



Student nurses' career motivation toward gerontological nursing: A longitudinal study



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ABSTRACT

Background: The intensity of student nurses' motivation toward a certain career can influence their behaviors for career choice and decision making. However, little is known about the career motivation among student nurses toward gerontological nursing and their influencing factors.

Objectives: The objectives of this study were to examine student nurses' career motivation toward gerontological nursing and to explore potential predictors using Bandura's reciprocal determinism.

Design: A longitudinal design was used in this study.

Settings and participants: A total of 305 student nurses were recruited from six hospitals in Shandong province, and they completed the questionnaires over three stages.

Methods: Student nurses' career motivation toward gerontological nursing, geriatrics attitudes, aging anxiety, empathy, and clinical practice environment were measured using the motivation questionnaire, the Geriatrics Attitudes Scale, the Anxiety about Aging Scale, the Interpersonal Reactivity Index, and the clinical practice environment questionnaire, respectively. Measurements were performed at the first month, fourth month, and seventh month of student nurses' clinical practice. A series of Pearson correlation, multiple linear regression, and generalized estimating equations were applied to analyze the data.

Results: Among 305 student nurses, the mean scores for career motivation toward gerontological nursing over three stages were 66.11 (SD = 8.98), 67.55 (SD = 8.53) and 66.78 (SD = 9.51), sequentially. There were significant differences in scores for career motivation over time ($P < 0.05$) and the lowest score was observed at the first month. Geriatric attitudes, aging anxiety, empathy, clinical practice environment and stage of clinical practice were notable predictors of student nurses' career motivation toward gerontological nursing.

Conclusions: Student nurses' career motivation toward gerontological nursing needs to be improved, especially at the first month of clinical practice. Targeted interventions should cultivate positive geriatric attitudes, relieve anxiety about aging, promote empathy, and enrich the clinical practice environment to improve student nurses' career motivation toward gerontological nursing.

1. Introduction

The proportion and absolute number of older people has increased dramatically worldwide (WHO, 2015a). It is estimated that people aged 65 years or older account for 8% (524 million) of the world's population in 2010, which will increase to 16% (1.5 billion) by 2050 (WHO, 2011). In China, the pace of population aging is considerably faster than many other countries and faster than experienced previously (WHO, 2015b). The Chinese population aged 60 years or older will increase from 168 million in 2010 to 402 million in 2040, and the percentage of older people will grow from 12.4% to 28% (UN DESA, 2017). One of the most relevant issues about aging is gradual increases in the burden of chronic

non-communicable diseases (WHO, 2015b). In 2010, approximately 23.2 million Chinese older people received inpatient treatment, accounting for 20% of hospitalizations. Furthermore, the number of inpatients and outpatients who were 60 years old or older has increased gradually in recent years (WHO, 2015b). Therefore, there will be more possibilities for nurses to care for older people in hospitals or communities, and demands for competent nurses are increasing. However, in China, only 10% of registered nurses have a bachelor degree or above, and only 20,000 registered nurses have professional qualifications for gerontological nursing (Yin, 2014). In response to a lack of qualified nurses in gerontological nursing, it is necessary to cultivate knowledgeable student nurses who are committed to working with older

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people. However, most student nurses have less intention to choose gerontological nursing as a career compared with other nursing areas (Rathnayake et al., 2016). According to Vroom's motivational theory (Vroom, 1994), the intensity of student nurses' motivation toward a certain career can influence their behaviors of career choice and decision making. Considering the period of clinical practice is crucial for the formation of career motivation; because student nurses face the challenge of multiple transitions, such as the learning place changing from school to hospital, it is essential to realize their career motivation toward gerontological nursing (hereafter abbreviated "CMGN"). However, there are few studies that focus on student nurses' CMGN, particularly in longitudinal studies.

2. Background

Bandura's reciprocal determinism is a central premise of social learning theory. This premise emphasizes that environment, personal characteristics (e.g., attitude and belief), and behavior interact with each other (Bandura, 1986). As motivation can explain individuals' behavior, we applied Bandura's reciprocal determinism theory as a framework to explore potential predictors of CMGN among student nurses. In the framework, CMGN was regarded as the aspect of behavior. Geriatrics attitudes, aging anxiety and empathy were viewed as the aspect of personal characteristics, and clinical practice environment served as the aspect of the environment. According to the expectancy-value theory (Vroom, 1994), career motivation was determined by both career expectancy and career value. Career expectancy refers to the possibility of reaching a certain goal. Career value means the desirability that individuals hold regarding their work activity, including interest, utility, attainment and cost. It was found that the lowest level of career value was during college years (from the age of 18 to 22) and the highest was after entering service (after the age of 22) (Jin and Rounds, 2012). Once the career value is established, it will be relatively stable and determine students' future behavior, such as career choice and decision making. Therefore, it is vital that nursing educators and practitioners understand CMGN and its potential predictors among student nurses.

Geriatrics attitudes refer to attitudes toward older people. A previous study demonstrated a positive relationship between geriatric attitudes and motivation for working in gerontological nursing (Cheng et al., 2015). Ageism and negative stereotypes were associated with student nurses devaluing working with older people (Sarabiacobo and Castanedo, 2015). A systematic review explored registered and student nurses' attitudes toward older people and observed that their attitudes toward older people were inconsistent; a portion had positive attitudes, a portion had negative attitudes, and a portion had neutral attitudes (Liu et al., 2013). However, even if student nurses held positive attitudes, they might show little interest in engaging in gerontological nursing (Rathnayake et al., 2016). Therefore, the relationship between student nurses' geriatric attitudes and CMGN should be further explored.

Aging anxiety has been defined as the concern and anticipation of adverse physical, mental and personal losses during the aging process. In addition, aging anxiety as a mediating factor can influence individual behavior toward older people (Lasher and Faulkender, 1993). It was found that students expressed high aging anxiety, especially those who were staying with older relatives (Sözvurmaz and Mandiracioğlu, 2017), and aging anxiety was related to job satisfaction and career commitment among people who were serving older people (Gendron et al., 2014). Therefore, we assume that student nurses' aging anxiety may influence their CMGN.

Empathy was defined as the ability to understand and experience other persons' thoughts and emotions (Davis, 1983). Nurses in the hospital were easy to confront with intensely emotional situations related to illness and suffering, where empathy was required. Empathy is a central aspect of healthcare and is associated with positive outcomes

for both patients and healthcare providers (Duarte et al., 2016; Hojat et al., 2011). Nonetheless, there would be a detrimental consequence, such as emotional exhaustion, if healthcare professionals, especially student nurses, received repeated exposure to intensely distressing situations while displaying high empathy (Duarte et al., 2016). A previous study found that student nurses tended to face patients in an imagine-other perspective, whereas professional nurses tended to adopt an objective perspective that caused lower vicarious emotional reactions (López-Pérez et al., 2013). This long-term exhaustion and helplessness diminished nurses' interest. In this study, we intended to examine whether student nurses' empathy can predict their CMGN.

Environment was believed to interact with personal characteristics and behavior according to Bandura's reciprocal determinism (Bandura, 1986). Clinical practice is an important part of nursing education and has huge effects on students' development and career choice (Duggan et al., 2013). Thus, realizing the evaluation of the clinical practice environment among student nurses is indispensable. A previous study found that student nurses who perceived the clinical learning environment in an overall positive way had more positive values considering a career in gerontological nursing (Carlson and Idvall, 2015). Hence, we included clinical practice environment as an independent variable to investigate if it could influence student nurses' CMGN over time.

3. Objectives

The objectives of this study were to examine CMGN among student nurses and to explore potential predictors using Bandura's reciprocal determinism.

4. Methods

4.1. Design, settings and participants

A longitudinal design was used in this study. Convenience sampling was conducted to recruit student nurses from six hospitals in Shandong province, and the data were collected from July 2014 to January 2015. Before becoming registered nurses in China, student nurses must experience an eight-month internship in a qualified hospital, where they have opportunities working with older people. Hence, student nurses usually attend clinical practice in the final year of the four- or five-year baccalaureate nursing program. In the current study, measurements were performed at the first month (stage 1), fourth month (stage 2), and seventh month (stage 3) of student nurses' clinical practice. Among 351 students, 326 completed the survey at stage 2, and 313 completed at stage 3. The effective response rates were 92.88% and 89.17% at stage 2 and stage 3, respectively. A total of 305 student nurses were included in the final analysis, and 8 were excluded due to missing data. All enrolled participants met the inclusion criteria: (1) enrolled in full-time and public undergraduate schools, (2) training hospitals at grade III, class A level, (3) nursing students working as an intern, and (4) provided informed consent and volunteered for the study. The exclusion criteria were (1) suspended clinical practice or dropped out of school during the investigation, and (2) refused to participate in the study.

4.2. Measurements

Sociodemographic characteristics were obtained from self-designed general information questionnaires and included age, gender, only-child status, residence, family economic status, whether nursing was the top choice of major (or not), whether parents' occupation related to healthcare (or not), experience of being taken care of by grandparents, experience of taking care of older people, relationship with older people, and lived with older family members (or not).

The motivation questionnaire (Cheng et al., 2014a) was used to measure student nurses' CMGN. This 20-item questionnaire was divided

Table 1
Comparisons of the score for student nurses' CMGN by sociodemographic characteristics at each stage (N = 305).

Sociodemographic characteristics	N (%)	CMGN (mean \pm SD)		
		Stage 1	Stage 2	Stage 3
Gender				
Male	40 (13.1)	66.25 \pm 8.76	66.23 \pm 8.96	63.80 \pm 9.21
Female	265 (86.9)	66.09 \pm 9.03	67.75 \pm 8.46	67.23 \pm 9.49
<i>t</i>		0.107	-1.052	-2.141
<i>P</i>		0.915	0.294	0.033
Only-child status				
Yes	51 (16.7)	67.20 \pm 9.30	67.78 \pm 9.01	67.45 \pm 10.43
No	254 (83.3)	65.89 \pm 8.91	67.50 \pm 8.45	66.65 \pm 9.33
<i>t</i>		0.948	0.217	0.549
<i>P</i>		0.344	0.828	0.584
Residence				
Urban	99 (32.5)	65.33 \pm 9.20	66.06 \pm 9.16	66.25 \pm 9.87
Rural	206 (67.5)	66.48 \pm 8.86	68.26 \pm 8.13	67.04 \pm 9.35
<i>t</i>		1.045	2.123	0.675
<i>P</i>		0.297	0.035	0.500
Family economic status				
High	5 (1.6)	71.40 \pm 8.59	62.20 \pm 6.30	64.80 \pm 3.42
Middle	191 (62.6)	65.87 \pm 8.59	67.48 \pm 8.30	66.67 \pm 9.71
Low	109 (35.7)	66.28 \pm 9.63	67.91 \pm 8.99	67.07 \pm 9.39
<i>F</i>		0.957	1.086	0.172
<i>P</i>		0.385	0.339	0.842
Parents' occupation related to healthcare				
Yes	11 (3.6)	68.00 \pm 9.21	69.73 \pm 9.60	71.55 \pm 9.72
No	294 (96.4)	66.04 \pm 8.98	67.47 \pm 8.49	66.61 \pm 9.47
<i>t</i>		0.711	0.863	1.697
<i>P</i>		0.477	0.389	0.091
Nursing as the top choice of major				
Yes	147 (48.2)	67.59 \pm 8.18	67.44 \pm 7.53	67.97 \pm 8.81
No	158 (51.8)	64.73 \pm 9.48	67.65 \pm 9.39	65.68 \pm 10.02
<i>t</i>		2.816	-0.209	2.106
<i>P</i>		0.005	0.834	0.036
Experience of being taken care of by grandparents				
Yes	220 (72.1)	66.33 \pm 9.34	67.75 \pm 8.69	67.10 \pm 9.78
No	85 (27.9)	65.54 \pm 7.97	67.01 \pm 8.12	65.98 \pm 8.77
<i>t</i>		0.685	0.681	0.921
<i>P</i>		0.494	0.496	0.358
Experience of taking care of older people				
Yes	192 (63.0)	67.21 \pm 9.14	67.88 \pm 8.51	67.41 \pm 9.72
No	113 (37.0)	64.24 \pm 8.42	66.98 \pm 8.56	65.72 \pm 9.08
<i>t</i>		2.822	0.887	1.506
<i>P</i>		0.005	0.376	0.133
Relationship with older people (e.g., grandparents)				
Good	297 (97.4)	66.46 \pm 8.80	67.78 \pm 8.44	66.95 \pm 9.45
Bad	8 (2.6)	53.00 \pm 5.13	59.00 \pm 8.07	60.63 \pm 10.32
<i>t</i>		4.304	2.907	1.864
<i>P</i>		0.000	0.004	0.063
Lived with older family members				
Yes	123 (40.3)	67.77 \pm 8.85	68.25 \pm 8.18	67.24 \pm 9.49
No	182 (59.7)	64.98 \pm 8.91	67.07 \pm 8.75	66.47 \pm 9.54
<i>t</i>		2.689	1.187	0.694
<i>P</i>		0.008	0.236	0.488

CMGN: career motivation toward gerontological nursing.

into a value subscale and an expectancy subscale. The value subscale consisted of four dimensions (14 items), including interest (3 items), utility (3 items), importance (5 items) and cost (3 items). All items were rated on a 5-point Likert scale ranging from 1 (fully disagree) to 5 (fully agree). We reversed scores for three negative items. A higher score indicated a higher level of CMGN. In the present study, the Cronbach's α for value subscale over three stages were 0.86, 0.82 and 0.87, sequentially. The Cronbach's α for expectancy subscale over three stages were 0.86, 0.85 and 0.88, sequentially.

The Chinese version of the Geriatrics Attitudes Scale (Reuben and Lee, 1996; Wang et al., 2009) was used to assess geriatric attitudes. The scale contained 14 items with a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). A higher average score indicated a more positive attitude toward older people. We reversed the scores for negative items. In the current study, the Cronbach's α over three stages

were 0.73, 0.74 and 0.75, sequentially.

The Chinese version of the Anxiety about Aging Scale (Lasher and Faulkender, 1993; Liu, 2012) was used to examine student nurses' aging anxiety. This 20-item scale contained 4 dimensions, including fear of old people, psychological concerns, fear of losses and physical appearance. Each item was scored on a 4-point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). After reversing scores of negative items, the total score ranged from 20 to 80, with a higher score indicating a higher level of aging anxiety. In the present study, the Cronbach's α for the scale over three stages were 0.74, 0.68 and 0.75, sequentially.

The Chinese version of the Interpersonal Reactivity Index (Davis, 1983; Zhan, 1986) was used to examine student nurses' empathy. This 22-item scale consisted of 4 dimensions: perspective taking, fantasy, empathy concern, and personal distress. Each item was evaluated on a

5-point Likert scale ranging from 0 (inappropriate) to 4 (very appropriate). A higher total score indicated a stronger empathy. In the current study, the Cronbach's α over three stages were 0.76, 0.79 and 0.71, sequentially.

The clinical practice environment questionnaire (Cheng et al., 2014b) was used to evaluate the clinical practice environment for gerontological nursing. This questionnaire consisted of 20 items, which were categorized further into 6 dimensions: sense of security, sense of belonging, continuity, objective, sense of achievement and importance. Each item was rated on a 5-point Likert scale ranging from 1 (absolutely disagree) to 5 (absolutely agree), and a higher average score indicated a better evaluation. In the current study, the Cronbach's α over three stages were 0.94, 0.94 and 0.95, sequentially.

4.3. Statistical analyses

Data analyses were performed by SPSS 22.0, and statistical significance level was defined as $P < 0.05$. Descriptive statistics including frequencies and percentages were used to describe student nurses' sociodemographic characteristics. Descriptive statistics including means and standard deviations were used to describe student nurses' CMGN, geriatric attitudes, aging anxiety, empathy and clinical practice environment at each stage. One-way ANOVA or independent t -test was conducted to examine differences in CMGN via sociodemographic characteristics. Correlations of student nurses' geriatric attitudes, aging anxiety, empathy, clinical practice environment and CMGN at each stage were calculated using Pearson correlation analysis. Multiple linear regression analysis was applied to identify factors associated with student nurses' CMGN at each stage. The ANOVA for repeated measurements was employed to test the changes of study variables over time. Generalized estimating equation was conducted to evaluate the predictors of student nurses' CMGN.

5. Results

5.1. Comparisons of CMGN by sociodemographic characteristics

Among 305 student nurses, the average age was 22.91 (SD = 0.97) years (range: 20–26). As shown in Table 1, most of the student nurses were female and had good relationships with older people. More than half of the student nurses lived in rural areas, had the experience of taking care of older people, did not choose nursing as the top major, and did not live with older family members in one house. In addition, comparisons of the score for student nurses' CMGN by sociodemographic characteristics at each stage are also presented in Table 1.

5.2. Mean scores for CMGN and independent variables and their changes over time

As shown in Table 2, the mean scores for CMGN among student nurses over three stages were 66.11 (SD = 8.98), 67.55 (SD = 8.53)

and 66.78 (SD = 9.51), sequentially. There were significant differences in scores for CMGN among student nurses over time ($P < 0.05$), and the lowest score was presented at the first month. In addition, there were significant differences in scores for expectancy, aging anxiety, empathy, and clinical practice environment among student nurses over time (all $P < 0.01$). However, scores for value and geriatric attitudes had no significant differences.

Post hoc multiple comparisons of statistically significant variables were further performed to clarify the concrete differences. There was a higher score for CMGN at stage 2 than at stage 1 ($P < 0.01$), while there was no significant difference between stage 1 and stage 3. For expectancy, the score at stage 1 was lower than scores at stage 2 and stage 3 (all $P < 0.01$), and there was no significant difference between stage 2 and stage 3. Regarding aging anxiety, we found the lowest score was at stage 3 (all $P < 0.01$), and there was no significant difference between stage 1 and stage 2. The results were similar when we analyzed empathy and clinical practice environment. There were higher scores at stage 1 than at stage 2 and at stage 3 (empathy, all $P < 0.01$; environment, $P < 0.05$, $P < 0.01$), and had no significant difference between stage 2 and stage 3.

5.3. Correlations between CMGN and independent variables at each stage

As presented in Table 3, scores for geriatric attitudes, empathy and clinical practice environment all were positively correlated with the score for CMGN over three stages, whereas the score for aging anxiety was negatively correlated with the score for CMGN over three stages (all $P < 0.01$).

5.4. Factors associated with CMGN at each stage

We used multiple linear regression analysis to identify factors associated with student nurses' CMGN at each stage. The score for CMGN was entered as the dependent variable. Scores for geriatric attitudes, aging anxiety, empathy and clinical practice environment and statistically significant sociodemographic characteristics were entered as independent variables. At the first stage, it was determined that geriatric attitudes, aging anxiety, empathy, clinical practice environment, relationship with older people, and nursing as the top choice of major accounted for 43.6% (adjusted $R^2 = 0.436$) of the variance in CMGN. At the second stage, geriatric attitudes, aging anxiety, empathy, clinical practice environment, and relationship with older people accounted for 37.7% (adjusted $R^2 = 0.377$) of the variance in CMGN. At the third stage, geriatric attitudes, aging anxiety, empathy, clinical practice environment, and nursing as the top choice of major accounted for 39.4% (adjusted $R^2 = 0.394$) of the variance in CMGN (Table 4).

5.5. Predictors of CMGN

Generalized estimating equation was performed to identify potential predictors of CMGN among student nurses. The score for student

Table 2
Repeated measurement analysis for student nurses' CMGN and independent variables over time (N = 305).

Variables	Mean \pm SD			Score range	F	P
	Stage 1	Stage 2	Stage 3			
CMGN	66.11 \pm 8.98	67.55 \pm 8.53	66.78 \pm 9.51	20–100	3.905	0.021
Expectancy	3.37 \pm 0.55	3.50 \pm 0.56	3.47 \pm 0.54	1–5	9.216	0.000
Value	3.28 \pm 0.47	3.32 \pm 0.44	3.28 \pm 0.50	1–5	1.527	0.218
Geriatric attitudes	3.56 \pm 0.39	3.54 \pm 0.38	3.50 \pm 0.40	1–5	2.513	0.082
Aging anxiety	48.23 \pm 5.25	47.70 \pm 4.50	47.01 \pm 4.50	20–80	9.640	0.000
Empathy	52.17 \pm 9.31	50.60 \pm 9.84	49.58 \pm 9.58	0–88	10.199	0.000
Clinical practice environment	3.40 \pm 0.54	3.33 \pm 0.56	3.27 \pm 0.56	1–5	7.217	0.001

CMGN: career motivation toward gerontological nursing.

Table 3
Pearson correlations between student nurses' CMGN and independent variables at each stage (N = 305).

Variables	1	2	3	4	5
Stage 1					
1. CMGN	1				
2. Geriatric attitudes	0.315**	1			
3. Aging anxiety	-0.347**	-0.194**	1		
4. Empathy	0.220**	0.133*	0.057	1	
5. Clinical practice environment	0.494**	0.005	-0.185**	0.160**	1
Stage 2					
1. CMGN	1				
2. Geriatric attitudes	0.314**	1			
3. Aging anxiety	-0.333**	-0.263**	1		
4. Empathy	0.341**	0.319**	-0.053	1	
5. Clinical practice environment	0.477**	0.118*	-0.262**	0.150**	1
Stage 3					
1. CMGN	1				
2. Geriatric attitudes	0.290**	1			
3. Aging anxiety	-0.320**	-0.288**	1		
4. Empathy	0.331**	0.209**	-0.016	1	
5. Clinical practice environment	0.515**	0.006	-0.230**	0.265**	1

CMGN: career motivation toward gerontological nursing.

* P < 0.05.

** P < 0.01.

Table 4
Multiple linear regression analysis for student nurses' career motivation toward gerontological nursing at each stage (N = 305).

Stage	Variables	B	SE	β	t	P
1	Constant	23.786	7.135	-	3.334	0.001
	Geriatric attitudes	5.280	1.027	0.230	5.141	0.000
	Aging anxiety	-0.340	0.080	-0.198	-4.235	0.000
	Empathy	0.133	0.043	0.138	3.096	0.002
	Clinical practice environment	6.823	0.744	0.414	9.173	0.000
	Relationship with older people	7.460	2.491	0.133	2.994	0.003
	Nursing as the top choice of major	2.040	0.791	0.114	2.579	0.010
2	Constant	36.972	7.727	-	4.785	0.000
	Geriatric attitudes	3.123	1.110	0.140	2.814	0.005
	Aging anxiety	-0.341	0.092	-0.180	-3.708	0.000
	Empathy	0.192	0.042	0.221	4.549	0.000
	Clinical practice environment	5.801	0.735	0.377	7.894	0.000
	Relationship with older people	7.996	2.422	0.150	3.302	0.001
3	Constant	32.056	7.967	-	4.024	0.000
	Geriatric attitudes	4.810	1.157	0.202	4.157	0.000
	Aging anxiety	-0.351	0.103	-0.166	-3.461	0.001
	Empathy	0.156	0.048	0.157	3.266	0.001
	Clinical practice environment	7.350	0.824	0.431	8.926	0.000
	Nursing as the top choice of major	1.942	0.868	0.102	2.237	0.026

Stage 1: F = 30.412, P < 0.001, R² = 0.451, adjusted R² = 0.436.

Stage 2: F = 31.624, P < 0.001, R² = 0.389, adjusted R² = 0.377.

Stage 3: F = 33.953, P < 0.001, R² = 0.406, adjusted R² = 0.394.

nurses' CMGN was entered as the dependent variable. Geriatric attitudes, aging anxiety, empathy, clinical practice environment, stage of clinical practice, age and statistically significant sociodemographic characteristics were entered as predictive variables. The results showed that gender, stage of clinical practice, relationship with older people, whether nursing was the top choice of major (or not), geriatric attitudes, aging anxiety, empathy, and clinical practice environment were significant factors predicting student nurses' CMGN, and other variables

Table 5
Generalized estimating equation for predictors of student nurses' career motivation toward gerontological nursing (N = 305).

Variables	B	SE	95% CI		Wald χ ²	P
			Lower	Upper		
Intercept	28.733	8.390	12.289	45.176	11.728	0.001
Stage 1	-1.628	0.494	-2.597	-0.660	10.861	0.001
Stage 2	0.383	0.460	-0.519	1.285	0.692	0.406
Stage 3	Reference	Group				
Age	0.161	0.304	-0.434	0.757	0.282	0.596
Lived in rural areas	0.814	0.669	-0.497	2.124	1.481	0.224
Lived with older family members	0.792	0.629	-0.440	2.024	1.589	0.208
Experience of taking care of older people	0.918	0.641	-0.338	2.174	2.051	0.152
Female	1.736	0.863	0.045	3.427	4.050	0.044
Good relationship with older people	5.953	1.563	2.889	9.017	14.499	0.000
Nursing as the top choice of major	1.431	0.591	0.273	2.590	5.865	0.015
Geriatric attitudes	3.926	0.806	2.346	5.506	23.709	0.000
Aging anxiety	-0.329	0.060	-0.446	-0.211	30.212	0.000
Empathy	0.120	0.032	0.057	0.183	14.088	0.000
Clinical practice environment	6.311	0.595	5.145	7.477	112.522	0.000

CI = confidence interval.

were not significant. According to the B values, student nurses who were female, chose nursing as the top major, had better relationships with older people, had more positive attitudes toward older people, had more powerful empathy, and had better evaluation of the clinical practice environment tended to have a higher level of CMGN. In contrast, student nurses who had a higher degree of aging anxiety tended to have a lower level of CMGN. In addition, we can realize that the level of student nurses' CMGN was lower at the first month of clinical practice compared with the seventh month (Table 5).

6. Discussion

6.1. Longitudinal changes of CMGN among student nurses

The present study showed that student nurses' CMGN had significant changes over time (P < 0.05), and the lowest level was at the first month of clinical practice. Possible reasons for the change of CMGN were that student nurses were non-committal about working in gerontological nursing (Neville, 2016) and felt underprepared to work with older people at the beginning of clinical practice (Duggan et al., 2013). A previous study found that gerontological nursing courses promoted student nurses' preference for working with older people over time (King et al., 2013). The study indicates that nursing educators and clinical instructors should realize student nurses' CMGN, especially at the first month of clinical practice. Strategies also need to be developed to improve student nurses' CMGN.

6.2. Effect of geriatric attitudes on CMGN among student nurses

This study found that student nurses' geriatric attitudes did not change obviously over time. A longitudinal study investigated 113 student nurses and found that student nurses' attitude toward older people changed from slightly negative to neutral (Bleijenberg, 2012). The eight-month internship in China may be able to explain this difference. The internship was too short for student nurses at the hospital to change their attitude toward working with older people. Nevertheless, geriatric attitude was observed to be an important predictor of CMGN among student nurses in our study. With the progress of the internship, the more positive attitudes toward older people, the

stronger CMGN they had, which was consistent with a previous study which demonstrated that geriatric attitudes were the best predictors of student nurses' willingness to care for older people (Chi et al., 2016). A program offering specific courses and training in gerontology was found to improve student nurses' attitudes toward older people effectively (Sarabiaco and Castanedo, 2015). Hence, nursing educators may improve student nurses' attitudes toward older people by innovating curriculum, and further activating students' CMGN.

6.3. Effect of aging anxiety on CMGN among student nurses

The results of our study revealed that the degree of student nurses' aging anxiety was significantly higher at the first and fourth month of clinical practice than that at the seventh month. This finding was in agreement with the finding from a previous study, which showed that aging anxiety was negatively correlated with aging knowledge (Zhan, 2017). Student nurses spent more time working with older people during internships and accumulated aging knowledge. Thus, the students learned to confront the process of aging and gradually reduced the degree of aging anxiety. In addition, this study found that aging anxiety decreased as CMGN increased. Aging anxiety was a constant negative predictor of CMGN among student nurses. A previous study (Boswell, 2012) showed that professional trainees who were anxious about aging and knew little about aging process before courses had less interest in gerontological nursing. However, after learning aging-related courses and formal contacting with older people, college students expressed a lower level of aging anxiety and a greater interest in gerontology (Bergman et al., 2014). Therefore, nursing educators may relieve student nurses' aging anxiety by developing curriculum that increases knowledge about aging and provides opportunities to work with older people, thereby improving students' CMGN, especially during the first four months of clinical practice.

6.4. Effect of empathy on CMGN among student nurses

Our study demonstrated that empathy among student nurses declined during their clinical practice. The study was consistent with prior findings that found that empathic behavior among student nurses decreased over time (Ten et al., 2017). Our study also indicated that the more powerful empathy that student nurses had, the higher level of CMGN they also had. Empathy was found to be a predictor of student nurses' CMGN. This finding was confirmed by a previous study (Pantovic-Stefanovic et al., 2015), which reported that medical students with high levels of empathy were more likely to choose people-oriented disciplines (e.g., internal medicine, geriatric medicine) than technology-oriented disciplines (e.g., surgery, forensic medicine) as a future career. Furthermore, empathy was connected with prosocial motivation and was a contributor to altruistic behaviors (Kjersti, 2015). This result might be interpreted as student nurses with stronger empathy having stronger altruistic desires to help older people, who were seen as a weak group in society. Hence, nursing educators should promote student nurses' empathy at the fourth and seventh month of clinical practice to improve students' CMGN.

6.5. The effect of clinical practice environment on CMGN among student nurses

In the present study, the evaluation of clinical practice environment showed a declined tendency among student nurses. It indicates that the degree of satisfaction on clinical practice environment needs to be improved. With prolonged exposure to clinical practice, student nurses gradually became familiar with the environment and observed potential problems at clinical settings that may affect their evaluation of the clinical practice environment. In addition, the present study showed that the better the evaluation of clinical practice environment is, the higher the level of the CMGN is. The clinical practice environment was

a predictor of student nurses' CMGN. Similar findings were revealed in a previous study, which demonstrated that poor working environment, lack of satisfaction and low professional esteem had bad effects on attracting more professionals to the specialty (Kydd and Wild, 2013). Therefore, the guidance and education of student nurses during the internship were extremely important, especially at the fourth and seventh months of clinical practice. Moreover, clinical instructors should create a helpful and supportive clinical practice environment to improve student nurses' CMGN.

6.6. Limitations

Although this report describes a longitudinal study, we should be cautious in interpreting causal relationships between variables. Furthermore, in the present study, participants were only undergraduate student nurses. Further studies including student nurses with different levels of education are needed to generalize our results. In addition, we only investigated the level of student nurses' CMGN and its changes during clinical practice. Thus, we propose tracing nursing students from the start of school combined with quality study such that we can understand the changes of CMGN profoundly. At last, because it is a local study, with a local teaching plan, generalizations about these findings are limited.

7. Conclusions

Student nurses' CMGN needs to be improved, especially at the first month of clinical practice. In the process of school and clinical practice, nursing educators should fully realize potential personal and contextual factors influencing CMGN among student nurses over time. Targeted interventions should cultivate positive geriatric attitudes, relieve anxiety about aging, promote empathy, and enrich the clinical practice environment to improve student nurses' CMGN. Additionally, encouraging student nurses to establish good relationships with older people, paying more attention to male student nurses, and guiding their career development may also be beneficial to students' CMGN.

Ethical approval

The study was approved by the Nursing Ethics Committee of Shandong University and received approval at all sites. Moreover, student nurses who participated in this study were all informed consent, and their personal data were in strict confidence.

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Contributions

Xiaohui Chai contributed to the analysis and interpretation of data, and was responsible for drafting the manuscript. Cheng Cheng and Jiaojiao Mei collected data for the study and participated in the review of the results. Xiuzhen Fan contributed to the conception and design of the study, and revised the manuscript for important intellectual content, and was the corresponding author. All authors read and approved the final manuscript.

Conflicts of interest

None.

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