influencing subjective norms [28]. A survey of young volunteers found that subjective norms represented vital determinants of their continuing willingness to participate in volunteer services and denoted a potential mediator of other factors on the future willingness of youth participation in volunteer services [29]. Subjective norms signify the influence tendencies of individual engagement in volunteer services for older adults and denote an important path through which personality traits affect the continuing willingness of college students to participate in volunteer services for older adults [30].

Based on the above analysis, this study proposes the following hypotheses.

**Hypothesis 2.** Subjective norms have a substantial positive impact on the continuing willingness of college students to participate in volunteer services for older adults.

**Hypothesis 3.** Personality traits have a substantial positive impact on the subjective norms regarding college students' participation in volunteer services for older adults.

**Hypothesis 4.** Subjective norms have a positive mediating effect between personality traits and the continuing willingness of college students to participate in volunteer services for older adults.

**Attitude.** Attitude refers to the extent of positive or negative evaluation that an individual holds towards a specific behaviour, encompassing both subjective assessment and resulting cognitive processes guiding behavioural responses. Yin et al. (2019) emphasised in their study on time banking that a higher level of comprehension among college students regarding the benefits of the 'time bank' pension volunteer service policy, coupled with a positive evaluation of such a service, increases the likelihood of their active participation in pension volunteer activities [31]. Wang and Deng's (2012) national survey of Chinese college students found that people are more inclined to participate in volunteer services when they believe that such services can increase their social experiences, enrich life and create social value [32]. The research conducted by Mihatsch et al. (2022) further demonstrates that college students' positive perception of the significance of volunteering serves as a motivating factor for their active engagement in volunteer

activities [33]. Ajzen (2018) explored the impact of personality traits on behaviour and attitudes, positing that personality traits influence the formation and manifestation of attitudes while also serving as a regulatory factor in moderating the influence of attitudes on behaviour to a certain extent [34]. The embodiment of ‘honesty-humility’ in personality traits was discussed by Ashton (2005), who further highlighted the positive correlation between personality traits and behavioural attitudes [35]. Zhang (2003) discovered that both personality traits and situational factors exert a substantial influence on behavioural attitudes [36]. Simultaneously, Carlo et al. (2005) investigated extraverted personality traits as a covariate and identified that positive behavioural attitudes, such as prosocial value motivation, exerted a substantial indirect influence on the relationship between personality traits and volunteers’ behaviours, thereby mediating the effect [37].

Based on the above analysis, this study proposes the following hypotheses.

**Hypothesis 5.** Attitude has a substantial positive impact on the continuing willingness of college students to participate in volunteer services for older adults.

**Hypothesis 6.** Personality traits have a substantial positive impact on attitudes towards college students’ participation in volunteer services for older adults.

**Hypothesis 7.** Subjective norms have a substantial positive impact on attitudes towards college students’ participation in volunteer services for older adults.

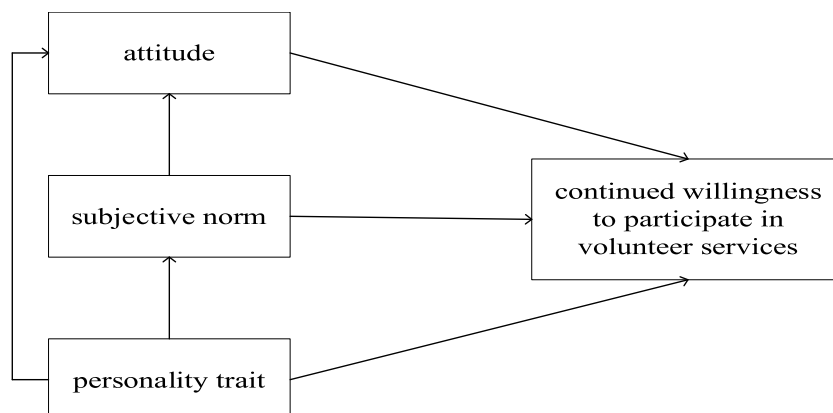
**Hypothesis 8.** Attitude has a positive mediating effect between personality traits and the continuing willingness of college students to participate in volunteer services for older adults.

**The chain mediating effect.** Chain mediation means that multiple mediating variables with sequential characteristics form a mediating chain, and independent variables act on dependent variables through the mediating chain [38]. Previous studies have demonstrated the substantial correlations between personality traits, subjective norms and attitudes of rational behaviour [39]; they have also evidenced that subjective norms and attitudes mediate between personality traits and behavioural intentions [40]. Wang et al.’s (2011) study on college students’ willingness to volunteer also shows that personal attitudes play a partial mediating role in the process of voluntary organisations’ influence on volunteers’ willingness to serve in the study of the path–order relationship between norms and attitudes [41]. Ajzen (1991) indicated that norms and attitudes denote two independent and interactive concepts and an individual’s evaluation of a certain behaviour is influenced by the preset norms of that person’s society [42]. Further research initiatives have found that subjective norms positively affect attitudes, which positively affect behavioural intentions [43]. Subsequently, some scholars added the path of ‘subjective norm-attitude’ to their research designs and found considerably improved explanatory power in their model [44]. In the context of socialising through volunteer services, norms encompassing behaviours, expectations and values exhibited by family members, peers and teachers exert influence on college students’ self-concept formation. These norms also contribute to shaping their sense of identity in relation to the role of volunteers while enhancing their attitude towards volunteering in the care of older adults. Consequently, they are further motivated to sustain their participation in such activities.

Based on the above analysis, this study proposes the following hypothesis.

**Hypothesis 9.** Subjective norms and attitudes play a chain mediating role in the process of personality traits affecting the continuing willingness of college students to participate in volunteer services for older adults.

Based on the aforementioned theories and analysis of the literature, this study constructs a theoretical model of the continuing willingness of college students to participate in volunteer services, as shown in Fig. 1. The model considers the continuing willingness of college students to participate in volunteer services for older adults as an endogenous latent variable, while subjective norms, attitudes and personality traits are regarded as exogenous latent variables. Notably, subjective norms and attitudes play a mediating role in the sequential process of personality traits influencing the continuing willingness of college students to participate in volunteer



**Fig. 1.** A hypothetical model of the continuing willingness of college students to participate in volunteer services for older adults.

services for older adults.

### 3. Data sources and model selection

#### 3.1. Study design

This study was primarily grounded in the TRA, relevant literature, and preliminary research to ensure the superior content validity of the administered questionnaire. Specific items were designed in the form of closed questions. The research group invited experts to review the contents of the questionnaire, and further refined it based on a preliminary investigation involving 30 students from Jiangsu Normal University. Simultaneously, in order to adhere to ethical requirements and minimize social expectation bias, the questionnaire incorporated informational prompts such as ‘there are no right or wrong answers’, ‘participation is voluntary’, ‘questionnaire responses will be kept confidential’ and ‘participants can withdraw at any time’ within its guidance section. All items were evaluated on a 5-level Likert-like scale, with 1 indicating complete disagreement and 5 indicating complete agreement. Among them, the personality trait (PT) variable was designed based on Zhou and Mei (2018)’s research [22], while the attitude (ATT) variable was developed following Mihatsch et al. (2022)’s study [33]. Considering the Chinese context of subjective norm (SN) and drawing from Zhang (2015)’s research, SN variables were categorized into mandatory norms (government, school) and demonstrative norms (family, friends) [45]. Additionally, by referring to Zhang et al. (2022)’s investigation [30], this paper assesses the continuing willingness of college students to participate in volunteer services for older adults (WTP) through two dimensions: willingness to provide future volunteer service and active engagement in volunteer activities. Table 1 presents the description and descriptive statistics of the variables measuring access to information sources.

#### 3.2. Ethical considerations

The ethical review of the program was approved by the Faculty Committee of the School of Public Administration and Society, Jiangsu Normal University (Protocol Ref#: SPAS-ER2021-1). Prior to participation, informed consent was obtained from all participants in accordance with the ethical guidelines and regulations governing human subject research. Data obtained from participants was treated with confidentiality and the privacy of the respondents was maintained. No false promises such as remuneration, food or financial aids were given. No psychological damage was incurred as the questionnaire was administered online and participants filled it in privacy.

**Table 1**  
Variables measuring information sources.

Variables	Description	Mean value	Standard deviation	Maximum value	Minimum value
Personality Trait	PT1:In activities, I am good at communication, self-initiative, optimistic and friendly, speculative and innovative.	3.613	1.182	5	1
	PT2:In activities, I am compassionate, obedient and helpful.	4.219	0.852	5	1
	PT3:In activities, I have curiosity and imagination, and like to accept new ideas.	4.100	0.846	5	2
	PT4:In activities, I am conscientious, conscientious and practical.	4.206	0.780	5	1
	PT5:In activities, I feel anxious and worried, and then prevent it before it happens.	4.094	0.923	5	1
Attitude	ATT1:Helping older adults can make me feel satisfied and fulfilled.	4.213	0.815	5	2
	ATT2:Providing volunteer services is very helpful to older adults.	4.100	0.846	5	2
	ATT3:Volunteer services to help older adults are of great value to society.	4.610	0.611	5	2
	ATT4:It is very important for me to participate in volunteer services to help older adults.	4.248	0.842	5	1
Subjective Norm	SN1:I have a responsibility to help older adults.	4.468	0.703	5	1
	SN2:My family supports me to participate in volunteer services to help older adults.	4.174	0.641	5	2
	SN3:My relatives and friends support me to participate in volunteer services to help older adults.	4.423	0.851	5	1
	SN4:Teachers or leading colleagues support me to participate in volunteer services to help older adults.	4.423	0.676	5	2
	SN5:The school/social environment supports me to participate in volunteer services to help older adults.	4.397	0.754	5	1
Willingness to participate	WTP1:I would like to provide volunteer services to help older adults in the future.	4.371	0.729	5	2
	WTP2:I will actively participate in volunteer services to help older adults.	4.290	0.828	5	1

### 3.3. Data sources

The survey targets of this study encompass college students who have actively participated in a volunteer service project for older adults in Jiangsu Province. From July to September 2021, the research team will use the Simple random sampling method and conduct a comprehensive survey utilizing both online and paper questionnaires. For the paper questionnaire survey, proficient researchers within the group were selected as investigators and underwent rigorous training in advanced research methodologies. Subsequently, offline surveys were conducted at various colleges and universities located in Xuzhou, Jiangsu Province. The investigator explicitly communicates the complete independence of the study to the targeted respondents within the voluntary service community, provides a confidentiality statement, and administers a standardized paper questionnaire with their consent, thereby alleviating potential concerns regarding data protection among participants. The person in charge of the voluntary service organization in Jiangsu Province utilized a standardized electronic questionnaire provided by the "Wenjuanxing" website to distribute a questionnaire link, inviting university students from Jiangsu Province who had participated in volunteer service projects to complete it. Ultimately, a total of 324 questionnaires were collected.

After collecting the questionnaires, initial data processing was conducted by eliminating short answer time, regular questionnaires, and invalid questionnaires with missing values. Subsequently, the data was imported into SPSS 27.0 software for statistical analysis and thorough examination. To address individual data anomalies, the method of replacing anomalous values with their respective average values was employed to ensure comprehensive data cleaning. Ultimately, a total of 310 valid data samples were obtained, yielding an effective rate of 95.7 %. The demographic characteristics of the sample are shown in Table 2.

### 3.4. Research methodology

The proposed theoretical model encompassed complex path relationships, and subjective errors were unavoidable in the measurement of latent variables. Hence, structural equation modelling (SEM) was initiated for the empirical analysis. The SEM comprised measurement models reflecting the relationships between the latent and measurable variables and a structural model indicating the structural associations between the latent variables. The SEM was represented by three matrix equations:

$$X = \Lambda x\xi + \delta \tag{1}$$

$$Y = \Lambda y\eta + \varepsilon \tag{2}$$

$$H = B\eta + \Gamma\xi + \zeta \tag{3}$$

Equations (1) and (2) denote the measurement models, and Equation (3) signifies the structural model, in which  $\eta$  and  $\xi$  are endogenous latent variable and exogenous latent variable matrices, respectively.  $\Lambda x$  and  $\Lambda y$  indicate the relationship coefficient matrices of observed variables X and Y, respectively;  $\delta$ ,  $\varepsilon$  and  $\zeta$  represent residual matrices and  $\eta$  is determined by B and the  $\Gamma$  coefficient matrix. In addition, the error term  $\zeta$  establishes a relationship between the endogenous and exogenous latent variables to construct the SEM. This study encompasses 4 latent variables (PT, SN, ATT, WTP) and 16 observed variables.

## 4. Research analyses and results

### 4.1. Testing of reliability and validity

The Cronbach's  $\alpha$  coefficient, widely employed in academia to assess the internal consistency of each factor, is deemed acceptable if it exceeds 0.7. The reliability of the questionnaire was assessed using SPSS 27.0 software in this study. The results obtained revealed an overall Cronbach's  $\alpha$  coefficient of 0.908, indicating a high level of internal consistency in the questionnaire. Furthermore, the individual latent variables demonstrated Cronbach's  $\alpha$  values ranging from 0.745 to 0.933, suggesting excellent reliability for the selected variables.

**Table 2**  
Descriptive statistics.

Variable	Attribute	Number	Percentage
Gender	Males	139	44.84 %
	Females	171	55.16 %
Age	15–18 years old	13	4.20 %
	19–24 years old	288	92.90 %
	25–30 years old	9	2.90 %
Number of times participating in various volunteer services	1-5 times	179	57.74 %
	6-10 times	50	16.13 %
	11 times and above	81	26.13 %
Political status	Member of the Communist Party of China	21	6.78 %
	Activist of party application	42	13.55 %
	Member of the Communist Youth League	215	69.35 %
	Masses	32	10.32 %



The Kaiser–Meyer–Olkin (KMO) test statistic serves as an indicator for comparing the simple correlation coefficient and the partial correlation coefficient among variables. In this study, the KMO statistic yielded a value of 0.901, while the Bartlett sphericity test demonstrated a significance level of 0.000, indicating that the data were deemed suitable for exploratory factor analysis. The measurable variables of the four latent variables in the hypothesis model were subjected to exploratory factor analysis using SPSS 27.0. To account for variable correlations, the Oblimin oblique rotation method was employed to determine the number of factors.

- (1) Personality trait. Using factor analysis, an effective factor was extracted, in which the measurable variables with a factor load greater than 0.6 were PT1, PT2 and PT4. The cumulative variance explanation rate of the three variables was 62.576 % and Cronbach's  $\alpha$  coefficient was 0.768. The measurable variables of latent personality trait variables were determined as PT1, PT2 and PT4.
- (2) Attitude. Using factor analysis, an effective factor was extracted, in which the measurable variables with factor load greater than 0.6 were ATT3 and ATT4, the cumulative variance explanation rate of the two variables was 58.639 %, Cronbach's  $\alpha$  coefficient was 0.801 and the measurable variables of the latent attitude variable were determined to be ATT3 and ATT4.
- (3) Subjective norms. Using factor analysis, an effective factor was extracted, in which the measurable variables with factor loads greater than 0.6 were SN3, SN4 and SN5, the cumulative variance explanation rate of the three variables was 66.322 %, Cronbach's  $\alpha$  coefficient was 0.875 and the measurable variables of the subjective normative latent variables were determined to be SN3, SN4 and SN5.
- (4) Continuing willingness to participate. Using factor analysis, an effective factor was extracted, in which the measurable variables with factor loads greater than 0.6 were WTP1 and WTP2, the cumulative variance explanation rate of the two variables was 94.109 %, Cronbach's  $\alpha$  coefficient was 0.933 and the measurable variables of the subjective normative latent variables were determined to be WTP1 and WTP2.

The model was optimised using exploratory factor analysis, resulting in a reduced model comprising 4 latent variables and 10 measurable variables. The test results for factor load and reliability of the measurable variables indicate that each latent variable is characterised by only one effective factor within its dimension. Furthermore, the first effective factor contributes to more than 50 % of the total variance, demonstrating strong structural validity for the four latent variables in the proposed model.

#### 4.2. Evaluation of model fit degree

The model fit index indicates the degree of consistency between the sample covariance matrix and the model set by the researcher, including fixed parameters and free parameters, with a better fit index indicating that the research model is more consistent with the sample data. The hypothetical relationship between variables was examined in this study by constructing an SEM using AMOS 26.0 software. The fitting results in Table 3 indicate that the model's overall fit meets the requirements, and the results of the parameter estimation are credible. The SEM design diagram in Fig. 1 is supported.

#### 4.3. Structural path test

##### 4.3.1. Direct effect test

The structural model shows the causal relationships between latent variables and can be employed to validate the hypothesised associations between variables. The results presented in Table 4 demonstrate a substantial positive influence of personality traits on service intention, subjective norms and attitudes. In addition, subjective norms exert a substantial impact on both service intention and attitude. Furthermore, attitude influences service willingness considerably. Consequently, the findings support hypotheses 1, 2, 3, 5, 6 and 7.

##### 4.3.2. Indirect effect test

This study estimated the indirect effect of the model using the bootstrap mediation effect test method of deviation correction. A total of 2000 bootstrap samples were randomly selected assuming a 95 % confidence interval. The upper and lower limits of the confidence interval did not contain 0, indicating the existence of the mediation effect and vice versa [46]. The results in Table 5 revealed that the upper and lower intervals of each variable did not contain 0 at the double-tailed significance detection level  $p < 0.05$ ,

**Table 3**

The fitting results of SEM overall fitness.

Index type	Specific indicator	Evaluation criteria	Fitting value	Fitting result
Absolute fitting index	$\chi^2/df$	<3	2.011	ideal
	Goodness of Fit Index (GFI)	>0.9	0.963	ideal
	Ajusted Goodness of Fit Index (AGFI)	>0.9	0.930	ideal
	Root Mean Square Residual (RMR)	<0.08	0.017	ideal
	Root Mean Square Error Approximation (RMSEA)	<0.08	0.057	ideal
Relative fitting index	Tucker-Lewis Index (TLI)	>0.9	0.979	ideal
	Comparative Fit Index (CFI)	>0.9	0.987	ideal
	Normed Fit Index (NFI)	>0.9	0.974	ideal

**Table 4**  
Results of direct effect test.

hypothesis	Path	Path coefficient	Standardized path coefficient	Standard error	Critical ratio	Test result
Hypothesis 1	PT→WTP	0.144 <sup>b</sup>	0.170 <sup>b</sup>	0.048	3.012	support
Hypothesis 2	SN→WTP	0.331 <sup>a</sup>	0.328 <sup>a</sup>	0.069	4.783	support
Hypothesis 3	PT→SN	0.499 <sup>a</sup>	0.592 <sup>a</sup>	0.062	8.055	support
Hypothesis 5	ATT→WTP	0.713 <sup>a</sup>	0.493 <sup>a</sup>	0.118	6.044	support
Hypothesis 6	PT→ATT	0.185 <sup>a</sup>	0.315 <sup>a</sup>	0.040	4.586	support
Hypothesis 7	SN→ATT	0.413 <sup>a</sup>	0.592 <sup>a</sup>	0.049	8.362	support

Note: PT stands for personality trait, SN stands for subjective norm, ATT stands for attitude and WTP stands for continued willingness to participate in volunteer services for the elderly.

<sup>a</sup>  $p < 0.001$ .

<sup>b</sup>  $p < 0.005$ .

**Table 5**  
Analysis of the mediating effect.

Variables	Coefficient	Bootstrapping						
		$\beta$	Standardisation Error	Bias-corrected		Percentile		Two-tailed salience
				S.E.	Lower	Upper	Lower	
<b>Total effect</b>								
SN→WTP	0.626	0.068	0.501	0.768	0.496	0.759	0.001	
PT→ATT	0.391	0.058	0.297	0.524	0.296	0.524	0.001	
PT→WTP	0.588	0.072	0.461	0.740	0.464	0.744	0.001	
<b>Indirect effect</b>								
SN→ATT→WTP	0.295	0.078	0.173	0.498	0.166	0.475	0.001	
PT→SN→ATT	0.206	0.044	0.134	0.307	0.131	0.303	0.001	
PT→SN→WTP	0.165	0.050	0.071	0.271	0.067	0.267	0.004	
PT→ATT→WTP	0.132	0.044	0.066	0.243	0.063	0.238	0.001	
PT→SN→ATT→WTP	0.147	0.042	0.088	0.257	0.082	0.245	0.000	

Note: PT stands for personality trait, SN stands for subjective norm, ATT stands for attitude and WTP stands for continued willingness to participate in volunteer services for the elderly.

indicating that the mediating effect exists, and Hypothesis 4, Hypothesis 8 and Hypothesis 9 are valid.

4.3.3. Robustness test

The non-experimental method employed in this study lacks experimental manipulation and random assignment to control for potential confounding factors, thereby potentially compromising the validity of the data analysis results due to confounding and spurious associations [47]. Therefore, to validate the theoretical model proposed in this study across different sample groups, SEM multi-group analysis tests were conducted using AMOS 26.0 software for groups with varying gender compositions and frequency of volunteer service participation. Alongside the baseline model (unconstrained), three constrained models were also established: an M1 structural weights model, M2 structural covariances model and M3 structural residuals model. The comparative results of model fit and nested models are presented in Table 6. The baseline model and the three restriction models all exhibited a satisfactory fit. The theoretical model proposed in this study demonstrated cross-gender and cross-participation frequency invariance, indicating its universality among male and female college students with varying levels of participation.

**Table 6**  
SEM multi-group analysis.

Models	P	CMIN/DF	GFI	CFI	NFI	RFI	IFI	TLI	RMSEA
Gender	Unconstrained	0.000	1.859	0.936	0.977	0.953	0.927	0.978	0.053
	M1:Structural weights	0.000	1.768	0.926	0.976	0.946	0.931	0.976	0.05
	M2:Structural covariances	0.000	1.779	0.925	0.975	0.945	0.93	0.975	0.05
	M3:Structural residuals	0.000	1.816	0.922	0.973	0.942	0.929	0.973	0.051
Participation frequency	Unconstrained	0.011	1.381	0.93	0.985	0.949	0.921	0.985	0.035
	M1:Structural weights	0.006	1.367	0.912	0.982	0.935	0.921	0.982	0.035
	M2:Structural covariances	0.008	1.346	0.912	0.982	0.935	0.923	0.983	0.034
	M3:Structural residuals	0.005	1.364	0.905	0.98	0.931	0.922	0.981	0.034
Evaluation criteria [48]	<0.05	<3	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	<0.08



## 5. Discussion

### 5.1. Further analysis of direct effects

Based on the original data of 310 college students who have engaged in volunteer service for older adults in China, this study analyses the influencing factors of willingness to continue to engage in volunteer services for older adults from three dimensions. The results show that personality traits, subjective norms and attitudes all have substantial positive effects on willingness to participate in volunteer services. This is consistent with the results of Poskus (2017) [20], He et al. (2023) [3], Yin et al. (2019) [31] et al. The results presented in Table 4 indicate that among the factors of personality traits, subjective norms and attitude, attitude exerts the strongest influence on service intention. Subjective norms follows as the second most influential factor on service intention, while personality traits ranks third in terms of its impact on service intention. This demonstrates that (1) attitude is the cornerstone of Chinese college students' continuing willingness to participate in voluntary service for older adults. Positive behavioural attitudes lead to positive behavioural intentions. When individuals perceive that engaging in volunteer services can enhance their social experiences, enrich their lives and generate social value, their inclination to participate in volunteer services will be heightened. (2) Subjective norms is the catalyst of Chinese college students' continuing willingness to participate. Our findings are consistent with previous research on the effect of subjective norms on willingness to participate in volunteering [26,27]. Family and educational institutions play pivotal roles in the socialisation process of college students. The provision of social support from various societal levels, including family and school, can enhance students' sense of identity considerably. (3) Individuals who are outgoing, responsible and motivated are more likely to be participants in volunteering. This is consistent with the studies of Matsuba et al. (2007) [19] and Long et al. (2021) [24] because personality traits encompass the holistic manifestation of an individual's cognitive and sensory attributes. Enduring personality characteristics serve as intrinsic motivators for college students to actively engage in volunteer services for older adults, driving their cognitive and behavioural inclinations towards active participation in such endeavours.

In addition, through the direct effect of the path coefficient comparison, this study found that attitude has the greatest impact on Chinese college students' continuing willingness to participate, followed by subjective norms and personality traits on service intention. This is somewhat different from the conclusions of previous studies. Zhou and Mei's (2018) study pointed out that subjective norms have the greatest impact on the intention to participate, followed by attitude and personality traits [22]. Wu et al. (2022) concluded that attitude has the greatest impact on intention to participate, followed by personality traits, and subjective norms has the least impact [25]. This may be due to the differences in sample characteristics, research design, theoretical framework and other aspects of different studies, resulting in different degrees of influence of subjective norms, attitudes and personality traits on willingness to volunteer. Therefore, it is important to remind readers to pay attention to the differences between research results and to look over the methodology, theoretical basis and specific context of the implementation of the various studies behind the differences. This helps to reveal the deep reasons behind the different results and provides richer theoretical and practical guidance for future research. Nevertheless, the conceptual framework established in this study provides a theoretical starting point suitable for the Chinese scenario to further investigate the dynamic mechanism process behind the decision-making of college students' elderly volunteer service participation, and this study also reveals the special role of attitude in the continuing engagement of Chinese college students in the older adults volunteer service.

### 5.2. Further analysis of mediating effects

Further analysis of the effect values in Table 5 found that the direct effect value of PT→WTP is 0.144, while the indirect path through PT→SN→WTP yields a value of 0.165, accounting for 28.06 % of the total effect. In addition, the indirect path via PT→ATT→WTP contributes an effect value of 0.132, representing 22.45 % of the total effect. Furthermore, the indirect path involving PT→SN→ATT→WTP results in an effect value of 0.147, corresponding to 25.00 % of the total effect. In other words, when the PT increases by 1 unit, the WTP can be increased by 0.444 units through SN and ATT, with SN and ATT accounting for 75.51 % of the explanatory power. These findings are similar to the results of previous studies [39,40,44]. This suggests that positive personality traits not only enhance the continuing willingness to participate in volunteer services for older adults but also further bolster their inclination towards such activities by improving subjective norms and attitude. In other words, the extent to which college students with positive personality traits are willing to engage in volunteer services for older adults is largely influenced by their subjective norms and attitude.

The direct effect value of SN→WTP was 0.331, while the indirect effect value of SN→ATT→WTP stood at 0.295, constituting 47.20 % of the total effect. In other words, 1-unit increase in SN leads to a 0.295 unit increase in the WTP through ATT, with ATT accounting for 47.20 % of the explanatory power. This is consistent with the conclusions of Wu et al. (2017) [43] and Al-Swidi et al. (2014) [49]. This suggests that subjective norms not only enhance the continuing willingness to participate in volunteer services for older adults but also further bolster their willingness to engage in such services by improving their attitude. Within the socialisation context of volunteer service, norms encompassing familial, peer and teacher behaviours, expectations and values exert influence on college students' self-concept formation as volunteers. These norms contribute to shaping their sense of identity in this role and fostering a positive attitude towards volunteering for older adults while stimulating their sustained participation.

The direct effect value of PT→ATT was 0.185, while the indirect effect value of PT→SN→ATT stood at 0.206, constituting 52.69 % of the total effect. A 1-unit increase in PT resulted in a corresponding increase of 0.206 units in ATT through SN, with SN contributing to 52.69 % of the explanatory power. Regarding this path setting, Chang (1998) [44] tried to add the causal path of SN-ATT in his study, which improved the model fitting considerably. Similarly, Tarkiainen and Sundqvist's (2005) study improved model results

considerably by setting a modified model of SN-ATT when exploring the relationship between attitude and willingness [50]. The results of this study show that this finding suggests that positive personality traits not only enhance the continuing willingness to participate in volunteer services for older adults but also further bolster their willingness through subjective norms. College students with a heightened sense of responsibility consciously adjust their attitude towards volunteering for older adults to conform to collective norms or align with influential individuals, thereby influencing their sustained participation in such services.

Overall, we synthesise the influence of three dimensions (personality traits, subjective norms and attitudes) on college students' willingness to engage in volunteer service for older adults. The results show that these three factors have a substantial positive impact on the willingness to continue volunteering. Through the analysis of direct and indirect effects, this study not only reveals the central role of attitude in the formation of willingness to participate in voluntary service but also emphasises the mechanism by which subjective norms indirectly affect voluntary service intention by influencing attitude. In addition, the study found that personality traits enhanced the willingness to engage in volunteer service for older adults considerably through the dual mediating effects of subjective norms and attitudes.

These findings have substantial implications for both theory and practice. Theoretically, this study enriches the application of rational behaviour theory in the field of volunteer services and highlights the mediating role of subjective norms and attitudes in transmitting the influence of personality traits on volunteer behaviour. From a practical standpoint, these results underscore the importance of fostering positive attitudes and establishing subjective norms within social and educational environments to cultivate and enhance college students' willingness to engage in volunteer services. By implementing such practical strategies, we can mobilise and sustain college students' continuing involvement in older adults' care services effectively, thereby providing society with more stable and efficient volunteer service resources.

## 6. Conclusions

This study attempts to assess the impact of personality traits, subjective norms and attitudes on the willingness of Chinese college students to participate in voluntary service for older adults. In our empirical research, we first set up the relationship between variables based on theory and literature. Second, we applied the SEM to test these relationships and ensured the rationality and reliability of the constructed model through exploratory factor analysis and fit evaluation. Third, based on the SEM and bootstrap mediation effect test method, this study found that personality traits, subjective norms and attitudes were important factors affecting the willingness to participate continuously, and there was a chain mediating effect in the influencing process. Fourth, we based our discussion on the data results of direct and indirect effects. Direct effect testing showed that service attitude has the strongest influence on the continuing willingness of Chinese college students to engage in volunteer services for older adults ( $p < 0.001$ ), followed by subjective norms ( $p < 0.001$ ) and personality traits ( $p < 0.005$ ). The indirect effect test showed that attitude mediates the relationship between subjective norms and the continuing willingness to engage in volunteer services for older adults, while subjective norms act as a mediator between personality traits and attitude. In addition, a chain mediating role of subjective norms and attitude is pivotal in the association between personality traits and the willingness of Chinese college students to engage in voluntary service for older adults. Finally, the robustness test results showed that the hypothetical model has cross-gender and cross-frequency invariance. In general, this study offers an innovative perspective on the chain influencing mechanism of the continuing willingness of college students to participate in volunteer services for older adults, thereby providing a novel lens for comprehending their inclination towards such activities. Furthermore, it underscores the significance of the TRA in informing policy design aimed at promoting college students' participation in volunteer services for older adults.

## 7. Policy recommendations

- (1) Colleges and universities should enhance the promotion and education of the volunteer spirit, augment college students' understanding of volunteering activities with older adults through thematic education, dissemination of exemplary achievements and other campus and societal initiatives, thereby fortifying individual ideological values and social responsibility and stimulating their enthusiasm for active participation. Simultaneously, it is imperative to foster and stimulate the inclination of college students towards volunteering by leveraging their peers and friends. This can be achieved by organising impactful events such as symposiums and presentations highlighting the commendable contributions of exemplary student volunteers. Such initiatives are crucial in recognising the influential role of peer norms in shaping a positive attitude and willingness among college students to engage in volunteer activities.
- (2) It is imperative to establish a policy framework that fosters the sustained engagement of university students. A good external environment helps to promote the continuing willingness of college students to serve older adults. Such a conducive environment should encompass effective incentives, adequate security measures, humanistic social care and due attention and support from institutions of higher learning and social organisations, among other elements. Appropriate consideration should be given to incorporating the duration and quality of college students' volunteer service into the school's evaluation system, while actively guiding them to register on the volunteer service website and ensuring effective record management of their care services for older adults.
- (3) Volunteering for older adults' care services represents behaviour that exhibits selfless dedication, and college students understand the value they provide. Motivating young volunteers to offer volunteer services freely for older adults entails recognising and affirming the work performed by the youth; however, it also serves as a good opportunity to enhance young people's cultural identity of caring for elders. Therefore, volunteering for older adults' care helps the youth and the nation in

several ways: improving social identity, changing the traditional pension culture, evolving a social identity conducive to the engagement of young people in pension services through volunteer services, creating a constructive atmosphere conducive to the promotion of volunteer services and ameliorating the sense of self-acquisition and satisfaction in young volunteers.

## 8. Limitations and scope of the future study

However, our study had its limitations. First, there may be interaction between the four latent variables of this study. Future research should aim to enhance the theoretical model, and readers should be mindful of possible interaction effects that may constrain the generalisability of our findings. Second, the theoretical model of this study did not incorporate demographic and policy context variables. Therefore, it is imperative to conduct further research on the impact of these relevant factors on college students' continuing willingness to participate in volunteer services for older adults. Third, this study was conducted in Jiangsu Province, China. Consequently, the findings may be subject to cultural and economic factors specific to this region, necessitating further validation for their generalisability. Fourth, mediation analysis was used in this study, and there is a limitation of using non-experimental cross-sectional data. Future studies need to examine this effect to improve the validity and certainty of this causal model. Nevertheless, the conceptual framework established in this study provides a theoretical starting point suitable for the Chinese scenario to further investigate the dynamic mechanism process behind the decision-making of college students' elderly volunteer service participation.

## Ethics approval and consent to participate

This study was initiated after approval from the Faculty Committee of the School of Public Administration and Society, Jiangsu Normal University (Protocol Ref#: SPAS-ER2021-1).

## Funding statement

This work was supported by Education Science Planning project of Jiangsu Province (C/2023/01/63); Undergraduate Education and Teaching Reform Research Project of Jiangsu Normal University (JKTY202303); Innovation and Entrepreneurship Training Program for College Students in Jiangsu Province (202210320152Y); Jiangsu Graduate Research and Practice Innovation Plan Project (KYCX22-2760 , 2024XKT0432).

## CRedit authorship contribution statement

**Ying Chen:** Writing – review & editing, Supervision, Investigation, Funding acquisition, Data curation. **Bo Hou:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Qiang Liu:** Writing – review & editing, Software, Methodology. **Jing Xie:** Visualization, Supervision.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References

- [1] The Ministry of Civil Affairs, Let the basic old-age service benefit every elderly, Beijing, <https://www.mca.gov.cn/n152/n166/c47591/content.html>, 2023.
- [2] Y.Y. Mei, S.Q. Pang, H.J. Zhao, et al., Cognition on and time for volunteer service for seniors of young people, *J. Nurs.* 23 (12) (2016) 1–4, <https://doi.org/10.16460/j.issn1008-9969.2016.12.001>.
- [3] H. Hui, X.L. Zhao, Y. Li, Research on factors influencing college students' participation in volunteer services for community-based elderly care, *J. Chin. Youth. Soc. Sci.* 42 (2) (2023) 88–94, <https://doi.org/10.16034/j.cnki.10-1318/c.2023.02.012>.
- [4] Z.D. Li, M.T. Shang, M.C. Hu, Hot topics and development of individual resilience of Chinese young college students: visual analysis based on three Chinese databases from 2000 to 2020, *Chin. J. Health Psychol.* 30 (7) (2022) 1092–1100, <https://doi.org/10.13342/j.cnki.cjhp.2022.07.027>.
- [5] H.M. Yan, Y.F. Xu, H.J. Chen, Characteristics of college student volunteer services since the reform and opening up and development trends in the new era, *Ideo. Theor. Ed.* 4 (2018) 102–107, <https://doi.org/10.16075/j.cnki.cn31-1220/g4.2018.04.018>.
- [6] L. Chen, D. Li, Y. Li, Does volunteer service foster education for a sustainable future?—empirical evidence from Chinese university students, *Sustain. Times* 15 (14) (2023) 11259.
- [7] T.M. Cruce, J.V. Moore, First-year students' plans to volunteer: an examination of the predictors of community service participation, *J. Coll. Student Dev.* 48 (6) (2007) 655–673, <https://doi.org/10.1353/csd.2007.0063>.
- [8] M.A. Lee, Volunteering and happiness: examining the differential effects of volunteering types according to household income, *J. Happiness Stu.* 20 (3) (2019) 795–814, <https://doi.org/10.1007/s10902-018-9968-0>.
- [9] S.E. Hobfoll, Personal characteristics of the college volunteer, *Am. J. Commun. Psychol.* 8 (4) (1980) 503–506, <https://doi.org/10.1007/BF00912860>.
- [10] M. Cowles, C. Davis, The subject matter of psychology: volunteers, *Brit. J. Soc. Psychol.* 26 (2) (1987) 97–102, <https://doi.org/10.1111/j.2044-8309.1987.tb00769.x>.
- [11] A.A.j. Van Goethem, A. Van Hoof, M.A.G. Van Aken, et al., Socialising adolescent volunteering: how important are parents and friends? Age dependent effects of parents and friends on adolescents' volunteering behaviours, *J. Appl. Dev. Psychol.* 35 (2) (2014) 94–101, <https://doi.org/10.1016/j.appdev.2013.12.003>.
- [12] B.M.F. Law, D.T.L. Shek, C.M.S. Ma, Validation of family, school, and peer influence on volunteerism scale among adolescents, *Res. Social Work Prac.* 23 (4) (2013) 458–466, <https://doi.org/10.1177/1049731513476144>.
- [13] H.W. Marsh, A.J.S. Morin, P.D. Parker, et al., Exploratory structural equation modeling: an integration of the best features of exploratory and confirmatory factor analysis, *Annu. Rev. Clin. Psychol.* 10 (2013) 85–110, <https://doi.org/10.1146/annurev-clinpsy-032813-153700>.

- [14] B. Hou, Y. Xu, Z.W. Wang, et al., The role of social fairness perceptions in farmers' continued participation in environmental governance: a China scenario, *Agric. Res.* (2024) 1–9, <https://doi.org/10.1007/s40003-023-00688-1>.
- [15] M. Fishbein, I. Ajzen, *Belief, Attitude, Intention, and Behavior: an Introduction to Theory and Research*, Addison-Wesley Press, Massachusetts, 1975.
- [16] N. Wei, B.B. Guo, Motivation analysis of voluntary service from the perspective of rational choice institutionalism, *Teach. Res.* 449 (3) (2016) 65–70.
- [17] Y. Zeng, Q. Tao, Value rationality and instrumental rationality of voluntary service and their relationship, *Stud. Ideological. Educ.* 183 (8) (2010) 52–56.
- [18] I. Ajzen, The theory of planned behaviour: reactions and reflections, *Psychol. Health* 26 (9) (2011) 1113–1127, <https://doi.org/10.1080/08870446.2011.613995>.
- [19] M.K. Matsuba, D. Hart, R. Atkins, Psychological and social-structural influences on commitment to volunteering, *J. Res. Pers.* 41 (4) (2007) 889–907, <https://doi.org/10.1016/j.jrp.2006.11.001>.
- [20] M.S. Poskus, R. Zukauskienė, Predicting adolescents' recycling behavior among different big five personality types, *J. Environ. Psychol.* 54 (2017) 57–64, <https://doi.org/10.1016/j.jenvp.2017.10.003>.
- [21] J.M. Roos, A. Kazemi, Personality traits and Internet usage across generation cohorts: insights from a nationally representative study, *Curr. Psychol.* 40 (3) (2021) 1287–1297, <https://doi.org/10.1007/s12144-018-0033-2>.
- [22] Y. Zhou, Q. Mei, Study on influencing factors of travel voluntary service intention based on TPB theory, *Tour. Sci.* 32 (3) (2018) 63–79+85, <https://doi.org/10.16323/j.cnki.lykx.2018.03.007>.
- [23] Z. Huang, Q.P. Wang, P. Chen, et al., Association of big five personality types with social media use and health information sharing behavior in older adults in Beijing, *Med. Soc.* 36 (11) (2023) 107–112, <https://doi.org/10.13723/j.yxysh.2023.11.018>.
- [24] J.W. Long, Q.J. Chen, Z.F. Hu, The construction of intergenerational harmonious psychological contract in the Chinese context of population aging in the perspective of positive psychology, *J. South China Norm. Univ. (Soc. Sci.)* (5) (2021), 55–63+205–206.
- [25] W. Wu, H.Y. Yu, X.H. Zhou, Identifying factors affecting willingness to participate in floating population health volunteer services by Chinese volunteers based on the theory of the planned behavior expansion model, *Front. Psychol.* 13 (2022) 953575, <https://doi.org/10.3389/fpsyg.2022.953575>.
- [26] S.K. Huang, X.X. Wei, The faith affecting the residents' participation in the savings of pension services, *South China Popul.* 28 (2) (2013) 28–38.
- [27] H. Cui, R. Sun, Y. Wang, et al., Investigation and influencing factors of the behavioral intention of nurses voluntarily participating in the care of older adults with disabilities, *Int. J. Nurs. Sci.* 10 (1) (2023) 64–71, <https://doi.org/10.1016/j.ijnss.2022.12.008>.
- [28] T.L. Milfont, C.G. Sibley, The big five personality traits and environmental engagement: associations at the individual and societal level, *J. Environ. Psychol.* 32 (2) (2012) 187–195, <https://doi.org/10.1016/j.jenvp.2011.12.006>.
- [29] T. Veludo-de-Oliveira, J.G. Pallister, G.R. Foxall, Accounting for sustained volunteering by young people: an expanded TPB, *Voluntas: int. J. Volunt. Nonprofit. Organ.* 24 (4) (2013) 1180–1198, <https://doi.org/10.1007/s11266-012-9317-6>.
- [30] B.S. Zhang, X. Li, X.Y. Li, et al., Research on the Influence mechanism of subjective norm on university students' volunteer engagement: a chain double-mediation with adjustment model, *Psychol. Dev. Educ.* 38 (5) (2022) 658–666, <https://doi.org/10.16187/j.cnki.issn1001-4918.2022.05.06>.
- [31] H.Y. Yin, F. Lu, Q.C. Huang, The willingness and influencing factors of "time bank" pension volunteer service based on perspective of college students, *Chin. J. Gerontol.* 39 (3) (2019) 716–720, <https://doi.org/10.3969/j.issn.1005-9202.2019.03.066>.
- [32] H. Wang, Q.H. Deng, College students' volunteer service activities: participation status and construction of long-term mechanism —— based on the national large-scale questionnaire survey, *China Youth Study* 198 (8) (2012) 46–50, <https://doi.org/10.19633/j.cnki.11-2579/d.2012.08.010>.
- [33] L. Mihatsch, M. von der Linde, F. Knolle, et al., Survey of German medical students during the COVID-19 pandemic: attitudes toward volunteering versus compulsory service and associated factors, *J. Med. Ethics* 48 (9) (2022) 630–636, <https://doi.org/10.1136/medethics-2020-107202>.
- [34] I. Ajzen, M. Fishbein, S. Lohmann, et al., The influence of attitudes on behavior, in: *The Handbook of Attitudes, Volume 1: Basic Principles*, 2018, pp. 197–255.
- [35] M.C. Ashton, K. Lee, Honesty-humility, the big five, and the five-factor model, *J. Pers.* 73 (5) (2005) 1321–1354, <https://doi.org/10.1111/j.1467-6494.2005.00351.x>.
- [36] S.X. Zhang, Research into the causality between sports behaviors and sports attitudes of university student, *J. Phys. Educ.* 3 (2003) 50–51, <https://doi.org/10.16237/j.cnki.cn44-1404/g8.2003.03.018>.
- [37] G. Carlo, M.A. Okun, G.P. Knight, et al., The interplay of traits and motives on volunteering: agreeableness, extraversion and prosocial value motivation, *Pers. Individ. Differ.* 38 (6) (2005) 1293–1305, <https://doi.org/10.1016/j.paid.2004.08.012>.
- [38] Q.C. Wang, R. Chang, Q. Xu, et al., The impact of personality traits on household energy conservation behavioral intentions—an empirical study based on theory of planned behavior in Xi'an, *Sustain. Energy Tech. Assess.* 43 (2021), <https://doi.org/10.1016/j.seta.2020.100949>.
- [39] A.B. Taylor, D.P. MacKinnon, J.Y. Tein, Tests of the three-path mediated effect, *Organ. Res. Methods* 11 (2) (2008) 241–269, <https://doi.org/10.1177/1094428107300344>.
- [40] A. Hershberger, M. Connors, M. Um, et al., The theory of planned behavior and e-cig use: impulsive personality, e-cig attitudes, and e-cig use, *Int. J. Ment. Health Addict.* 16 (2018) 366–376, <https://doi.org/10.1007/s11469-017-9783-6>.
- [41] J.W. Wang, C.N. Wei, K. Harada, et al., Applying the social cognitive perspective to volunteer intention in China: the mediating roles of self-efficacy and motivation, *Health Promot. Int.* 26 (2) (2011) 177–187, <https://doi.org/10.1093/heapro/daq056>.
- [42] I. Ajzen, The theory of planned behavior, *Organ. Behav. Hum. Dec.* 50 (2) (1991) 176–211, [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- [43] G. Wu, L.F. Chen, Y.B. Zhang, et al., Study on e-waste recycling behavior intention from the standard/non-standard and emotional/rational perspective, *Soft. Science* 31 (3) (2017) 135–138, <https://doi.org/10.13956/j.ss.1001-8409.2017.03.29>.
- [44] M.K. Chang, Predicting unethical behavior: a comparison of the theory of reasoned action and the theory of planned behavior, *J. Bus. Ethics* 17 (16) (1998) 1825–1834, <https://doi.org/10.1023/A:1005721401993>.
- [45] G.L. Zhang, L.L. Zhang, X. Qiu, et al., Mechanism of fishermen's participation in professional cooperative organizations based on planned behavior theory, *Agric. Econ.* 36 (8) (2015) 97–104, <https://doi.org/10.13246/j.cnki.iae.2015.08.014>.
- [46] K.J. Preacher, A.F. Hayes, SPSS and SAS procedures for estimating indirect effects in simple mediation models, *Behav. Res. Methods Instrum. Comput.* 36 (2004) 717–731, <https://doi.org/10.3758/bf03206553>.
- [47] A.F. Hayes, *Introduction to Mediation, Moderation, and Conditional Process Analysis: a Regression-Based Approach*, The Guilford Press, North Carolina, 2017.
- [48] T.D. Little, Mean and covariance structures (MACS) analyses of cross-cultural data: practical and theoretical issues, *Multivar. Behav. Res.* 32 (1) (1997) 53–76, [https://doi.org/10.1207/s15327906mbr3201\\_3](https://doi.org/10.1207/s15327906mbr3201_3).
- [49] A. Al-Swidi, S.M.R. Huque, M.H. Hafeez, et al., The role of subjective norms in theory of planned behavior in the context of organic food consumption, *Brit. Food J.* 116 (10) (2014) 1561–1580, <https://doi.org/10.1108/BFJ-05-2013-0105>.
- [50] A. Tarkiainen, S. Sundqvist, Subjective norms, attitudes and intentions of Finnish consumers in buying organic food, *Brit. Food J.* 107 (11) (2005) 808–822, <https://doi.org/10.1108/00070700510629760>.