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Knowledge of aging, attitudes toward older people and willingness to engage in geriatric rehabilitation among rehabilitation students in southwestern China: a cross-sectional study

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Abstract

Background As the global elderly population rises, providing quality care for older adults is increasingly challenging. Rehabilitation technicians are crucial in this effort. Their knowledge and attitudes significantly impact care quality and their willingness to work with the elderly. While many studies have examined healthcare professionals' attitudes toward older adults, few focus on rehabilitation students. This study assesses Chinese rehabilitation students' knowledge of aging, attitudes toward older individuals, willingness to care for them, and the factors influencing these aspects.

Methods A sample of 890 rehabilitation students from three colleges and universities in southwestern China was investigated with a self-administered questionnaire, which included socio-demographic information, the Palmore Facts on Aging Quiz, the Kogan's Attitude towards Older People Scale and the Chinese Version of the Interpersonal Reactivity Index. Data analyses were conducted using SPSS version 25.0. Descriptive statistics were used to illustrate the demographic characteristics of the respondents. The frequency and percentage of responses was calculated. Means and standard deviations were computed for general knowledge of aging, attitudes toward older people, and empathy. Independent t-tests and one-way ANOVA assessed differences in FAQ, KAOP, and IRI-C scores between groups. Pearson's correlation examined correlations among general knowledge of aging, attitudes toward older people and empathy ability. Chi-square or Fisher's exact tests compared willingness to engage in geriatric rehabilitation across different respondent characteristics. Hierarchical multiple regression analysis explored the independent effect of different variables on attitudes toward older people.

Results The Chinese rehabilitation students from three colleges and universities in southwestern China displayed a relatively low level of knowledge about aging, but a generally positive attitude towards older people. Females had significantly more positive attitudes toward older people than males ($p < 0.01$). The students who had previous experience of being cared for by (maternal) grandparents, living with the elderly, and taking care of the elderly showed significantly more positive attitudes toward older people ($p = 0.001$, 0.007 and 0.007 , respectively) and a significantly stronger willingness to engage in geriatric rehabilitation ($p = 0.013$, < 0.01 and < 0.01 , respectively) than

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those who had not had these experiences. Students with good relationships with older people had more positive attitudes toward the elderly ($p < 0.01$) and greater willingness to engage in geriatric rehabilitation ($p < 0.01$). Those with frequent contact with the elderly also showed more positive attitudes ($p < 0.01$) and a stronger willingness to engage in geriatric rehabilitation ($p = 0.002$) compared to those with less contact. Knowledge of aging and empathy ability were both significantly positively related to attitudes toward older people and both independent predictors of attitudes toward older people ($r = 0.143, p < 0.01$ and $r = 0.337, p < 0.01$).

Conclusions It is crucial to prepare rehabilitation students with adequate knowledge and positive attitudes to ensure the quality of rehabilitation and care provided to older people. Educators should adopt effective strategies to promote rehabilitation students' geriatric rehabilitation knowledge and increase their positive attitudes toward older people.

Keywords Knowledge of aging, Older people, Attitudes, Rehabilitation students, Geriatric rehabilitation

Background

The world population of older people is increasing rapidly [1, 2]. In developed countries, persons aged 60 years and above are expected to increase from 11.5% in 2012 to 22% by 2050 [2, 3]. With the shift in demographics and increase in life expectancy, the risk of chronic diseases, functional disabilities, dysfunction, cognitive impairments and dependence increased [4, 5]. This phenomenon increases the greater demand for rehabilitation worldwide. But in many parts of the world, this growing need for rehabilitation remains largely unmet, with more than 50% of people living in some low- and middle-income countries do not receive required rehabilitation services [6].

China has the largest elderly population in the world [7]. The percentage of adults aged 65 and over has increased from 123 million (9.1%) in 2011 to 200 million (14.2%) in 2021 [8]. By 2050, China's population aged 65 and over will reach 395 million [9]. This phenomenon makes China particularly vulnerable to the burdens associated with caring for older adults, and the need for rehabilitation treatment is relatively high [6, 7]. Rehabilitation education was started in the 1990s in China [10]. Since 2001, The Ministry of Education has initiated the cultivation of rehabilitation therapists by approving five colleges and universities to offer undergraduate education in rehabilitation therapy [11, 12]. After more than two decades of development, approximately 500 colleges and universities in China have established professional disciplines related to rehabilitation treatment, and the number of technical personnel specializing in this field has exceeded 14,000 [6].

The goal of geriatric rehabilitation is to optimize functional ability, facilitate activity and retain functional reserve and social participation in older individuals [2, 13]. The quality of health services given to the elderly is strongly affected by the attitudes of healthcare professionals toward them [4, 14]. A negative attitude towards older people has been reported among healthcare professionals and has been viewed as an obstacle to supplying quality healthcare and treatment for older individuals [15,

16]. Although there are numerous studies about healthcare professionals' attitudes toward older people, most of these studies focused on nursing and medical students, with few studies on rehabilitation students. The aim of the present study was thus to assess rehabilitation students' knowledge of aging, attitudes toward older individuals, the willingness to care for older people and factors influencing rehabilitation students' knowledge and attitudes in a Chinese context.

Methods

Design and participants

This cross-sectional, questionnaire-based descriptive study was conducted from October 2022 to March 2023 in three colleges and universities located in Chongqing, one of the four direct-administered municipalities of China. Convenience sampling was applied. All rehabilitation students from Chongqing Medical and Pharmaceutical College, Chongqing Medical University, and Chongqing Three Gorges Medical College in China were eligible to participate in the study. There were no exclusion criteria. The study was approved by the Ethical Committee of Chongqing Medical and Pharmaceutical College (KYLSC20220918003). All participants were informed about the goals of the study and then signed an informed consent form. To ensure the confidentiality, questionnaires were submitted anonymously. A sample size of 385 was calculated using the formula for cross-sectional surveys: $n = z^2 / 4d^2$, where $z = 1.96$ for a 95% confidence level and $d = 5\%$ represents the margin of error [17]. Considering a 20% attrition rate, the minimum sample size is 482. The sample size obtained in this study was 890.

Instruments

The self-administered questionnaire used in this study consisted of 4 sections or measures, namely socio-demographic information, the Paltrow Facts on Aging Quiz (FAQ), the Kogan's Attitude towards Older People Scale (KAOP) and the Chinese Version of the Interpersonal Reactivity Index (IRI-C).

Socio-demographic information

The socio-demographic section was designed by the research team to collect the general characteristics of rehabilitation students, including gender, age, the highest level of education, grade, place of residence, whether the only child in the family, household income per month, studied geriatric rehabilitation or not, previous experience caring for by (maternal) grandparents, previous experience living with older people, previous experience caring for older people, relationship with older people, frequency of contacting with older people, willing to engage in work related to geriatric rehabilitation after graduation.

The Palmore facts on aging quiz (FAQ)

The Palmore's Facts on Aging Quiz [18] was adopted to measure general knowledge of aging. The FAQ is a self-report scale containing 25 questions with a "true", "false" or "don't know" response. The statements cover some physical, mental, social and economic factors as well as the most frequent misconceptions related to aging. A score of 1 is assigned to a correct response and a score of 0 to an incorrect response or "don't know". A total score ranges from 0 to 25, with higher scores indicating greater knowledge of aging. The Chinese version of the questionnaire has been translated and demonstrates adequate reliability and validity [19, 20].

Kogan's attitude towards older people scale (KAOP)

The Kogan's Attitude towards Older People Scale (KAOP) was used to assess attitudes toward older people [21]. This tool has been widely adopted to examine attitudes toward older people [4, 14, 22]. The KAOP comprises 34 statements: 17 positive and 17 negative statements. Responses are graded using a 7-point Likert scale ranging from "strongly disagree" (1 point) to "strongly agree" (7 points). The negative statements are reverse-scored. The total summed score range is 34 to 238, and 119 is the neutral middle score. Higher scores indicate more positive attitudes toward older people. The instrument has been translated into Chinese and has demonstrated good structural validity, content validity and reliability [23].

Chinese version of the interpersonal reactivity index (IRI-C)

The Interpersonal Reactivity Index (IRI) is a self-report instrument developed by Davis based on the multidimensional nature of empathy, which intends to assess empathy ability [24]. The Chinese version of the IRI (IRI-C) has been translated and validated in the Chinese environment [25, 26]. The IRI-C comprises 22 items and four subscales, namely, Perspective Taking (i.e., PT, five items), Empathic Concern (i.e., EC, six items), Fantasy (i.e., FS, six items) and Personal Distress (i.e., PD, five items). PT evaluates the other person's psychological

perspective. EC assesses interests, concerns and feelings for the other person. FS measures one's tendency to transpose oneself imaginatively into the situations and feelings of fictional characters portrayed in books, photos, or films. PD evaluates one's feelings of anxiety and discomfort in stressful interpersonal situations. PT and FS represent the cognitive trait of empathy, while EC and PD represent the emotional trait of empathy. Each item is rated on a 5-point Likert scale ranging from "not true at all" (0 points) to "extremely true" (4 points). Negative items 2,5,10,11 and 14 are reverse-coded questions. A higher score demonstrates a higher level of empathy and greater empathy ability.

Statistical analysis

All data analyses were performed using the Statistical Package for Social Sciences (SPSS) 25.0 version (SPSS Inc, Chicago, Illinois). Descriptive statistics were used to illustrate the demographic characteristics of the respondents. The frequency and percentage of responses were calculated. Mean and standard deviation were calculated for the general knowledge of aging, attitudes toward older people and empathy ability. Differences in scores of FAQ, KAOP and IRI-C between groups were tested using independent t-test and one-way ANOVA. Pearson's correlation was used to examine correlations among the general knowledge of aging, attitudes toward older people and empathy ability. The chi-square test or Fisher's exact test was used to compare respondents with different characteristics in willingness to engage in geriatric rehabilitation for older people.

Hierarchical multiple regression analysis was performed to explore the independent effect of different variables on attitudes toward older people. All demographic variables were entered in model 1. Before entering the model, dummy variables were set for categorical variables. In models 2 and 3, the general knowledge of aging and four subscales of empathy ability were sequentially entered. Standardized estimate (β), F, R^2 and R^2 -changes (ΔR^2) were given for each model.

Results

Demographic characteristics

A total of 890 participants were studied in this study. The mean age of the respondents was 19.1 years ($SD \pm 1.22$) and ranged from 17 to 25 years. Demographic characteristics of the participants are presented in Table 1. Among the 890 rehabilitation students, 680 (76.4%) were females, 783 (88%) were studying for a vocational degree, and 864 (97.1%) were juniors. The majority of the respondents (57.1%) had not studied geriatric rehabilitation and an overwhelming majority (86.3%) had previous experience of living with older people. 71.8% of the respondents reported having previous experience of being cared for

Table 1 Demographic characteristics of participating rehabilitation students and mean scores on assessments($n = 890$)

Characteristics	N(%)
Gender	
Male	210(23.6)
Female	680(76.4)
Age	
17–19	631(70.9)
20–25	259(29.1)
Highest level of education	
Vocational	783(88)
Bachelor	107(12)
Grade	
1st	628(70.6)
2nd	236(26.5)
3rd	21(2.4)
4th	5(6)
Place of Residence	
Urban	287(32.2)
Rural	603(67.9)
Only child in the family	
Yes	221(24.8)
No	669(75.2)
Household income per month	
< RMB 2000	172(19.3)
RMB 2000–5000	416(46.7)
RMB 5000–10,000	231(26)
> RMB 10,000	71(8)
Have you studied geriatric rehabilitation?	
Yes	382(42.9)
No	508(57.1)
Do you have previous experience of being cared for by (maternal) grandparents?	
Yes	639(71.8)
No	251(28.2)
Do you have previous experience of living with older people?	
Yes	768(86.3)
No	122(13.7)
Do you have previous experience of taking care of older people?	
Yes	614(69)
No	276(31)
Relationship with older people	
Harmony	716(80.4)
General	170(19.1)
Bad	4(4)
Frequency of contacting with older people	
Frequent contact	331(37.2)
General	457(51.3)
Not much contact	102(11.5)
Are you willing to engage in work related to geriatric rehabilitation after graduation?	
Willing	373(41.9)
Unwilling	82(9.2)
Uncertain	435(48.9)
Reasons for unwillingness to engage in work related to geriatric rehabilitation (multiple choice)	

Table 1 (continued)

Characteristics	N(%)
Older people are unhygienic	131(14.7)
It is difficult for the elderly to communicate	384(43.1)
Older people are boring	52(5.8)
No challenge	104(11.7)
The work is relatively hard	428(48.1)
Unpleasant experiences with older people in the past	100(11.2)
Lower salary	376(42.2)
Disrespected	188(21.1)
Total FAQ, Mean \pm SD	9.9 \pm 3.95
Total KAOP, Mean \pm SD	161.65 \pm 23.78
Total IRI-C, Mean \pm SD	51.46 \pm 11.19

Note: FAQ the Palmore Facts on Aging Quiz, KAOP the Kogan's Attitude towards Older People Scale, IRI-C the Chinese Version of the Interpersonal Reactivity Index

by grandparents or maternal grandparents and 69% had previous experience of taking care of older people. A large majority (88.5%) of the participants contacted frequently or generally with older people and most of them had a good relationship with older people (80.4%). When asked about their willingness to engage in work related to geriatric rehabilitation after graduation, 41.9% of the students considered it as a valid option and 48.9% were unsure. Then further asked about the reasons for unwillingness to engage in work related to geriatric rehabilitation. The three most selected choices were: The work is relatively hard (48.1%), it is difficult for the elderly to communicate (43.1%) and lower salary (42.2%) (Table 1).

Levels of knowledge of aging, attitude towards older people and empathy ability

The mean FAQ's score was 9.9 ± 3.95 (Table 1). All rehabilitation students in the study had one or more misunderstandings about aging. The majority of the rehabilitation students incorrectly viewed the following issues as normal and unavoidable problems for older adults: Loss of interest/ability in sexual activity (77.8%), Feeling sad and desolate most of the time (69.3%), Depression (67.1%), Low income (80.8%), More religious (81%) and being socially isolated (58.7%). Moreover, they perceived older people to be less productive than younger people (72.7%) and less capable of adapting to change (69.1%). However, most rehabilitation students correctly identified some of the challenges older adults face, including declines in lung function (77.5%), sensory abilities (sight, hearing, taste, touch and smell) (79.6%), physical strength (77.4%) and response capability (67.3%), as well as taking longer to learn new things (74.3%) (Table 2). The students had the willingness to engage in work related to geriatric rehabilitation after graduation scored significantly higher in FAQ than those uncertain ($p < 0.01$) (Table 3).

Table 2 The responses on the Palmore facts on aging quiz ($n=890$)

Item	Knowledge Item	Correct answer	Correct responses		Incorrect responses
			N	%	%
1	Most elderly people suffer from senility, such as memory defects, mental confusion or lack of judgment.	False	441	49.6	50.4
2	The five senses of vision, hearing, taste, touch and smell in the elderly are relatively weak.	Ture	708	79.6	20.4
3	Most older people have no interest in and inability to have sexual relations.	False	198	22.2	77.8
4	The lung function of the elderly is relatively weak and the vital capacity tends to be reduced.	Ture	690	77.5	22.5
5	Most older people feel sad and desolate most of the time.	False	273	30.7	69.3
6	The physical strength of the elderly is relatively weak.	Ture	689	77.4	22.6
7	At least 10% of the elderly live in nursing homes (such as mental nursing homes and apartments for the elderly) for a long time.	False	319	35.8	64.2
8	Older drivers are less likely to be involved in traffic accidents than younger drivers.	Ture	240	27	73
9	Older people are less productive than younger people.	False	243	27.3	72.7
10	More than 75% of seniors are physically and mentally capable to complete their daily activities independently.	Ture	382	42.9	57.1
11	Most older people cannot adapt to change.	False	275	30.9	69.1
12	Older people often take longer to learn new things.	Ture	661	74.3	25.7
13	Depression is more common in older people than in younger people.	False	293	32.9	67.1
14	Older people don't respond as well as younger people.	Ture	599	67.3	32.7
15	Generally speaking, older people are very similar.	False	273	30.7	69.3
16	Most older people say they are rarely bored.	Ture	282	31.7	68.3
17	Most older people are socially isolated.	False	368	41.3	58.7
18	Older people have fewer workplace accidents than younger people.	Ture	237	26.6	73.4
19	People over 65 years old account for more than 15%.	False	138	15.5	84.5
20	Most medical staff will not give priority to the elderly for medical treatment.	Ture	142	16	84
21	The income of most elderly people is below the low-income standards set by the government.	False	171	19.2	80.8
22	Most older people continue to work or hope to work, such as doing housework or volunteering.	Ture	495	55.6	44.4
23	Older adults become more religious with age.	False	169	19	81
24	Most older adults say they are less easily upset or angry.	Ture	359	40.3	59.7
25	The health and economic status of older adults may remain the same or decline in 2020 (compared to younger adults).	False	167	18.8	81.2

The mean score on the KAOP was 161.65 ± 23.78 , indicating that the rehabilitation students generally had a positive attitude towards older people (defined as > 119 points) (Table 1). Independent t test found that females had significantly more positive attitude towards older people than males ($p < 0.01$) (Table 3). No differences were found between grades, nor after studying geriatric rehabilitation. The students who had previous experience of being cared for by (maternal) grandparents, living with the elderly, and taking care of the elderly showed significantly more positive attitudes toward older people than those had not have these experiences ($p = 0.001, 0.007$ and 0.007 , respectively) (Table 3). The students who had good relationship with older people exhibited a significantly more positive attitude towards the elderly than those who had general or bad relationship with older people ($p < 0.01$ and $p = 0.009$, respectively). Compared with the students who had regular or less contact with the elderly, the students who had frequent contact with the elderly had significantly more positive attitudes toward the elderly ($p < 0.01$). Moreover, the participants who had the

willingness to engage in work related to geriatric rehabilitation after graduation yielded significant higher scores on KAOP than those who did not have the willingness or uncertain ($p < 0.01$) (Table 3).

The empathy scores ranged from 20 to 85, with a mean score of 51.46 ± 11.19 (Table 1). Independent t test showed that females' empathy ability was significantly higher than that of males ($p = 0.001$) (Table 3).

Comparison of willingness to engage in geriatric rehabilitation for older people by demographic characteristics

Chi-square test or Fisher's exact test found that there was no significant difference between willingness to engage in geriatric rehabilitation and gender, age, education level, grade or place of residence. The students who had studied geriatric rehabilitation, had previous experience of being cared for by (maternal) grandparents, living with the elderly, and taking care of the elderly showed significantly stronger willingness to engage in geriatric rehabilitation ($p = 0.006, 0.013, < 0.01$ and < 0.01 , respectively) (Table 4).

Table 3 Differences in scores on knowledge, attitudes, and empathy by characteristics of rehabilitation students (Mean ± SD)

Characteristics	FAQ	KAOP	KAOP+	KAOP-	IRI-C
Gender					
Male	9.71 ± 4.37	155.01 ± 21.76	78.81 ± 17.78	76.2 ± 18.31	49.21 ± 11.43
Female	9.96 ± 3.81	163.7 ± 24.02**	82.81 ± 15.18**	80.89 ± 16.72**	52.15 ± 11.03**
PValue	0.466	<0.01	0.003	0.001	0.001
Age					
17–19	9.87 ± 3.93	161.55 ± 24.27	81.68 ± 16.19	79.87 ± 17.20	51.52 ± 10.83
20–25	9.98 ± 4.00	161.89 ± 22.59	82.32 ± 15.25	79.57 ± 17.27	51.30 ± 12.04
PValue	0.687	0.846	0.584	0.812	0.783
Highest level of education					
Vocational	9.89 ± 4.02	161.91 ± 24.08	81.88 ± 16.39	80.03 ± 17.51	51.39 ± 11.10
Bachelor	10.01 ± 3.40	159.78 ± 21.46	81.97 ± 11.93	77.98 ± 14.79	51.94 ± 11.90
PValue	0.763	0.385	0.948	0.249	0.633
Grade					
1st	10.05 ± 4.01	161.92 ± 24.44	81.11 ± 16.62	80.81 ± 17.28	51.38 ± 11.30
2nd	9.42 ± 3.89	160.37 ± 22.54	83.67 ± 14.37	76.70 ± 17.12**	51.59 ± 10.76
3rd	10.52 ± 2.66	166.57 ± 19.29	83.52 ± 9.77	83.05 ± 13.81	51.24 ± 13.65
4rd	9.90 ± 3.95	167.40 ± 23.78	85.60 ± 5.55	79.78 ± 17.22	56.20 ± 8.35
PValue	0.167	0.583	0.174	0.014	0.809
Place of Residence					
Urban	9.63 ± 4.18	163.69 ± 25.38	82.71 ± 17.16	80.98 ± 17.40	51.99 ± 11.48
Rural	10.03 ± 3.83	160.68 ± 22.94	81.47 ± 15.28	79.21 ± 17.11	51.21 ± 11.05
PValue	0.154	0.078	0.274	0.154	0.329
Only child in the family					
Yes	9.95 ± 3.91	163.57 ± 23.44	82.81 ± 16.95	80.76 ± 16.55	51.49 ± 12.56
No	9.89 ± 3.97	161.02 ± 23.88	81.56 ± 15.56	79.46 ± 17.43	51.45 ± 10.71
PValue	0.847	0.167	0.311	0.332	0.966
Household income per month					
< RMB 2000	9.57 ± 4.03	158.97 ± 23.63	80.23 ± 17.75	78.74 ± 19.81	51.26 ± 11.56
RMB 2000–5000	9.92 ± 3.94	162.07 ± 23.03	82.19 ± 13.83	79.89 ± 16.05	51.52 ± 10.78
RMB 5000–10,000	9.93 ± 3.89	162.46 ± 24.93	82.29 ± 17.30	80.18 ± 16.98	50.69 ± 11.12
> RMB 10,000	10.49 ± 4.05	163.03 ± 24.70	82.62 ± 17.90	80.41 ± 18.11	54.07 ± 12.65
PValue	0.42	0.42	0.513	0.835	0.169
Have you studied geriatric rehabilitation?					
Yes	10.09 ± 3.98	163.03 ± 23.81	81.84 ± 16.96	81.19 ± 17.11	51.54 ± 10.84
No	9.76 ± 3.93	160.62 ± 23.73	81.89 ± 15.10	78.73 ± 17.23	51.39 ± 11.46
PValue	0.212	0.135	0.963	0.035	0.842
Do you have previous experience of being cared for by (maternal) grandparents?					
Yes	9.90 ± 4.01	163.23 ± 23.71	82.67 ± 15.59	80.57 ± 16.78	51.57 ± 11.20
No	9.90 ± 3.82	157.62 ± 23.53	79.83 ± 16.56	77.78 ± 18.15	51.18 ± 11.19
PValue	0.997	0.001	0.017	0.03	0.636
Do you have previous experience living with older people?					
Yes	9.90 ± 3.95	162.53 ± 23.61	82.31 ± 15.88	80.22 ± 17.14	51.45 ± 11.04
No	9.93 ± 3.99	156.12 ± 24.20	79.08 ± 15.88	77.04 ± 17.49	51.49 ± 12.14
PValue	0.94	0.007	0.037	0.058	0.972
Do you have previous experience of taking care of older people?					
Yes	10.07 ± 3.92	163.08 ± 24.04	82.11 ± 16.53	80.98 ± 17.27	51.68 ± 11.33
No	9.52 ± 3.99	158.46 ± 22.92	81.34 ± 14.45	77.12 ± 16.82	50.97 ± 10.88
PValue	0.052	0.007	0.507	0.002	0.380
Relationship with older people					
Harmony	9.91 ± 3.92	164.13 ± 23.92**	82.79 ± 16.03*	81.34 ± 16.86	51.97 ± 11.23
General	9.84 ± 4.11	151.88 ± 18.57**	78.36 ± 14.51**	73.52 ± 16.73**	49.39 ± 10.82**
Bad	11.25 ± 2.99	133.75 ± 62.60	66.25 ± 27.05	67.50 ± 36.45	47.75 ± 12.04
PValue	0.776	<0.01	0.001	<0.01	0.021

Table 3 (continued)

Characteristics	FAQ	KAOP	KAOP+	KAOP-	IRI-C
Frequency of contacting with older people					
Frequent contact	10.02 ± 4.14	166.91 ± 25.20**	83.83 ± 17.64	83.07 ± 17.89**	52.99 ± 11.75
General	9.89 ± 3.87	158.99 ± 21.85**	80.53 ± 15.11*	78.46 ± 16.33**	50.54 ± 10.46**
Not much contact	9.56 ± 3.71	156.51 ± 24.48	81.47 ± 12.65	75.04 ± 17.09	51.46 ± 11.19
PValue	0.594	<0.01	0.015	<0.01	0.007
Are you willing to engage in work related to geriatric rehabilitation after graduation?					
Willing	10.56 ± 3.55**	167.09 ± 24.16**	84.63 ± 16.75**	82.46 ± 17.24**	52.94 ± 11.04**
Unwilling	9.96 ± 4.12	153.54 ± 26.37**	79.99 ± 14.41*	73.55 ± 20.51**	50.93 ± 11.35
Uncertain	9.33 ± 4.16	158.51 ± 21.92	79.86 ± 15.10	78.66 ± 16.09	50.29 ± 11.17
PValue	<0.01	<0.01	<0.01	<0.01	0.003

Note: The statistical difference between the first and second group is marked in the second group, the statistical difference between the second and third group is marked in the third group, and the statistical difference between the first and third group is marked in the first group. FAQ the Palmore Facts on Aging Quiz, KAOP the Kogan's Attitude towards Older People Scale, IRI-C the Chinese Version of the Interpersonal Reactivity Index

* $p < 0.05$

** $p < 0.01$

Moreover, those students who were non-only child in the family, had good relationship with older people and contacted frequently with the elderly significantly more willing to engage in geriatric rehabilitation work ($p = 0.007$, < 0.01 and $= 0.002$, respectively) (Table 4).

Correlations among knowledge of aging, attitude towards older people and empathy ability

Pearson correlation was conducted to examine the correlations among rehabilitation students' knowledge of aging, attitude towards older people and empathy ability. As shown in Table 5, the knowledge of aging and empathy ability both significantly positively correlated with attitude towards older people ($r = 0.143$, $p < 0.01$ and $r = 0.337$, $p < 0.01$).

After adjusting demographic characteristics, hierarchical multiple regression analysis was performed to examine whether the correlations between knowledge of aging, empathy ability and attitude towards older people remain significant. Table 6 indicates that two blocks of independent variables significantly predicted attitudes toward older people: knowledge of aging (R^2 change = 0.012, $p < 0.01$) and empathy ability (R^2 change = 0.078, $p < 0.01$). After adjusting demographic characteristics, knowledge of aging and empathy ability both positively associated with attitude towards older people ($\beta = 0.114$, $p < 0.01$ and $\beta = 0.288$, $p < 0.01$, respectively).

Discussion

This study aimed to assess Chinese rehabilitation students' knowledge of aging, attitudes toward older adults and factors influencing their knowledge and attitudes. The Chinese rehabilitation students from three colleges and universities in Chongqing illustrated a relatively low level of knowledge about aging, with a mean 9.9 ± 3.95 points of FAQ score and an average of 39.6% correct answers (ranging from 15.5 to 79.6%). Several previous

studies have displayed similar poor knowledge about aging among nursing and physical therapist students and physical therapist clinicians [19, 27–32]. The average FAQ score in this study was even lower than scores acquired from another study among medical students [33]. Similarly, the correct answers of FAQ in this study were lower than those in another study of Chinese general practitioners [16]. When it comes to facts about aging, the rehabilitation students know better about physical facts and less about social facts. Similar to this finding, Yanni Yang et al. found that general practitioners' awareness of the social and psychological facts of aging was lower than their awareness of the physical facts of aging [16]. This phenomenon may be related to the lack of focus in medical education on geriatrics. Fewer than 50% of the medical schools involved in a study (42%) incorporated geriatrics and aging-related subjects into their curricula [34]. In a systematic review, Mateos-Nozal J et al. [35] also reported that the issue of medical education in geriatrics is a global challenge. Only 41% of countries report including some content related to geriatrics in their medical graduation programs. In Europe, although there has been a gradual increase over the years, only 62% of medical schools have made the teaching of geriatrics mandatory [35]. This should raise concerns about the current knowledge level and education of rehabilitation students in China. In the education of rehabilitation students in China, there should also be a focus on teaching geriatrics.

The findings from this study indicated that rehabilitation students generally had a positive attitude toward older people. This finding is similar to some previous researches which have found that nursing and physical therapist students hold positive attitudes toward older adults [4, 19, 36–38]. Conversely, several studies reported negative attitudes toward older adults among nursing students [28, 39–41]. Several studies reported neutral to

Table 4 Comparison of rehabilitation students with different characteristics in willingness to engage in geriatric rehabilitation for the older people

Characteristics	Willing (n, %)	Unwilling (n, %)	Uncertain (n, %)	χ	<i>p</i>
Gender				4.369	0.113
Male	84(40.0)	27(12.9)	99(47.1)		
Female	289(42.5)	55(8.1)	336(49.4)		
Age				0.466	0.792
17–19	261(41.4)	57(9)	313(49.6)		
20–25	112(43.2)	25(9.7)	122(47.1)		
Highest level of education				3.38	0.184
Vocational	332(42.4)	76(9.7)	375(47.9)		
Bachelor	41(38.3)	6(5.6)	60(56.1)		
Grade				4.478	0.612
1st	256(40.8)	60(9.6)	312(49.7)		
2nd	108(45.8)	21(8.9)	107(45.3)		
3rd	7(33.3)	1(4.8)	13(61.9)		
4rd	2(40)	0(0)	3(60)		
Place of Residence				3.689	0.158
Urban	114(39.7)	34(11.8)	139(48.4)		
Rural	259(43)	48(8)	296(49.1)		
Only child in the family				9.829	0.007
Yes	89(40.3)	32(14.5)	100(45.2)		
No	284(42.5)	50(7.5)	335(50.1)		
Household income per month				16.215	0.013
< RMB 2000	78(45.3)	19(11)	75(43.6)		
RMB 2000–5000	162(38.9)	27(6.5)	227(54.6)		
RMB 5000–10,000	105(45.5)	24(10.4)	102(44.2)		
> RMB 10,000	28(39.4)	12(16.9)	31(43.7)		
Have you studied geriatric rehabilitation?				10.394	0.006
Yes	180(47.1)	25(6.5)	177(46.3)		
No	193(38)	57(11.2)	258(50.8)		
Do you have previous experience of being cared for by (maternal) grandparents?				8.637	0.013
Yes	287(44.9)	54(8.5)	298(46.6)		
No	86(34.3)	28(11.2)	137(54.6)		
Do you have previous experience of living with older people?				18.632	<0.01
Yes	340(44.3)	61(7.9)	367(47.8)		
No	33(27)	21(17.2)	68(55.7)		
Do you have previous experience of taking care of older people?				19.107	<0.01
Yes	285(46.4)	46(7.5)	283(46.1)		
No	88(31.9)	36(13)	152(55.1)		
Relationship with older people				26.210	<0.01
Harmony	321(44.8)	56(7.8)	339(47.3)		
General	51(30)	23(13.5)	96(56.5)		
Bad	1(25)	3(75)	0(0)		
Frequency of contacting with older people				16.822	0.002
Frequent contact	159(48)	32(9.7)	140(42.3)		
General	187(40.9)	40(8.8)	230(50.3)		
Not much contact	27(26.5)	10(9.8)	65(63.7)		

weak positive attitudes toward older people among physical therapist students [42, 43].

In order to put forward interventions to improve attitudes toward older adults, it is necessary to understand what factors are involved in leading to negative or positive attitudes among students. Gender is the major factor,

and females showed significantly more positive attitude towards older people than males in this study. Previous researches have also shown similar results, which may suggest that females are more caring than males [1, 22, 40, 44]. However, the literature is inconsistent in this regard. Zverev Y [45] suggested that there was no

Table 5 Correlation matrix of knowledge, attitudes and empathy

Variable	Mean ± SD	1	2	3	4	5	6	7	8	9
1.FAQ	9.90 ± 3.95	1								
2.KAOP	161.65 ± 23.78	0.143**	1							
3.KAOP+	81.87 ± 15.91	0.089**	0.690**	1						
4.KAOP-	79.78 ± 17.22	0.115**	0.743**	0.029	1					
5.IRI-C	51.46 ± 11.19	0.002	0.337**	0.296**	0.192**	1				
6.PT	11.61 ± 4.11	0.005	0.302**	0.281**	0.158**	0.817**	1			
7.FS	14.29 ± 3.59	0.036	0.285**	0.229**	0.181**	0.796**	0.540**	1		
8.EC	15.64 ± 3.70	0.122**	0.366**	0.225**	0.297**	0.583**	0.315**	0.491**	1	
9.PD	9.92 ± 4.46	0.130**	0.034	0.111**	0.056	0.632**	0.431**	0.288**	0.053	1

Note: FAQ the Palmore Facts on Aging Quiz, KAOP the Kogan’s Attitude towards Older People Scale, IRI-C the Chinese Version of the Interpersonal Reactivity Index, PT Perspective Taking, FS Fantasy, EC Empathic Concern, PD Personal Distress

*p<0.05

**p<0.01

Table 6 Hierarchical linear regression analysis of independent factors correlated to attitude toward older people

Variables	Step 1(β)	Step 2(β)	Step 3(β)
Step 1			
Gender: Male (ref: female)	0.185**	-0.179**	-0.143**
Age	0.063	0.060	0.069
Highest level of education (ref: Bachelor)	0.040	0.044	0.053
Grade:1st(ref:4th)	-0.141	-0.144	-0.059
Grade:2nd(ref:4th)	-0.202	-0.194	-0.108
Grade:3rd(ref:4th)	-0.029	-0.03	-0.003
Place of Residence: Urban (ref: rural)	0.059	0.067	0.056
Only child in the family: Yes (ref: no)	0.056	0.053	0.054
Household income per month:< RMB 2000(ref:> RMB 10000)	-0.063	-0.049	-0.024
Household income per month: RMB 2000–5000(ref:> RMB 10000)	-0.003	0.007	0.034
Household income per month: RMB 5000–10,000(ref:> RMB 10000)	-0.026	-0.016	0.022
Have you studied geriatric rehabilitation? (ref: no)	-0.001	-0.005	-0.001
Do you have previous experience caring for by (maternal) grandparents? (ref: no)	0.025	0.026	0.03
Do you have previous experience living with older people? (ref: no)	-0.009	-0.007	0.005
Do you have previous experience caring for older people? (ref: no)	0.018	0.01	0.006
Relationship with older people: Harmony(ref: Bad)	0.514*	0.531**	0.456*
Relationship with older people: General(ref: Bad)	0.350	0.363	0.311
Frequency of contacting with older people: Frequent contact (ref: Not much contact)	0.024	0.018	0.008
Frequency of contacting with older people: General (ref: Not much contact)	-0.079	-0.084	-0.07
Are you willing to engage in work related to geriatric rehabilitation after graduation: Willing (ref: Unwilling)	0.223**	0.215**	0.196**
Are you willing to engage in work related to geriatric rehabilitation after graduation: Uncertain (ref: Unwilling)	0.064	0.074	0.089
Step 2			
FAQ		0.114**	0.121**
Step 3			
IRI			0.288**
F	6.357**	6.717**	10.874**
R2	0.133	0.146	0.224
ΔR2	0.133	0.012	0.078

*p<0.05

**p<0.01

difference between males and females in their attitudes toward older people. Hweidi IM et al. [46] reported more positive attitudes toward older people in males. These results should be explained from different cultural and professional aspects.

In our study, we found that the students who had previous experience of being cared for by (maternal) grandparents, living with the elderly, and taking care of the elderly showed significantly more positive attitudes toward older people and significantly stronger willingness to engage

in geriatric rehabilitation than those had not have these experiences. The experience of living with the elderly has a positive impact on developing positive attitudes toward older people [4, 47]. Living with the elderly and being cared for by (maternal) grandparents gives young people a different experience. The practical contact with older people can influence their impressions of them. Receiving care from older people from an early age may contribute to full trust in the elderly, which in turn helps build positive attitudes and extirpate stereotypes or misunderstandings of rehabilitation students. At the same time, Chinese long-inherited culture beliefs and social conventions could explain the results of the present study [16, 19]. Perhaps influenced by centuries of Confucianism, older adults are highly respected, valued and supported in traditional Chinese culture. Children are raised to believe that everyone should love, respect and take care of the older family members [16, 19]. The culture of respecting and valuing older people very likely influenced rehabilitation students' attitudes toward older adults and willingness towards working with them in the present study.

This study found that relationship and contact frequency with older people are another two important factors affecting rehabilitation students' attitudes toward older people and willingness to engage in geriatric rehabilitation. This result is consistent with other studies [19, 48]. Contacting frequently with older people assists the students to have more opportunity to exposure to older adults and socialize with them, then develop closer relationships with them consequently [19, 48]. Therefore, they are more likely to establish positive attitudes toward older people and more desirable to engage in geriatric rehabilitation. However, adverse experiences with older people often have a negative impact and lead to negative attitudes [39]. Thence, consideration should be given to incorporating learning activities that promote socialization with older adults into rehabilitation curricula.

Another important finding of concern from this study is the low interest in engaging in geriatric rehabilitation. In the current study, only 41.9% of participants preferred to engage in work related to geriatric rehabilitation after graduation and 48.9% was uncertain. In accordance, King et al. [49] and Bleijenbergh et al. [50] both indicated a poor preference for taking care of older people among nursing students. Peach [51] also indicated that only 16.1% of the physical therapist students considered working mainly with solely elderly patients after graduation. Henderson et al. [52] also reported that students did not like working with older people despite their positive attitudes toward them. The reasons for unwillingness to engage in work related to geriatric rehabilitation were further investigated in the present study. Rehabilitation students attributed their poor interest to engage in geriatric

rehabilitation to unpleasant experiences with older people in the past, difficulties in communicating with older people, a perception that older people are unhygienic and boring and the work is relatively hard, low salary, no challenge and disrespected. These findings were consistent with previous studies [4, 52–55]. As the country's population ages at an unprecedented rate, the results from this study demonstrated the urgent need to motivate rehabilitation students to consider geriatric rehabilitation as their career preference. More contact and experiences with older adults during the study period should be guaranteed.

In our study, we reported that the participants who had the willingness to engage in work related to geriatric rehabilitation after graduation scored significantly higher in FAQ and KAOP scales. The students who had studied geriatric rehabilitation showed more desire to engage in geriatric rehabilitation. Lack of knowledge and ageist attitudes and behaviors are reported to be severe barriers to nursing students' willingness to care for older people [3, 56]. Rathnayake et al. [4] found that students with positive attitudes toward older people prefer to care for older people. McKinlay and Cowan [36] and Liu et al. [41] also reported that the preference to work with older individuals are likely to be associated with positive attitudes. Similar results were found among students in other majors besides nursing students. White L [57] reported that health profession students' attitudes and beliefs about older people can influence their willingness to engage in the geriatric health workforce. O'Brien C [58] also indicated that more positive attitudes toward older adults were significantly associated with greater desire to work with older adults. Therefore, evoking rehabilitation students' positive attitudes toward older adults is an important approach to motivate them to consider geriatric rehabilitation as their career choice.

The results of Pearson correlation revealed that knowledge of aging and empathy ability were both significantly positively related to attitudes toward older people. Knowledge of aging was also positively related to empathy ability, although the difference was not significantly. Furthermore, the results of hierarchical multiple regression showed that knowledge of aging and empathy ability were independent predictors of attitudes toward older people. These findings were congruent with numerous previous studies which revealed strong relationship between knowledge of aging and attitudes toward older people [5, 59, 60]. It is documented that greater knowledge of aging may promote empathy ability and contribute to positive attitudes [61]. Conversely, knowledge deficit or misunderstanding about aging may produce negative attitudes [5]. King et al. [49] believed that integrating geriatric nursing into the curriculum would alleviate the fears and concerns associated with caring for older people. A positive attitude plays

an important role in the quality of care for older people [1]. Therefore, universities and educators in China should realize that education may enhance rehabilitation students' knowledge about aging, promote their positive attitudes and improve their perceptions of engaging in geriatric rehabilitation. Courses on geriatric rehabilitation should be considered to include in the curriculum, either in school education for rehabilitation students or continuing education for technical personnel specializing in rehabilitation treatment.

Nonetheless, there are several limitations in the current study. First, as the study involved only three colleges and universities in southwestern China, findings may not be generalized to rehabilitation students from other regions. Second, because of the cross-sectional study design, it is not possible to examine the relationship longitudinally. A longitudinal or cohort study could be recommended to examine the attitudes toward older adults among the rehabilitation students at different time frames. Third, all instruments were self-reported and therefore the inherent limitations of self-report measures should not be overlooked. The questionnaire required the participants to answer whether they would like to engage in geriatric rehabilitation after graduation. Some students may chose to answer in a way that increases social desirability.

Conclusions

To our knowledge, this is the first reported study undertaken in China to explore rehabilitation students' knowledge of aging, attitudes toward older individuals and the willingness to care for older people. As such, it provides data on a new area of research that has implications for geriatric education programs.

Rehabilitation students in three colleges and universities in southwestern China displayed a relatively low level of knowledge about aging, but a generally positive attitude towards older people. Rehabilitation students' willingness to engage in geriatric rehabilitation was influenced by their attitudes. Being cared for by (maternal) grandparents, living with the elderly, taking care of the elderly, having good relationships with older people and having frequent contact with older people were significant factors related to positive attitudes.

In light of the increased life expectancy and burgeoning older population in China, it is crucial to prepare rehabilitation students with adequate knowledge and positive attitudes to ensure the quality of rehabilitation and care provided to older people. Educators should adopt effective strategies to promote rehabilitation students' geriatric rehabilitation knowledge and increase their positive attitudes toward older people.

Abbreviations

FAQ	The Palmore Facts on Aging Quiz
IRI-C	The Chinese Version of the Interpersonal Reactivity Index
KAOP	The Kogan's Attitude towards Older People Scale

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Author contributions

RS conceived and designed the study. LP, XZ and YY undertook the data collection and analysis. YZ, LT and ZS drafted the manuscript. RS and YZ reviewed the manuscript. The authors read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The study was approved by the Ethical Committee of Chongqing Medical and Pharmaceutical College(KYLLSC20220918003) and written informed consent was required from all participants. Participation was voluntary and students were informed about the purpose of the study. Confidentiality was assured and questionnaires were submitted anonymously. This study has obtained the necessary permissions to use the questionnaires.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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