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Original Article

Factors associated with nursing students' willingness to care for older adults in Korea and the United States

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ABSTRACT

Objective: Elderly health care needs increase and nurses' role for elderlies is vital. It is significant to identify nursing students' intention to care for elderlies. Thus, this study investigated nursing students' willingness to care for elderlies in Korea and the United States.

Methods: The study was conducted with 437 undergraduate nursing students from Korea and the United States from May 25 to 31, 2018. Participants completed a survey including frequency and quality of contact, anxiety about aging, empathy, attitude toward elderly, and willingness to care.

Results: Study findings from the entire group showed that nursing students' willingness to care for the elderly was positively associated with contact quality ($\beta = 0.22$, $P < 0.001$) and empathy ($\beta = 0.12$, $P = 0.009$) but negatively associated with anxiety about aging ($\beta = -0.23$, $P < 0.001$) and attitude toward the elderly ($\beta = -0.14$, $P = 0.004$). Contact quality ($\beta = 0.30$, $P < 0.001$) was positively associated with the willingness to care in Korean students, whereas extended family living type ($\beta = -0.15$, $P = 0.012$) and attitude toward the elderly ($\beta = -0.18$, $P = 0.005$) negatively associated in US students.

Conclusion: This study suggested that nursing educators reinforce contact quality and empathy but reduce anxiety about aging and attitude toward elderly to enhance future nurses' care quality.

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What is known?

There are several studies conducted on nurses' attitude and willingness to care for older adults and overall nurses are not very interested in older adult care. However, there is a paucity of research on nursing students' intention to care for older adults.

What is new?

This study demonstrated that factors associated with nursing students' willingness to care for older adults in both South Korea and the United States.

1. Introduction

The elderly population is increasing steadily as the average life span extends due to the global development of medical technology. In accordance with the publication from Statistics Korea in 2017, those aged 65 or over accounted for 13.8% of total population of Korea [1]. In the United States in 2016, the older adult population was 15.2% of the entire population. It is projected to be 23.5% in the United States but 40% in Korea in 2060 [1,2]. This increase will require more health care services than other age groups because they have higher needs for long-term nursing care services, including chronic degenerative diseases, dementia, and stroke [3,4]. It is known that the positive attitude of the nurse towards older adults affects the quality of nursing care because nurses play a key role in contacting and providing older adults and their families with nursing care [5,6]. Therefore, it is important to study in advance the willingness of nursing students who will become the future nurses, to care for older adults.

Although the older adult population has increased and their nursing care is significant, Korean nursing students have shown low preference for older adult care during the clinical rotations

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including fundamental, adult medical-surgical, community, and gerontological nursing courses [7]. However, other studies showed nursing students had unclear or positive attitude to older adults [3,5,7].

Raising nursing students' willingness to care for older adults is one of the good ways to prepare for the aging population [4,8]. In previous studies, this was influenced by the positive attitude to them, interest in their related issues, volunteer activities related to them, and knowledge about them [8,9]. Thus, it is suggested that nursing students' attitude toward older adults needs to improve in pursuit of enhancing willingness to care for this population [4,10].

In contrast to willingness to care for older adults of nursing students published in China and South Korea, there was a paucity of research for this and contributing factors in western countries, such as European countries and the United States. Willingness to care for the elderly is generally influenced by the same culture as the attitude to the elderly in the country. Accordingly, this study explored nursing students' willingness in the United States and Korea.

The purpose of this study was to compare nursing students' willingness to care for older adults and its associated factors between the United States and Korea and to explore the common associated factors between nursing students from the United States and Korea. It is expected that the finding of this study would be used as fundamental data for the development of older adults related nursing programs, because the study incorporated two different countries with high generalizability. Consequently, nursing students can develop a willingness to care for older adults.

2. Methods

2.1. Design

This study is a cross-sectional survey design to describe the factors influencing nursing students' willingness to care for older adults in Korea and the US.

2.2. Participants and data collection

Convenient sampling was conducted from Korean and US nursing students who were in undergraduate nursing programs. Korean participants were from two different nursing schools while the US participants were from a single nursing school. Since the US nursing program began in the second year (sophomore) of college after completion of basic courses (prerequisites) in the first year (freshman), Korean participants were selected from the second year to the fourth year excluding the first year. Therefore, the inclusion criteria were all second, third, and fourth year students in nursing programs who signed the consent for the study.

All researchers had a total of three meetings together to establish standard procedure of the data collection. During the meeting, we, researchers reached a consensus on details of the consent for this study and the concept of each question in the survey. In addition, only these researchers distributed the survey to participants and helped with questions from participants.

Data collection was conducted with the approval of both Institutional Review Board (IRB) in Korea and the US. The paper survey was distributed from May 25, 2018 to May 31, 2018 by the researchers in each country. The purpose of the study, contents, procedures, and absolute confidentiality were explained to all participants before signing the consent. They were informed that participating the survey was voluntary and they could withdraw it anytime. After participants read and agreed in participating survey, they signed in the consent of the survey and completed it. It took approximately 15 min to complete the survey. The sample size was calculated using the G power 3.1 program and the desired sample

size was 141. The significant level (α) was 0.05 for multiple regression analysis, the effect size was 0.20, calculated from previous studies [4,8,9], the power was 0.95, and the number of factors was 12. After excluding incomplete responses (two and three incomplete responses from Korea and the US, respectively), 198 Korean and 239 US participants were used for the final analysis (98.7% response rate), which indicated the number of participants was sufficient.

2.3. Measurements

2.3.1. Frequency and quality of contact with older adults

This study used a tool for contact developed by Hutchinson et al. [11] and we were approved to use it by the authors. For the US nursing students, an English version was used. For Korean students, a Korean version was used. One of the researchers in this study translated the tool to Korean and then a scholar fluent in Korean and English did reverse translation from Korean to English to validate the Korean language version. The tool included six items scored on a 7-point Likert scale: three items for the frequency and three items for the quality of contact with older adults, with higher scores indicating higher frequency and quality values. Cronbach's α in this study was 0.86 for the frequency of contact with older adults and 0.81 for the quality of the contact in Korean version. On the other hand, Cronbach's α was 0.62 for the frequency of contact with older adults and 0.68 for the quality of the contact in the English version.

2.3.2. Anxiety about aging

In this study, the Anxiety about Aging Scale (AAS) developed by Lasher and Faulkender [12] was used for the US students and the Korean language version, translated by Park and Cho [13], was used for Korean students. We were approved to use it by the authors. A total of 20 items comprised of 11 items of 'Anxiety about loss', 5 items of 'Fears of the older adults', and 4 items of 'Psychological instability,' and the higher the score the greater the anxiety about aging. Cronbach's α values in the study by Park and Cho were 0.81 for anxiety about loss, 0.84 for fears of the older adults, and 0.076 for psychological instability [13]. This study showed 0.75, 0.86, and 0.70 as Cronbach's α value for anxiety about loss, fear of older adults, and psychological instability, respectively.

2.3.3. Empathy for older adults

Empathy for older adults was measured by using the Interpersonal Reactivity Index (IRI) developed by Davis [14]. However, the original IRI was revised by Park [15] because only 20 out of 28 question items were validated related to empathy for older adults [16]. This revised tool was validated by two researchers in this study and three nursing faculty who were adult and gerontology nursing content experts. Items with the Content Validity Index (CVI) of 0.8 or higher were used only. Thus, the US nursing students used 20 questions in the English version while Korean nursing students used the Korean version after receiving permission to use this tool by Park [15]. Cronbach's α for cognitive empathy and emotional empathy was 0.76 and 0.68, respectively, in this study.

2.3.4. Attitude toward older adults

The attitude toward older adults was measured by the Semantic Differential Scale developed by Sanders et al. [17] for the US students while its Korean language version by Won et al. [18] was used for Korean students. We were approved to use it by the authors. This tool consists of 20 questions. Each question is composed of adjective pairs that are opposite to each other, and rated from 1 to 7 points. The higher the score, the more negative attitude toward older adults. Cronbach's alpha was 0.87 in the study by Sanders et al.

[17] and the study by Won et al. [18]. In this study, Cronbach's α was 0.89.

2.3.5. Willingness to care for older adults

The US nursing students' willingness to care for older adults was measured by the tool developed by Zhang et al. [8]. We were approved to use it by the authors. For Korean nursing students, their willingness was measured by the Korean version of the tool, which was validated after the translation and reverse translation process by a researcher of this study and faculty, fluent in both English and Korean. This tool consists of 5 items in a 5-point Likert scale, with higher scores indicating a higher willingness to care for older adults. Cronbach's α was 0.85 in the study by Zhang et al. [8] and 0.88 in this study.

2.4. Data analysis

The SPSS 21.0 statistical program was used to analyze the data as follows. First, Chi-test and *t*-test were used to analyze the general characteristics of Korean and US nursing students, the frequency and quality of contact with older adults, anxiety about aging, empathy for older adults, attitude to older adults, and willingness to care for older adults. Second, Pearson correlation coefficients were used to analyze the relationship between the frequency and quality of contact with older adults, anxiety about aging, empathy toward older adults, attitude to older adults, and willingness to care for older adults. Third, multiple regression analysis was used to analyze the factors associated with the willingness of nursing students to care for older adults.

3. Results

3.1. General characteristics of Korean and US nursing students

Korean nursing students had significantly more experience of older adult related volunteer activities than the US nursing students ($\chi^2 = 116.07, P < 0.001$). However, the US students had more clinical practice (183, 76.6%) related to older adults than Korean students (114, 57.6%), which was significantly different between the two groups ($\chi^2 = 17.94, P < 0.001$) (Table 1).

3.2. Comparison of the associated factors between Korean and US nursing students

Korean nursing students showed significantly higher level than

the US nursing students regarding frequency of contact ($t = 2.89, P = 0.004$), anxiety about aging ($t = 4.72, P < 0.001$), attitude toward older adults ($t = 9.03, P < 0.001$), and emotional empathy ($t = 3.01, P = 0.003$). The US nursing students had significantly higher level than Korean nursing students in quality of contact ($t = -5.75, P < 0.001$), cognitive empathy ($t = -7.25, P < 0.001$), and willingness to care for older adults ($t = -5.28, P < 0.001$) (Table 2).

3.3. Correlation of the associated factors between Korean and US nursing students

In Korean nursing students, contact frequency and contact quality had the strongest relationship among variables ($r = 0.70, P < 0.001$). On the other hand, contact quality and anxiety about aging were most strongly related among variables in the US nursing students ($r = -0.53, P < 0.001$) (Table 3).

3.4. Factors influencing nursing students' willingness to care for older adults

General characteristics of participants were treated as dummy variables to investigate factors affecting the willingness of nursing students to care for older adults. Frequency of contact, quality of contact, anxiety about aging, empathy to older adults, and attitude toward older adults were used as independent variables during the multiple regression analysis. The tolerance limits for diagnosing multicollinearity between independent variables were more than 0.10 and the variation inflation factor (VIF) was smaller than 10, which indicated the absence of multicollinearity [19].

In order to examine the autocorrelation of the dependent variables, the Durbin-Watson value for the independence test of the error terms was found to range from 1.911 to 2.166, indicating there was no autocorrelation of the error. As a result, the regression model showed statistically significant differences between the Korean, US, and the entire group.

In Korean nursing students, the most influencing factor of the willingness to care for older adults was the anxiety about aging ($\beta = -0.36, P < 0.001$), followed by the quality of contact ($\beta = 0.30, P < 0.001$), senior year ($\beta = 0.16, P = 0.003$), and empathy ($\beta = 0.13, P = 0.028$). Quality of contact, senior year, and empathy positively affected, whereas anxiety about aging negatively affected the willingness to care for older adults. These factors explained 45.3% of the willingness to care for older adults. On the other hand, among the US nursing students, the most influencing factor was the anxiety about aging ($\beta = -0.22, P = 0.001$), followed by senior year

Table 1
General characteristics of the participants ($n = 437$).

Variable	Categories	Korean ($n = 198$)		American ($n = 239$)		χ^2	<i>P</i>
		<i>n</i>	%	<i>n</i>	%		
Year in college	Second	80	40.4	81	33.9	3.93	0.140
	Third	72	36.4	83	34.7		
	Fourth	46	23.2	75	31.4		
Gender	Male	24	12.1	43	18.0	2.88	0.090
	Female	174	87.9	196	82.0		
Family living style	Nuclear family	174	87.9	208	87.0	0.07	0.790
	Extended family	24	12.1	31	13.0		
Experience of volunteer work*	Yes	177	89.4	93	39.1	116.07	<0.001
	No	21	10.6	145	60.9		
Experience of older adult related nursing practice	Yes	114	57.6	183	76.6	17.94	<0.001
	No	84	42.4	56	23.4		
Participation in older adult related courses*	Yes	117	59.1	152	63.9	1.04	0.307
	No	81	40.9	86	36.1		

Note: *Missing data excluded.

Table 2
Comparison of students' scores of questionnaire between Korean and American ($n=437$).

Variables	Korean ($n = 198$)		American ($n = 239$)		t	P
	Score (Mean \pm SD)	Score (range)	Score (Mean \pm SD)	Score (range)		
Contact frequency	4.25 \pm 1.52	1.00–7.00	3.90 \pm 0.83	1.00–6.33	2.89	0.004
Contact quality	4.23 \pm 1.33	1.00–7.00	4.92 \pm 1.14	1.00–7.00	-5.75	<0.001
Anxiety about aging	2.67 \pm 0.51	1.11–4.14	2.45 \pm 0.47	1.25–3.50	4.72	<0.001
Fear of old people	2.67 \pm 0.73	1.00–5.00	2.14 \pm 0.65	1.00–4.00	7.96	<0.001
Psychological concerns	2.42 \pm 0.59	1.00–4.00	2.30 \pm 0.66	1.00–4.25	2.02	0.044
Fear of loss	2.93 \pm 0.65	1.09–4.64	2.91 \pm 0.61	1.18–4.73	0.28	0.778
Empathy	3.63 \pm 0.38	2.57–4.63	3.75 \pm 0.36	2.52–4.70	-3.42	0.001
Cognitive	3.60 \pm 0.49	2.29–5.00	3.96 \pm 0.55	2.43–5.00	-7.25	<0.001
Emotional	3.66 \pm 0.43	2.77–4.85	3.53 \pm 0.41	2.23–4.62	3.01	0.003
Attitude	3.95 \pm 0.65	1.75–5.95	3.36 \pm 0.71	1.00–6.55	9.03	<0.001
Care willingness	3.52 \pm 0.71	1.00–5.00	3.90 \pm 0.76	1.40–5.00	-5.28	<0.001

Table 3
Correlations between contact frequency and quality, anxiety about aging, empathy, attitude, and care willingness for older adults ($n = 437$).

Countries	Variables	Contact frequency	Contact quality	Anxiety about aging	Empathy	Attitude	Care willingness
Korean ($n = 198$)	Contact frequency	–	–	–	–	–	–
	Contact quality	0.70	–	–	–	–	–
	Anxiety about aging	-0.33	-0.52	–	–	–	–
	Empathy	0.31	0.43	-0.33	–	–	–
	Attitude	-0.24	-0.42	0.59	-0.32	–	–
	Care willingness	0.37	0.56	-0.58	0.39	-0.40	–
American ($n = 239$)	Contact frequency	–	–	–	–	–	–
	Contact quality	0.31	–	–	–	–	–
	Anxiety about aging	-0.14	-0.53	–	–	–	–
	Empathy	0.18	0.19	-0.24	–	–	–
	Attitude	-0.12	-0.38	0.30	-0.17	–	–
	Care willingness	0.17	0.28	-0.29	0.18	-0.25	–

Note: all $P < 0.01$.

($\beta = -0.21$, $P = 0.001$), attitude toward older adults ($\beta = -0.18$, $P = 0.005$), extended family ($\beta = -0.15$, $P = 0.012$), and empathy ($\beta = 0.13$, $P = 0.035$). These factors had a negative relationship with nursing students' willingness to care for older adults and explained the 17.1% result (Table 4 & Table 5).

The finding from the combined group of nursing students showed their general characteristics, such as nationality or school year, did not influence the willingness to care for older adults. Instead, the most influencing factor was the anxiety about aging ($\beta = -0.23$, $P < 0.001$), followed by the quality of contact ($\beta = 0.22$, $P < 0.001$), attitude ($\beta = -0.14$, $P = 0.004$), and empathy for older adults ($\beta = 0.12$, $P = 0.009$). That is, nursing students had a high willingness to care for older adults when they had high quality of contact and empathy for them, whereas they had low willingness when they had negative attitude and high anxiety of aging. These factors explained the 28.5% of the willingness of nursing students to care for older adults (Table 6).

4. Discussion

Korean nursing students had more experience in older adult related volunteer activities than the US students, whereas the US students had more experience in older adult related clinical practice than Korean students. Korean students had more frequency in contact with, older adults while the US students had higher quality

of contact with older adults. Koreans traditionally live with their extended family even though this study result showed no difference from the US students in terms of family living style. This indicated Korean students had higher contact opportunities with older adults than the US students. On the other hand, US nursing students had fewer opportunities for contact with older adults because their family living style was more likely a nuclear family type. The US nursing students had higher quality of contact with older adults. This was probably attributed to the characteristics of clinical assignment. In other words, students explore their assigned clinical cases thoroughly and they get to know clients - possibly older adults. Specifically, US nursing students usually have longer hours of clinical practice, up to 12 h per day and nursing faculty stay in the clinical area during the entire time. In many cases, a student is paired with a nurse to effectively learn direct patient care, which possibly deepens the relationship between the nursing student and the patient. On the other hand, in many volunteer activities, the relationship between the student and the patient is not as deep as that in clinical rotations. This could explain why the US nursing students had a higher quality of contact with older adults.

Korean students had higher anxiety about aging including fears and psychological instability about older adults than US students. This is comparable with the result of the study by Yun and Lachman, which stated Koreans had a higher anxiety level about aging, and greater fear of elderly, psychological concerns, and physical appearance compared to Americans [20]. One of the possible reasons for high anxiety about aging in Korea is attributed to insufficient public pension for older adults. Korea has the lowest level of public pension (16.3% of total income) among the 36 members of Organization for Economic Co-operation and Development (OECD) while the average public pension occupies 58.6% of total income for older adults among OECD members [20]. Almost 70% of Koreans

Table 4
Assignment method of independent variables.

Independent variable	Assignment method
Year in college	Second = 1, Third = 2, Fourth = 3
Family living style	Nuclear family = 0, Extended family = 1

Table 5
Associating factors of care willingness for older adults in two countries ($n = 437$).

Variables	Korean ($n = 198$) ^a					American ($n = 239$) ^b				
	B	SE	β	t	P	B	SE	β	t	P
Constant	3.24	0.51	–	6.36	<0.001	4.50	0.63	–	7.17	<0.001
Year in college	0.27	0.09	0.16	2.98	0.003	–0.35	0.10	–0.21	–3.52	0.001
Anxiety about aging	–0.51	0.09	–0.36	–5.84	<0.001	–0.35	0.10	–0.22	–3.35	0.001
Empathy	0.25	0.11	0.13	2.21	0.028	0.28	0.13	0.13	2.13	0.035
Contact quality	0.16	0.04	0.30	4.51	<0.001	–	–	–	–	–
Attitude	–	–	–	–	–	–0.19	0.07	–0.18	–2.82	0.005
Family living type	–	–	–	–	–	–0.34	0.14	–0.15	–2.54	0.012

Note: ^aAdjusted $R^2 = 0.453$, $F = 41.64$, $P < 0.001$; ^bAdjusted $R^2 = 0.171$, $F = 10.71$, $P < 0.001$.

Table 6
Associating factors of care willingness for older adults ($n = 437$).

Variables	B	SE	β	t	P	Adjusted R^2	F	P
Constant	3.64	0.48	–	7.62	<0.001	0.285	44.20	<0.001
Anxiety about aging	–0.35	0.08	–0.23	–4.45	<0.001			
Contact quality	0.13	0.03	0.22	4.32	<0.001			
Attitude	–0.14	0.05	–0.14	–2.86	0.004			
Empathy	0.24	0.09	0.12	2.63	0.009			

aged 65 or more years received financial support transfers from their children, which was a quarter of an average elder's income [21,22]. When people do not have sufficient financial resource for their life after retirement, they get anxious for the future, which influenced Korean nursing students as members of Korean society.

US students showed higher empathy to older adults and cognitive empathy, a subcategory. On the other hand, Korean students had higher emotional empathy to older adults. Even though a specific reason for this difference was not found, it was reported organizational culture played an important role in enhancing empathy and the culturally sensitive environment encouraged people to feel more empathy [23]. That means empathy is positively related to understanding diversity. The US has a more diverse population than Korea and Americans are more exposed to different cultures, languages, races, and ideas. So US nursing students might have been influenced by diversity and more familiar with a diverse population. Therefore, older adults may be understood well and this enhances nursing students' empathy toward them.

Korean nursing students showed more negative attitude toward older adults while US nursing students showed higher willingness to care for them. According to a recent report on the human rights of older persons in Korea, 80.9% of young people (19–39 years old) reported negative social prejudice against the elderly [24]. The attitude toward the elderly in Korean society seems to influence nursing students' willingness to care for them in Korea.

The study findings also showed that willingness to care, contact quality, contact frequency, anxiety of aging, empathy, and attitude were either positively or negatively related to each other in both Korean and US students, but there was no relationship between attitude and contact frequency among US students. In Korean students, contact quality and frequency, empathy, and willingness to care were positively related to each other, but negatively related to both anxiety and attitude that were positively related to each other. The difference between two countries may have come from cultural differences, which shows contact frequency is unrelated to the attitude toward older adults in the US students while it is negatively related to the attitude in Korean students. However, further studies are recommended to explore this difference.

This study identified factors influencing the willingness to care for older adults in both Korean and US nursing students: quality of

contact, anxiety about aging, empathy, and the attitude toward older adults. However, these two groups showed a few differences. Korean students showed the empathy, quality of contact with older adults, and being senior year increased their willingness to care for older adults while experience of older adult related course and the anxiety of aging decreased the willingness. This indicates that a curriculum focused on high quality of contact and empathy building needs to be developed for Korean nursing students. Also, students' anxiety level about aging needs to reduce through learning activities, so that students will learn that aging is a natural process without being biased. This way, students will be able to have positive experience with older adult related courses. US nursing students showed low willingness to care for older adults when they were senior year, lived in extended family types, had high anxiety, or negative attitude toward older adults. This means that they may have lost interest in older adult care or found more interest in other fields of nursing care as they advance during the program. Also, unpleasant experience of living in the extended family type (e.g. conflicts from generation gaps) might have had bad impacts on willingness if they lived with grandparents before. Like Korean students, the US students' anxiety about aging decreased their willingness to care for older adults. Their attitude toward older adults also negatively impacted the willingness. Thus, the nursing program needs to help students reduce the anxiety and attitude throughout the course. Since anxiety was negatively related to the quality of contact with older adults in both Korean and the US students, nursing programs can be redesigned to increase the contact quality throughout the course to decrease anxiety. For example, students may need more assignments or clinical activities that require extensive effort in older adult related courses or the program may need to create more courses related to older adult care to reduce students' anxiety about aging.

Despite the identification of the factors and suggestion of revision in nursing programs, this study has limitations. First, students often see what nurses and nursing faculty do to older adult patients in clinical settings, which may influence their willingness to care or attitude toward the old population. Gibbs and Kulig indicated that nursing faculty influenced nursing students' behaviors and attitude as a role model and they played a key role in enhancing nursing students' attitude toward older adults [25]. Thus, further studies are needed that include the influence of nurses and other health

care professionals. Second, clinical faculty's influence on students' willingness to care for older adults was not investigated in the study. Accordingly, further studies are suggested to examine the clinical faculty's influence. Lastly, there will be a need for different participants in other countries to investigate factors influencing nursing students' willingness to generalize the finding of this study since this study was conducted in only two countries.

5. Conclusion

It is known that willingness of nurses and caregivers to care for elderly influences quality of care provided. However, there is no study showing the relationship between nursing students' willingness to care and their quality of care among nursing students. Thus, qualitative studies regarding this content are recommended in the future. Assuming nursing students (future nurses)' willingness to care influences their care quality, it is valuable that this study explored factors influencing their willingness to care for older adults in two countries, South Korea and the United States, which has not been conducted before. Nursing students' willingness to care for older adults was positively affected by contact quality and empathy to older adults and negatively affected by anxiety of aging and attitude toward older adults. Hence, researchers suggested that nursing students should be supported to learn how to enhance empathy and quality of contact with older adults and to decrease anxiety of aging and attitude toward older adults throughout the program at the university and during the clinical practice rotations, especially fundamental, community, adult medical-surgical, and community nursing courses that involve gerontological patient care. Consequently, nursing students will be able to increase their willingness to care for older adults, which will eventually promote quality of care for the older adult population.

Conflicts of interest

The authors declare no conflicts of interest and there is no funding was provided for this research.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2019.09.004>.

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