

Knowledge, Attitude, and Practice Toward Chronic Pain in Older Adults Among Health Sciences Students: A Cross-Sectional Study

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Purpose: Effective management of chronic pain in older adults is essential for enhancing physical health, quality of life, and psychological well-being. This study aimed to investigate the knowledge, attitudes, and practices (KAP) of health sciences students regarding chronic pain among older adults.

Materials and Methods: This cross-sectional study was conducted among health sciences students at Fujian Health College from November to December 2023, utilizing a validated questionnaire. A total of 1785 valid questionnaires were enrolled (356 males; mean age: 18.82±0.94 years). A structural equation modeling (SEM) analysis was performed to determine how the KAP dimensions influenced each other.

Results: The mean scores for knowledge, attitudes, and practices were 20.60±3.22 (possible range: 0–32; 64.38% of maximum range), 48.57±8.31 (possible range: 12–60; 80.95% of maximum range), and 28.62±6.67 (possible range: 9–45; 63.60% of maximum range), respectively. The SEM analysis indicated that knowledge directly influenced attitudes ($\beta=0.91$, $P<0.001$) and practices ($\beta=0.14$, $P=0.002$), with an indirect influence on practices ($\beta=0.28$, $P<0.001$). Attitudes directly influenced practices ($\beta=0.30$, $P<0.001$).

Conclusion: The study found that health sciences students exhibited moderate knowledge, a positive attitude, and moderate practices concerning chronic pain in older adults. Targeted educational interventions on this topic are essential in the training curriculum for future healthcare providers.

Keywords: knowledge, attitude, practice, chronic pain, older adults, health sciences students, cross-sectional study

Introduction

Chronic pain, defined as pain for >3 months, is common among adults >65 years old, but the reported prevalence varies widely,^{1,2} between 30% and 53%.^{3–5} In the United States, health conditions such as multimorbidity, depressive symptoms, arthritis, and hip fractures are linked to an increased likelihood of experiencing bothersome pain lasting more than one month in older adults.³ Data from the China Health and Aging Tracking Survey (CHARLS) 2018 indicated that 60.0% of adults aged 45 and older experienced physical pain, with the prevalence increasing with age.⁶ Pain may be categorized based on the underlying biological mechanism. Nociceptive pain is due to chemical, thermal, and/or mechanical damage activating nociceptors and an inflammatory response. Neuropathic pain is caused by damage to or disorders of the central or peripheral nervous system.⁷ Chronic pain is associated with functional and social limitations, anxiety, depression, sleep impairment, and isolation.^{1,8}

The management of chronic pain in older adults consists of conservative strategies (eg, physical activity, rehabilitation, counseling, and self-management) and, if appropriate, medication-based strategies, and will be based on the type of pain.¹ Hence, a proper knowledge of pain among healthcare professionals is crucial to implement effective pain control strategies. Still, it is essential to identify knowledge gaps, misconceptions, and inappropriate practices among healthcare providers to improve chronic pain management. Even though they are not yet practicing, health sciences students will be

the future healthcare providers, and determining whether their training curriculum on chronic pain management is appropriate requires studies. Such studies could provide data to improve the teaching and training programs.

The knowledge, attitude, and practice (KAP) methodology is a structured survey method that provides quantitative and qualitative data on the gaps, misunderstandings, and misconceptions toward a specific subject in a specific population. Health sciences students represent a critical force in the future healthcare workforce. Their understanding of chronic pain, especially in older adults, plays a crucial role in delivering high-quality care and ensuring effective pain management. However, health sciences students often lack sufficient knowledge and may have negative attitudes or inadequate skills when dealing with chronic pain in older adults. This deficiency can impair their ability to diagnose and treat pain effectively, leading to inadequate pain relief and negatively affecting the quality of life and mental well-being of older patients. A study conducted among final-semester nursing students in Eritrea revealed insufficient knowledge and poor attitudes toward pain management in general.⁹ However, there has been limited research exploring the KAP of health sciences students regarding chronic pain in older adults specifically.

Therefore, this study aims to investigate the KAP of health sciences students toward chronic pain in older adults, providing insights to guide educational interventions and improve patient outcomes.

Materials and Methods

Study Design and Participants

This cross-sectional study was conducted between November 2023 and December 2023 at Fujian Health College and enrolled health sciences students. The inclusion criterion was being a full-time student at Fujian Health College. The exclusion criterion was a refusal to participate in this study. This study was approved by the Ethics Committee of Fujian Health College (#RT2023-04), and all participants provided written informed consent.

Questionnaire Introduction

The questionnaire was developed and modified based on available guidelines^{10–12} and suggestions from three pain domain experts to ensure content validity. A pilot study was conducted with a small sample (33 participants). The participants were requested to identify any difficult-to-understand questions to determine face value. The reliability of the questionnaire was assessed, resulting in an overall Cronbach's α of 0.900 (or 0.542 for knowledge, 0.959 for attitude, and 0.829 for practice).

The final questionnaire (the items are presented in [Tables S1–S5](#)) was in Chinese and encompassed information collection across four dimensions: basic information (13 questions), knowledge dimension (16 items), attitude dimension (12 items), and practice dimension (nine items). In the knowledge dimension, a correct answer (ie, true when the statement was true or false when the statement was false) was awarded 2 points. An incorrect answer (ie, true when the statement was false and vice versa) scores 0 points. An “unsure” answer was warranted 1 point because the participant acknowledged that he/she did not know the answer. In the attitude and practice dimensions, the scores were assigned on a scale from positive to negative, ranging from high (5 points) to low (1 point). The final total scores were within a specified range (minimum-maximum). Items that could not be scored were treated as categorical variables. For each dimension, a cumulative score exceeding 70% is regarded as indicative of adequate knowledge, a positive attitude, and proactive practice. In KAP surveys, we often categorize respondents as having “good”, “adequate”, or “poor” KAP based on their total scores. The cutoff point used to distinguish these categories is not universally standardized and can range from 60% to 80% or higher, depending on the study and context.^{13,14} The 70% cutoff is frequently used in KAP studies to define a “good” level of knowledge, attitude, or practice. This threshold is often chosen because it is seen as a reasonable indicator that a respondent possesses a substantial majority of the required knowledge or practices, but not necessarily perfect mastery.^{15,16} Many KAP studies refer to a “modified Bloom's cutoff”, where scores >80% are considered “good”, 60%–79% as “moderate”, and <60% as “poor”. Some studies simplify this by using 70% as a single cutoff to clearly distinguish between “good” and “poor” KAP, especially when only two categories are needed.^{13,17} Using a 70% cutoff allows for easier comparison with other studies that have adopted the same threshold, supporting consistency in reporting and interpretation across research.^{15,16,18} The 70% threshold is often seen as a practical balance—high enough to reflect meaningful knowledge or practice, but not so high as to be unattainable for most respondents.¹³

The survey was administered online through the electronic questionnaire platform Sojump (<https://www.wjx.cn/>). The survey link was distributed to the study participants through WeChat and QQ groups, using snowball sampling. Class representatives were added to the QQ communication directory based on the school's class committee list, and the questionnaire was forwarded to class groups for distribution. The questionnaire was distributed to the overall study department group (which included academic representatives from various classes within the school), and academic representatives further forwarded it to class groups. To maintain data quality and ensure comprehensive responses, a one-submission-per-IP address restriction was enforced, and all questionnaire items were mandatory. The participants were assured of anonymity during the survey process. The fact that answers to all questions are mandatory is made clear in the instructions that the participants must read before completing the questionnaire. The instructions also reassure the participants that no intimate questions are being asked, and that all data are handled anonymously. The research team, comprising three doctors trained as research assistants responsible for questionnaire promotion and distribution, meticulously reviewed all submissions for completeness, internal consistency, and logical coherence. Investigators were trained to grasp the problem's meaning and the investigation process, enhancing data accuracy and consistency. Questionnaires containing logical errors, incomplete answers, or uniform responses across all items were categorized as invalid.

It needs to be emphasized that chronic pain education was not a formalized, standalone component of all students' curricula; however, relevant knowledge was incorporated into specific programs and courses, particularly those focused on geriatric care. Nursing students received training in geriatric nursing that included modules on managing chronic pain in older adults, while the Geriatric Management and Health Care program covered foundational aspects of age-related pain conditions. Additionally, anatomy and physiology courses (eg, joint anatomy, neuroanatomy) occasionally addressed chronic pain topics—such as osteoarthritis or neuropathic pain—within broader discussions of age-related musculoskeletal and neurological conditions. Nevertheless, systematic, in-depth instruction on chronic pain pathophysiology or multimodal management was not universally mandated across all disciplines.

Statistical Analysis

Statistical analyses were performed using R 4.3.0, and SEM analyses were performed using SPSS 14.0. Continuous data meeting the normal distribution (according to the Kolmogorov–Smirnov test) were presented as means \pm standard deviations (SD) and maximum and minimum values and tested using Student's *t*-test (two levels) or ANOVA (more than two levels). Continuous data not meeting the normal distribution were presented as medians (interquartile ranges) and maximum and minimum values and tested using the Mann–Whitney *U*-test (two levels) or the Kruskal–Wallis *H*-test (more than two levels). Categorical data were presented as *n* (%) and analyzed using the chi-squared test. The correlations between the pairs of dimensions were tested using Pearson Correlation Analysis. Pearson correlation coefficient ranges from -1 to $+1$, with negative values indicating a negative correlation, positive values indicating a positive correlation, and 0 indicating no correlation. In multivariable analysis, 70% of the total score was used as the cutoff value, as recommended by the guidelines for the design of KAP studies.^{13,19,20} Variables with $p < 0.05$ in the univariable analyses were included in the multivariable logistic regression analysis. Multicollinearity was assessed using the variance inflation factor (VIF) analysis; no multicollinearity was found in this study. A structural equation modeling (SEM) analysis was used to test the relationships among KAP dimensions. The SEM analysis was based on the assumption that knowledge influences attitude, knowledge influences practice, and attitude influences practice. The SEM assumptions were validated: multivariate normality, linearity, no systematic missing data, sufficient sample size, independence of observations, correct model specification, no multicollinearity, unidimensionality of constructs, independence of error terms, interval-level data, and validity and reliability. The model fit indices included root mean square error of approximation (RMSEA), standardized root mean squared residual (SRMR), Tucker-Lewis index (TLI), and comparative fit index (CFI). Two-sided *P*-values < 0.05 were considered statistically significant.

Results

Characteristics of the Participants

A total of 1981 individuals participated, with 1785 valid questionnaires (90.11%) and an effective response rate of 90.11%. Their mean age was 18.82 ± 0.94 years. There were 356 males (19.94%); 64.31% were living in urban areas, 88.46% were following a 3-year course, 59.50% were freshmen, 41.68% were studying nursing, 50.03% had living

expenses of 1000–1500, 87.51% had older adults in their family, 58.66% had no family members with chronic pain, and 48.18% never had education on chronic pain (Table 1). Table S1 presents the causes of chronic pain among the family members of the participants who reported family members with chronic pain. The most common (>10%) causes were lumbar disc herniation (42.68%), cervical spondylosis (30.35%), rheumatoid arthritis (22.76%), osteoporosis (22.09%), gout (21.82%), frozen shoulder (20.73%), osteoarthritis (18.56%), and diabetic peripheral neuropathy (11.52%).

Table 1 Demographic Characteristics and KAP Score

Variables	n (%)	Knowledge		Attitude		Practice	
		Score	p ^k	Score	p ^a	Score	p ^p
Total	1785 (100)	20.60±3.22		48.57±8.31		28.62±6.67	
Gender			0.003		0.591		0.145
Male	356 (19.94)	20.03±3.30		48.45±10.61		29.40±7.59	
Female	1429 (80.06)	20.74±3.18		48.60±7.64		28.43±6.41	
Age	18.82±0.94						
Residence			0.910		0.251		0.053
Rural	1148 (64.31)	20.59±3.23		48.44±7.96		28.44±6.45	
Urban	637 (35.69)	20.62±3.20		48.82±8.91		28.96±7.04	
Professional nature			0.016		0.233		0.956
3-year diploma	1579 (88.46)	20.63±3.21		48.48±8.18		28.61±6.57	
5-year diploma	133 (7.45)	19.98±3.03		48.86±10.15		28.78±7.66	
Other	73 (4.09)	21.01±3.53		50.08±7.37		28.70±6.96	
Grade			0.285		<0.001		0.298
Freshman	1062 (59.50)	20.58±3.10		49.12±8.06		28.44±6.77	
Sophomore	637 (35.69)	20.68±3.39		47.29±8.44		28.78±6.32	
Junior and above	86 (4.82)	20.22±3.37		51.30±9.09		29.63±7.79	
College			0.002		<0.001		0.103
Nursing college	744 (41.68)	20.83±3.29		48.61±7.75		28.83±6.44	
Pharmacy college	261 (14.62)	20.64±3.07		48.64±8.68		28.12±6.84	
Medical technology department	7 (0.39)	22.86±2.27		58.14±4.49		32.29±7.23	
Medical department	358 (20.06)	20.59±3.06		49.26±8.67		28.84±6.64	
Health management department	415 (23.25)	20.13±3.27		47.72±8.65		28.31±6.96	
Major			0.004		0.011		0.014
Nursing	524 (29.36)	20.97±3.22		48.97±7.60		28.41±6.44	
Geriatric health and management	93 (5.21)	20.42±3.68		46.28±7.79		30.41±5.61	
Other	1168 (65.43)	20.45±3.17		48.58±8.63		28.57±6.83	
Living expenses (CNY)			0.812		0.110		0.656
<1000	328 (18.38)	20.50±3.25		48.31±8.85		28.79±6.64	
1000-1500	893 (50.03)	20.66±3.17		48.42±7.82		28.43±6.39	
1500-2000	470 (26.33)	20.53±3.25		48.74±8.64		28.80±6.89	
>2000	94 (5.27)	20.73±3.37		50.15±9.19		28.98±8.08	
Presence of older adults in the family			0.485		0.416		0.124
Yes	1562 (87.51)	20.60±3.22		48.64±8.27		28.72±6.64	
No	223 (12.49)	20.61±3.19		48.08±8.58		27.97±6.86	
Family members with chronic pain			0.389		0.203		0.097
Yes	738 (41.34)	20.70±3.09		48.86±8.25		28.93±6.63	
No	1047 (58.66)	20.53±3.31		48.37±8.35		28.40±6.69	
Duration of chronic pain education			<0.001		<0.001		<0.001
Never received	860 (48.18)	19.99±3.29		47.75±8.54		26.72±6.75	
<1 year	726 (40.67)	21.10±3.05		48.98±7.92		29.87±5.91	
1-2 years	121 (6.78)	21.41±3.25		50.18±7.97		31.60±5.97	
>2 years	78 (4.37)	21.42±2.79		51.32±8.74		33.41±6.75	

Notes: Continuous variables are presented as means±standard deviations. Categorical variables are presented as n (%). CNY: Chinese yuan. p^k: Comparison of knowledge scores between different demographic characteristics; p^a: Comparison of attitude scores between different demographic characteristics; p^p: Comparison of practice scores between different demographic characteristics.

Knowledge, Attitude, and Practice Dimensions

The mean knowledge, attitude, and practice scores were 20.60 ± 3.22 (maximum of 32; 64.38%), 48.57 ± 8.31 (maximum of 60; 80.95%), and 28.62 ± 6.67 (maximum of 45; 63.60%), respectively. The knowledge scores varied among health sciences students of different genders, the nature of the diplomas, programs, majors, and chronic pain education (all $p < 0.05$) (Table 1). In the knowledge dimension, the highest correct rate was observed for item K12 (correct in 81.01%; “Chronic pain in the older adults leads to a decline in daily living abilities”). The lowest correct rate was found for item K5 (correct in 42.58%; “Chronic pain can be cured”). (Table S2). The health sciences students with different grades, programs, majors, and chronic pain education had different attitude scores (all $p < 0.05$) (Table 1). The attitude item with the highest score was A1 (80.73% positive; “I believe that chronic pain in older adults may lead to limitations and reductions in their participation in social activities”), while the lowest score was observed for A11 (65.53% positive; “I have confidence in my professional competence”). (Table S3). There were significant differences in practice scores among health sciences students with different majors and chronic pain education (all $p < 0.05$) (Table 1). The practice item with the highest score was P9 (68.63% consistent; “I would recommend the older adult person to seek professional treatment at a hospital”), while the lowest score was seen for P3 (26.61% consistent; “I have participated in team care practice for chronic pain in older adults, such as collaborating with other healthcare professionals”). (Table S4).

Correlations Analysis

The knowledge scores were positively correlated to the attitude (weak correlation, $r = 0.321$, $p < 0.001$) and practice (weak correlation, $r = 0.180$, $p < 0.001$) scores. The attitude scores were positively correlated to the practice scores (weak correlation, $r = 0.367$, $p < 0.001$).

Multivariable Logistic Regression Analysis

Studying in the health management department was negatively associated with knowledge, while < 1 year of chronic pain education, 1–2 years of chronic pain education, and > 2 years of chronic pain education were positively associated with the knowledge (Table 2). The female gender and sophomore grade were negatively associated with attitude, while knowledge scores, junior and above grade, living expenses > 2000 , 1–2 years of chronic pain education, and > 2 years of chronic pain education were positively associated with attitude (Table 3). The attitude scores, majoring in geriatric health and management, < 1 year of chronic pain education, 1–2 years of chronic pain education, and > 2 years of chronic pain education were positively associated with practice (Table 4). Tables S1–S5 presents the differences in baseline demographic characteristics between groups with knowledge, attitude, and practice levels $\geq 70\%$ and $< 70\%$.

Table 2 Univariable and Multivariable Analysis for the Knowledge Dimension

Variables	Univariable Analysis			Multivariable Analysis		
	OR	95% CI	p	OR	95% CI	p
Gender						
Male	Ref.					
Female	1.243	0.985–1.569	0.067			
Age	1.036	0.939–1.144	0.486			
Residence						
Rural	Ref.					
Urban	0.935	0.770–1.135	0.496			
Professional nature						
3-year diploma	Ref.					
5-year diploma	0.700	0.488–0.998	0.0497			
Other	1.297	0.809–2.106	0.285			

(Continued)

Table 2 (Continued).

Variables	Univariable Analysis			Multivariable Analysis		
	OR	95% CI	p	OR	95% CI	p
Grade						
Freshman	Ref.					
Sophomore	1.122	0.922–1.367	0.251			
Junior and above	0.956	0.615–1.485	0.840			
College						
Nursing college	Ref.			Ref.		
Pharmacy college	0.823	0.620–1.092	0.176	0.765	0.496–1.177	0.224
Medical technology department	1.950	0.417–13.674	0.427	1.734	0.349–12.645	0.526
Medical department	0.853	0.662–1.099	0.218	0.742	0.489–1.120	0.157
Health management department	0.633	0.497–0.806	<0.001	0.603	0.401–0.901	0.014
Major						
Nursing	Ref.			Ref.		
Geriatric health and management	0.896	0.576–1.398	0.626	0.718	0.456–1.132	0.152
Other	0.770	0.626–0.947	0.014	1.069	0.721–1.592	0.740
Living expenses (CNY)						
<1000	Ref.					
1000-1500	1.052	0.817–1.355	0.694			
1500-2000	1.032	0.778–1.369	0.827			
>2000	1.301	0.821–2.076	0.264			
Presence of older adults in the family						
Yes	Ref.					
No	0.828	0.625–1.097	0.189			
Family members with chronic pain						
Yes	Ref.					
No	0.907	0.751–1.096	0.313			
Duration of chronic pain education						
Never received	Ref.			Ref.		
<1 year	1.957	1.602–2.393	<0.001	1.984	1.620–2.433	<0.001
1-2 years	2.682	1.805–4.043	<0.001	2.677	1.792–4.058	<0.001
>2 years	1.904	1.193–3.071	0.007	1.899	1.187–3.074	0.008

Abbreviations: CNY, Chinese yuan; OR, odds ratio; CI, confidence interval; Ref., reference category.

Structural Equation Modeling Analysis

The fit of the SEM model yielded good indices demonstrating an acceptable model fit (Table 5), and the results imply that knowledge may influence attitude ($\beta=0.91$, $p<0.001$) and practice ($\beta=0.15$, $p=0.002$), while attitude may influence practice ($\beta=0.31$, $p<0.001$). Knowledge may directly influence attitude ($\beta=0.91$, $p<0.001$) and practice ($\beta=0.14$, $p=0.002$) and may indirectly influence practice ($\beta=0.28$, $p<0.001$), while attitude may directly influence practice ($\beta=0.30$, $p<0.001$) (Table 6 and Figure 1).

Discussion

The results suggest that health sciences students have moderate knowledge, positive attitudes, and moderate practice toward chronic pain in older adults. Education about chronic pain in older adults should be provided in the training curriculum of future healthcare providers.

Few studies are available on the KAP of pain management for older adults. Liyew et al²¹ reported that nurses in Ethiopia had good knowledge and a lower level of attitude toward pain management, but the study did not examine pain management in older adults, and the nurses were working at a hospital. Gorawara-Bhat et al²² reported that nurses perceived several challenges in assessing older patients' pain in the emergency department. A moderate KAP was

Table 3 Univariable and Multivariable Analysis for Attitude Dimension

Variables	Univariable Analysis			Multivariable Analysis		
	OR	95% CI	p	OR	95% CI	p
Knowledge	1.184	1.142–1.229	<0.001	1.193	1.149–1.241	<0.001
Gender						
Male	Ref.			Ref.		
Female	0.614	0.482–0.784	<0.001	0.576	0.439–0.758	<0.001
Age	0.931	0.833–1.038	0.206			
Residence						
Rural	Ref.			Ref.		
Urban	1.301	1.056–1.603	0.013	1.205	0.962–1.508	0.104
Professional nature						
3-year diploma	Ref.			Ref.		
5-year diploma	1.456	1.003–2.095	0.045	1.098	0.690–1.725	0.688
Other	1.337	0.808–2.168	0.246	0.861	0.485–1.493	0.602
Grade						
Freshman	Ref.			Ref.		
Sophomore	0.698	0.558–0.869	0.001	0.624	0.489–0.793	<0.001
Junior and above	2.036	1.306–3.170	0.002	1.935	1.119–3.354	0.018
College						
Nursing college	Ref.			Ref.		
Pharmacy college	1.298	0.958–1.752	0.089	1.130	0.809–1.571	0.469
Medical technology department	15.057	2.551–285.258	0.012	8.128	1.205–162.116	0.064
Medical department	1.218	0.927–1.598	0.155	1.003	0.735–1.364	0.983
Health management department	0.950	0.726–1.241	0.710	0.892	0.666–1.191	0.443
Major						
Nursing	Ref.					
Geriatric health and management	0.611	0.348–1.027	0.073			
Other	1.078	0.862–1.351	0.514			
Living expenses (CNY)						
<1000	Ref.			Ref.		
1000-1500	0.865	0.656–1.145	0.306	0.831	0.621–1.116	0.215
1500-2000	1.084	0.800–1.474	0.603	1.046	0.756–1.450	0.786
>2000	2.217	1.387–3.545	0.001	2.112	1.269–3.520	0.004
Presence of older adults in the family						
Yes	Ref.					
No	0.879	0.639–1.194	0.416			
Family members with chronic pain						
Yes	Ref.					
No	0.901	0.734–1.106	0.316			
Duration of chronic pain education						
Never received	Ref.			Ref.		
<1 year	1.222	0.983–1.520	0.071	1.177	0.928–1.494	0.178
1-2 years	1.740	1.166–2.576	0.006	1.607	1.040–2.467	0.031
>2 years	2.472	1.541–3.953	<0.001	2.089	1.256–3.461	0.004

Abbreviations: CNY, Chinese yuan; OR, odds ratio; CI, confidence interval; Ref., reference category.

reported in Irish and Jordanian nurses toward pain management in older adults.²³ Still, those studies were performed on participants who completed their training and had work experience. In addition, the participants were working in hospitals and attended to inpatients or patients visiting the emergency department. Many healthcare providers work in the community, and examining the KAP of students who might work in the community is relevant to determining their needs for education about pain management in older adults. One study revealed that final-semester nursing students in

Table 4 Univariable and Multivariable Analysis for Practice Dimension

Variables	Univariable Analysis			Multivariable Analysis		
	OR	95% CI	p	OR	95% CI	p
Knowledge	1.118	1.081–1.157	<0.001	1.007	0.968–1.048	0.740
Attitude	1.140	1.121–1.159	<0.001	1.140	1.121–1.160	<0.001
Gender						
Male	Ref.					
Female	0.797	0.624–1.021	0.070			
Age	1.049	0.943–1.164	0.375			
Residence						
Rural	Ref.					
Urban	1.216	0.987–1.497	0.066			
Professional nature						
3-year diploma	Ref.					
5-year diploma	1.181	0.806–1.709	0.384			
Other	1.132	0.676–1.846	0.628			
Grade						
Freshman	Ref.					
Sophomore	1.012	0.817–1.253	0.910			
Junior and above	1.523	0.962–2.382	0.068			
College						
Nursing college	Ref.					
Pharmacy college	0.831	0.606–1.130	0.243			
Medical technology department	2.852	0.624–14.576	0.172			
Medical department	1.025	0.782–1.341	0.855			
Health management department	0.830	0.636–1.079	0.167			
Major						
Nursing	Ref.			Ref.		
Geriatric health and management	1.768	1.119–2.774	0.014	2.260	1.331–3.820	0.002
Other	1.069	0.853–1.342	0.565	1.090	0.847–1.405	0.506
Living expenses (CNY)						
<1000	Ref.					
1000-1500	0.871	0.663–1.150	0.326			
1500-2000	1.101	0.814–1.492	0.534			
>2000	1.375	0.849–2.209	0.191			
Presence of older adults in the family						
Yes	Ref.					
No	0.774	0.559–1.057	0.113			
Family members with chronic pain						
Yes	Ref.					
No	0.866	0.707–1.062	0.167			
Duration of chronic pain education						
Never received	Ref.			Ref.		
<1 year	1.938	1.552–2.424	<0.001	1.834	1.433–2.350	<0.001
1-2 years	3.227	2.178–4.778	<0.001	2.759	1.771–4.298	<0.001
>2 years	6.471	3.993–10.684	<0.001	5.623	3.271–9.857	<0.001

Abbreviations: CNY, Chinese yuan; OR, odds ratio; CI, confidence interval; Ref., reference category.

Eritrea had insufficient knowledge and attitude toward pain management in general,⁹ and no data were available for China.

The present study revealed that the health sciences students at one institution in China had a need for education about the etiology of chronic pain, the impact of chronic pain on the central nervous system, the possibility of curing chronic

Table 5 Fit Indices of the SEM Analysis

Indicators	Reference	Results
RMSEA	<0.08 is good	<0.001
SRMR	<0.08 is good	<0.001
TLI	>0.8 is good	>0.999
CFI	>0.8 is good	>0.999

Abbreviations: RMSEA, root mean square error of approximation; SRMR, standardized root mean squared residual; TLI, Tucker-Lewis index; CFI, comparative fit index.

Table 6 SEM Analysis

Model Paths		Total Effects		Direct Effect		Indirect Effect	
		β (95% CI)	p	β (95% CI)	p	β (95% CI)	p
Attitude <- Practice <-	Knowledge	0.91 (0.79, 1.02)	<0.001	0.91 (0.79, 1.02)	<0.001	—	—
	Attitude	0.30 (0.27, 0.34)	<0.001	0.30 (0.27, 0.34)	<0.001	—	—
	Knowledge	0.42 (0.33, 0.52)	<0.001	0.14 (0.05, 0.24)	0.002	0.28 (0.23, 0.32)	<0.001

Abbreviation: CI, confidence interval.

pain, the factors influencing chronic pain, and the impact of chronic pain. The participants who had received education about chronic pain in older adults showed higher scores in all three KAP dimensions. It also shows that the students who received education specifically on chronic pain had better practices than those who did not receive education, highlighting the need for and importance of education. Although the participants were at different progression levels in their training, and chronic pain education might occur later in the training curriculum, about half of the participants had received no education about chronic pain in older adults. Of course, having received training on chronic pain should lead to better practice related to chronic pain. In addition, majoring in geriatric health and management should also lead to better practice since chronic pain management is central in geriatrics. A lower knowledge score was observed for those studying health management, probably because patient care was not the focus of their studies. A lower attitude was observed in sophomores, but a higher attitude was seen in juniors, which could be related to the level of training. Higher living expenses were also associated with higher attitude scores. A major in geriatric health management was associated with better practice toward chronic pain in older adults, probably because of the training. Considering that knowledge influences attitude and practice and that attitude influences practice, efforts should be taken to improve knowledge in all students, which should translate into better practice^{24,25} and better patient outcomes.^{26,27}

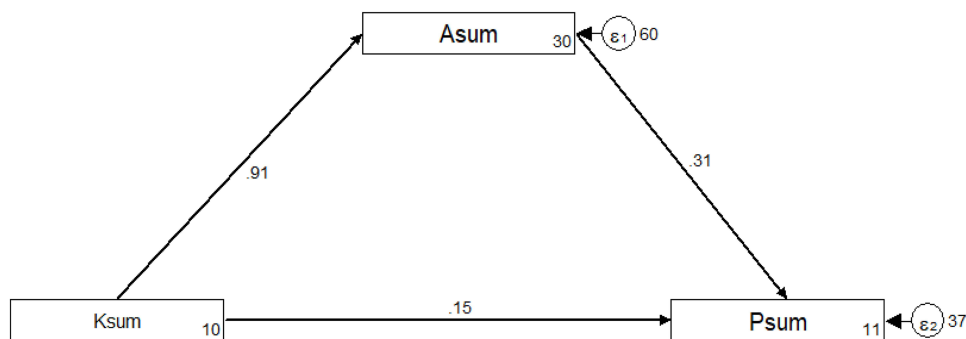


Figure 1 Structural equation modeling analysis. Assumption: knowledge (Ksum) influences attitude (Asum), knowledge (Ksum) influences practice (Psum), and attitude (Asum) influences practice (Psum). The measured variables are drawn in rectangular shapes. The circles with the caption starting with “e” indicate measurement errors in each observed variable. Solid straight lines refer to direct effects, while curved solid lines represent indirect effects. Each number on the arrows indicates an individual standardized regression coefficient of each dependency.

Hence, the teaching and training curriculum should be modified based on the results of the present KAP study to optimize the KAP toward chronic pain and its management in older Chinese adults. Such training could be based on the latest teaching techniques in health education. Future studies should design and evaluate such teaching and training based on the results of the present study. Longitudinal studies could also provide data on how KAP could evolve with teaching and training.

This study had limitations. It was performed at a single institution, resulting in a relatively small sample size (when considering the number of health sciences students in China), limiting generalizability. The participants were limited to a single geographical area, also limiting generalizability. The study was cross-sectional, and causality could not be analyzed. A SEM analysis was used as a surrogate for causality, but the results should be interpreted with caution since SEM analyses may imply causality, but it remains statistically inferred based on predetermined hypotheses.^{28–30} All data were self-reported. As such, all KAP analyses are at risk for the social desirability bias, which entails that some participants could be tempted to answer what they know they should think or do instead of what they are really thinking or doing.^{31,32}

Conclusions

Health sciences students demonstrate a moderate level of knowledge, a positive attitude, and moderate practices concerning chronic pain in older adults. It is recommended that targeted educational interventions be integrated into the training curriculum to improve both knowledge and attitudes regarding chronic pain among future healthcare providers. Key points regarding recognizing and diagnosing chronic pain, managing chronic pain, and fostering realistic expectations regarding chronic pain should be emphasized.

Abbreviations

KAP, Knowledge, attitudes, and practices; SD, Standard deviations.

Data Sharing Statement

All data generated or analyzed during this study are included in this published article. Original data can be made available upon reasonable request to the corresponding author.

Ethics Approval and Informed Consent

This work has been carried out in accordance with the Declaration of Helsinki (2000) of the World Medical Association. This study was approved by the Ethics Committee of Fujian Health College (#RT2023-04), and all participants provided written informed consent.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflict of interest in this work.

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