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The use of body mechanics principle, clinical-practice fatigue, and practice satisfaction of nursing students

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ABSTRACT

Purpose: The purpose of this study is to investigate the relations among the use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction of nursing students.
Methods: Participants were 149 nursing students with clinical-practice experience from four nursing colleges in South Korea. Data were collected from May to July of 2016 using structured questionnaires. The collected data were analyzed using PASW Statistics 22.0.
Results: The participants' scores for the use of body mechanics principle, clinical-practice fatigue, and practice satisfaction were 3.12 (out of 5), 4.61 (out of 7), and 3.58 (out of 5), respectively. The use of the body mechanics principle and clinical-practice fatigue showed a negative correlation ($r = -0.379$, $p < 0.001$) while the use of the body mechanics principle and practice satisfaction showed a positive correlation ($r = 0.341$, $p < 0.001$). Clinical-practice fatigue and practice satisfaction showed a positive correlation ($r = -0.384$, $p < 0.001$). The group of students who scored high on the use of the body mechanics principle showed significantly lower scores on clinical-practice fatigue than those who scored low on the use of the body mechanics principle ($t = 3.879$, $p < 0.001$) while the scores on the satisfaction of clinical practice were significantly high ($t = -3.338$, $p < 0.001$).
Conclusions: This study found that nursing students' use of the body mechanics principle could reduce clinical-practice fatigue and increase practice satisfaction. It is necessary to develop and teach various body mechanics programs for nursing students.

1. Introduction

Nursing students' clinical practice is an essential part of their curriculum that connects theories with real situations and, through education, allows nursing students to experience various nursing situations and gain nursing competency, which meets the needs of a rapidly changing contemporary society. All nursing students recognize the importance of clinical-practice education, but, nonetheless, they experience stress from clinical practice as well as from their academic training. Stress and anxiety can increase due to difficulties in applying theoretical knowledge to a clinical-practice situation, through difficulties in interpersonal relationships with nursing clients, due to a feeling of helplessness stemming from their ambiguous role as nursing students at the practice site, or from the mere fact of having to do a lot of practice (Lee & Noh, 2016; Sun et al., 2016).

'Body mechanics' is a term that indicates a coordinated effort of the musculoskeletal and nervous systems to maintain balance, posture, and body alignment in daily life, which is directly related to effective bodily functioning. Improper working posture increases the risk of damage to the body. Body mechanics refers to the method of efficiently using the body when making movements, such as bending the body, lifting a heavy object or person, stretching an arm, sitting, standing, or lying while performing tasks (Karahan & Bayraktar, 2004; H.J. Lee, 2002).

Research on nursing activities and body mechanics in clinical situations has been mostly related to backaches. It has been reported that most nurses who experienced backaches rarely used the body mechanics principle (Choi, 2009; Rahmah, Rozy, Halim, Jamsiah, & Shamsul, 2008). In addition, research on burdens to the body related to nurses' working posture revealed that the degree of burden on the body was highest when changing a patient's position due to improper posture, which could be the source of the backache. I.J. Lee (2002) proposed that a method should be implemented for the habitual use of body mechanics for nurses carrying out their jobs.

Similarly, nursing students also participate in nursing practices such as patient transfers and position changes. Nursing students may experience psychological anxiety from an unfamiliar ward environment during the clinical practice, psychological and physical fatigue due to long-term practice, sleep disorder, or chronic fatigue syndrome due to

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difficulties with taking breaks in time. The persistent fatigue experienced during clinical practice can be a major cause for nursing students to lose their interest in clinical practice and nursing and can bring about the negative result of harming their health (Angelone, Mattei, Sbarbati, & Di Orio, 2011; Michalec, Diefenbeck, & Mahoney, 2013). Fatigue during clinical practice was found to cause several difficulties, including trouble with clinical-practice performance, anxiety, interpersonal relationship stress, insecurity and decreased concentration in the learning process, and negative practice satisfaction (Rella, Winwood, & Lushington, 2009).

Nurses are often required to carry out work activities in an upright posture for many hours in a row, transfer patients (depending on the patients' level of consciousness), and move medical devices, all of which require application of the body mechanics principle to avoid physical harm and to effectively use the body while nursing (Jung & Suh, 2013). Therefore, it is necessary to educate nursing students at the start of their training on the use of the body mechanics principle while nursing and to implement a systematic training program for them to learn it adequately during the undergraduate program.

There has been almost no research conducted on the body mechanics of nursing students in South Korea. A correlational study was performed on postural habit, backache, and stress (Kim & Choi, 2014), but even basic studies on the effect of education on the body mechanics principle for nursing students or the use of the body mechanics principle and its necessity for nursing students in clinical practice sites have not be conducted.

Therefore, this study aimed to present basic data to support the recommendation that body mechanics can be effectively used in clinical practice by determining the effects of the body mechanics principle on clinical-practice fatigue and practice satisfaction in nursing students. The goals of the present study were as follows. a) Find the degree of use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction of nursing students. b) Find the relations among use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction of nursing students.

2. Methods

2.1. Study design

This study used a descriptive survey to examine and find the relationship among use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction of nursing students.

2.2. Participants and data collection

The participants were nursing students who had clinical-practice experience and were enrolled in undergraduate nursing programs in four nursing colleges in South Korea. Data were collected from May to July of 2016. A structured questionnaire was used, which took approximately 10 min to complete. The number of participants ($n = 134$) was calculated using G*power 3.1.9 for the correlation test with a significance level of $\alpha = 0.05$, a power of 95%, and a medium effect size of 0.3. A total of 150 questionnaires were distributed, and, after excluding one incomplete response, 149 were included in the final analysis.

2.3. Ethical considerations for participants

For the ethical protection of the participants in the present study, the purpose and method of the study were explained to participants before the questionnaires were distributed, and only the participants who volunteered and submitted a written consent form participated in the study.

3. Measurements

3.1. Use of the body mechanics principle

For the measurement of use of the body mechanics principle, an instrument developed by Lee (2002a) was used. The instrument uses a five-point Likert scale composed of seven items, including functional and anatomical posture maintenance, posture with a lowered basal area, close proximity to an object, using the leg muscles, and utilization of body weight. In the present study, use of the body mechanics principle was measured during the clinical-practice period, and a higher score signifies higher utilization of the body mechanics principle. The instrument reliability measured by Cronbach's alpha was 0.91 in Lee's study (2002a); the Cronbach's alpha in the present study was 0.78.

3.2. Clinical-practice fatigue

The Fatigue Severity Scale was developed by Krupp, LaRocca, Muir-Nash, and Steinberg (1989). to measure clinical-practice fatigue and was tested by Lee, Jeong, Lim, Cho, Ma, and Ko (2013) for its reliability and validity for use with South Korean university students. The instrument used a seven-point Likert scale with a total of nine items. Fatigue felt during the clinical practice period was measured with a higher score signifying greater fatigue. The instrument reliability measured by Cronbach's alpha was 0.93 in the study by Lee et al. (2013); the Cronbach's alpha in the present study was 0.87.

3.3. Practice satisfaction

To measure practice satisfaction, an instrument for measuring satisfaction of nursing students developed by Kim (2010) was used. The instrument uses a five-point scale composed of nine items: acquisition of professional knowledge and skills nursing students must have, practice contents, educational environment of the practice facility, practice work, practice work instruction, appropriateness of practice hours, role models, interpersonal relationship, and satisfaction with the relationship with patients. A higher score signifies higher practice satisfaction. The Cronbach's alpha in the study by Kim (2010) was 0.91; the Cronbach's alpha in the present study was 0.88.

3.4. Data analysis

The collected data were analyzed using PASW Statistics 22.0, and detailed analysis methods were as follows: (a) Participants' characteristics and use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction were analyzed using descriptive statistics (frequency, percentage, average, standard deviation, minimum, and maximum). (b) The score differences in the use of body mechanics, clinical-practice fatigue, and practice satisfaction according to participants' characteristics were analyzed using an independent *t*-test and ANOVA. (c) The relations among use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction were analyzed using Pearson's correlation coefficients; the score differences in clinical-practice fatigue and practice satisfaction between the high-scoring and low-scoring groups on the use of the body mechanics principle were analyzed using an independent *t*-test. (d) The collected data were analyzed at a significance level of 0.05.

4. Results

4.1. Participant's characteristics

The participants consisted of 149 nursing students of which 132 (88.6%) were female and 17 (11.4%) were male. Thirty-three (22.1%) participants were juniors, and 116 (77.9%) were seniors. Thirty-five (23.5%) participants completed 1–2 semesters of clinical practice, and

Table 1
General participant characteristics and score for use of body mechanics principle, clinical-practice fatigue, and practice satisfaction among nursing students.

Variables	n (%)	Use of body mechanics principle		Clinical-practice fatigue		Practice satisfaction	
		Mean ± SD (range 1–5)	t (*p*)	Mean ± SD (range 1–7)	t (*p*)	Mean ± SD (range 1–5)	t (*p*)
Total score		3.12 ± 0.67		4.616 ± 1.01		3.59 ± 0.61	
Age(year), mean ± SD	21.68 ± 1.12						
Gender							
Female	132(88.6)	3.07 ± 0.66	2.955	4.66 ± 0.98	−1.370	3.58 ± 0.62	0.233
Male	17(11.4)	3.58 ± 0.54	(0.004)	4.30 ± 1.20	(0.173)	3.62 ± 0.51	(0.816)
Grade							
Third	33(22.1)	2.98 ± 0.83	−1.174	4.83 ± 1.09	1.385	3.19 ± 0.67	−4.503
Fourth	116(77.9)	3.16 ± 0.61	(0.247)	4.55 ± 0.98	(0.168)	3.70 ± 0.54	(< 0.001)
Completed clinical practice semesters							
1–2 semester	35(23.5)	2.97 ± 0.81	−1.340	4.72 ± 1.15	0.735	3.22 ± 0.67	−4.214
3–4 semester	114(76.5)	3.17 ± 0.61	(0.122)	4.58 ± 0.96	(0.464)	3.69 ± 0.54	(< 0.001)
Walking habit							
Yes	45(30.2)	3.39 ± 0.62	3.380	4.29 ± 0.94	−2.608	3.66 ± 0.59	1.065
No	104(69.8)	3.00 ± 0.65	(0.001)	4.75 ± 1.01	(0.010)	3.55 ± 0.61	(0.289)
Regular meal							
Yes	49(32.9)	3.16 ± 0.65	0.456	4.61 ± 0.93	−0.018	3.60 ± 0.54	0.175
No	100(67.1)	3.10 ± 0.75	(0.649)	4.61 ± 1.05	(0.985)	3.58 ± 0.63	(0.861)
Meal before clinical practice							
Yes	93(62.4)	3.12 ± 0.68	0.034	4.56 ± 1.00	−0.819	3.60 ± 0.60	0.540
No	56(37.6)	3.12 ± 0.64	(0.973)	4.70 ± 1.03	(0.414)	3.55 ± 0.62	(0.590)
Living arrangements							
Home (commute within 1.5-h distance)	97(65.1)	3.10 ± 0.63	0.496	4.52 ± 1.07	3.928	3.58 ± 0.64	0.791
Home (commute 1.5-h or greater distance)	12(8.1)	3.20 ± 0.75	(0.686)	4.90 ± 0.67	(0.010)	3.82 ± 0.61	(0.501)
Dormitory	12(8.1)	3.33 ± 0.77		4.02 ± 0.90		3.54 ± 0.46	
Self-boarding and home stay	28(18.8)	3.07 ± 0.72		5.05 ± 0.76		3.51 ± 0.54	
Musculoskeletal conditions							
Yes	22(14.8)	3.13 ± 0.62	0.090	4.43 ± 1.20	−0.888	3.77 ± 0.55	1.544
No	127(85.2)	3.12 ± 0.68	(0.929)	4.64 ± 0.97	(0.376)	3.55 ± 0.61	(0.125)
Subjective health condition							
Good	65(43.6)	3.27 ± 0.63	6.194	4.25 ± 0.87	13.365	3.71 ± 0.53	2.623
Average	42(28.2)	3.13 ± 0.59	(0.003)	4.58 ± 0.86	(< 0.001)	3.49 ± 0.50	(0.076)
Not healthy	41(27.5)	2.82 ± 0.71	[a]a > c	5.22 ± 1.10	[a]a > c, b > c	3.47 ± 0.77	
Physical burden of clinical practice							
Very difficult	32(21.5)	2.73 ± 0.66	9.888	5.39 ± 0.92	24.681	3.38 ± 0.83	5.191
Slightly difficult	71(47.7)	3.13 ± 0.63	(< 0.001)	4.70 ± 3.95	(< 0.001)	3.53 ± 0.55	(0.007)
Manageable	45(30.2)	3.38 ± 0.61	[a]b > a, c > a	3.95 ± 0.73	[a]a > b > c	3.80 ± 0.43	[a]c > a
Clinical practice stress							
Severe	70(47.0)	3.02 ± 0.70	1.577	4.97 ± 1.02	13.668	3.46 ± 0.64	5.623
Slight	51(34.2)	3.21 ± 0.59	(0.214)	4.50 ± 0.89	(< 0.001)	3.58 ± 0.56	(< 0.004)
Average	27(18.1)	3.22 ± 0.69		3.88 ± 0.77		3.91 ± 0.48	

[a] Scheffe's test; SD, Standard Deviation

114 (76.5%) participants completed 3–4 semesters of clinical practice.

Forty-five (30.2%) participants had usual walking habits, 49 (32.9%) had regular eating habits, and 93 (62.4%) participants stated they have a meal before clinical practice.

With regard to living arrangements, 97 (65.1%) participants commuted up to one and a half hours, 12 (8.1%) commuted more than one and a half hours, 12 (8.1%) lived in a dormitory, and 28 (18.8%) practiced self-boarding or boarding. Twenty-two participants (14.8%) had been diagnosed with musculoskeletal conditions in the recent four years.

When examining subjective health conditions, 65 (43.6%) participants responded as having good, 42 (28.2%) as having average, and 41 (27.5%) as having poor health. With regard to the physical burden of clinical practice, 32 (21.5%) stated it was very difficult, 71 (47.7%) stated it was slightly difficult, and 45 (30.2%) stated manageable. When rating clinical practice stress, 70 participants (47.0%) stated severe, 51 (34.2%) stated slight, and 27 (18.1%) stated average (Table 1).

4.2. Use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction in relation to participant characteristics

The scores for use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction were 3.12 (± 0.67) (out of 5), 4.61 (± 1.01) (out of 7), and 3.58 (± 0.61) (out of 5), respectively.

The differences in the scores for the use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction in relation to the characteristics of participants are shown in Table 1. The body mechanics principle showed significant differences for gender

Table 2
Correlation for use of body mechanics principle, clinical-practice fatigue, and practice satisfaction among nursing students.

	Use of body mechanics principle r (*p*)	Clinical-practice fatigue	Practice satisfaction
Use of body mechanics principle	1		
Clinical-practice fatigue	−0.379 (< 0.001)	1	
Practice satisfaction	0.341 (< 0.001)	−0.384(< 0.001)	1

(t = 2.955, $p = 0.004$), walking habit (t = 3.380, $p = 0.001$), subjective health condition (t = 6.194, $p = 0.003$), and physical burden of clinical practice (t = 9.888, $p < 0.001$). Significant differences were found for clinical-practice fatigue depending on walking habit (t = −2.608, $p = 0.010$), living arrangements (t = 3.928, $p = 0.010$), subjective health condition (t = 13.365, $p < 0.001$), physical burden of clinical practice (t = 24.681, $p < 0.001$), and clinical-practice stress (t = 13.668, $p < 0.001$). Practice satisfaction was significantly different depending on grade (t = −4.503, $p < 0.001$), completed number of practice semesters (t = −4.124, $p < 0.001$), physical burden of clinical practice (t = 5.191, $p = 0.007$), and clinical-practice stress (t = 5.623, $p = 0.004$).

4.3. Relationships among use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction

The relationships among use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction of participants is shown in Tables 2 and 3. The relationship between the use of the body mechanics principle and clinical-practice fatigue showed a negative correlation ($r = -0.379$, $p < 0.001$), but a positive correlation was found between use of the body mechanics principle and practice satisfaction ($r = 0.341$, $p < 0.001$). A negative correlation was found between clinical-practice fatigue and practice satisfaction ($r = -0.384$, $p < 0.001$).

To examine the relationships among clinical-practice fatigue, practice satisfaction, and use of the body mechanics principle in detail, participants were divided into two groups, those that scored 50% or higher and those that scored less than 50% on use of the body mechanics principle, and the differences in scores were examined. Clinical-practice fatigue was lower for the high-scoring body mechanics group than for the low-scoring group (low group 4.93 ± 0.99 > high group 4.31 ± 0.95, t = 3.879, $p < 0.001$); the practice satisfaction scores were significantly higher for the high-scoring group as well (low group 3.41 ± 0.64 < high group 3.74 ± 0.53, t = −3.338, $p < 0.001$).

Table 3
Difference in use of body mechanics principle, clinical-practice fatigue, and practice satisfaction among nursing students.

Variables	Group	Clinical-practice fatigue (range 1–7)	t (*p*)	Practice satisfaction (range 1–5)	t (*p*)
Use of body mechanics principle	Lower score group (n = 72)	4.93 ± 0.99	3.879 (< 0.001)	3.41 ± 0.64	−3.338 (0.001)
	Upper score group (n = 76)	4.31 ± 0.95		3.74 ± 0.53	

5. Discussion

This study was conducted to present basic data in support of body mechanics being efficiently used in clinical practice by nursing students. The present study investigated whether body mechanics can be used as an intervention for nursing students' fatigue at education sites and to determine whether it affects practice satisfaction.

5.1. Participants' use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction

Participants' scores for use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction were 3.12 (out of 5), 4.61 (out of 7), and 3.58 (out of 5), respectively. They were all above the mean scores.

Regarding the scores for the use of the body mechanics principle, participants in the present study obtained higher mean scores than those in a study on ICU nurses using the same instrument, which obtained an average of 2.29 (Song, 2011), and two other studies on general hospital nurses, which obtained mean scores of 2.70 (Choi, 2012) and 2.11 (Jung & Suh, 2013). It is difficult to compare, however, because there is a difference between nursing students and nurses in the physical activities they perform for nursing patients at hospitals. Nursing students should form a habit of using the body mechanics principle, and it should be continued when they work as nurses.

The average score for clinical-practice fatigue was 4.61, which was higher than the average of 3.20 of a study (Lee et al., 2013) on general university students in South Korea. This indicates that nursing students' fatigue is greater than that of general university students and that an intervention related to fatigue appears to be needed.

In addition, the average score for practice satisfaction was 3.58, which was higher than the mean of 3.31 of a study (Kim, 2010) on psychiatry nursing practice students. Since only a few schools were included in the study, comparison is difficult.

In addition, the use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction was influenced by participants' various characteristics, and differences in the degree of influence were found depending on gender, grade, completed number of practice semesters, walking habit, subjective health condition, physical burden of clinical practice, living arrangements, and clinical-practice stress. Therefore, if body mechanics programs and practice improvement programs for nursing students and nurses are going to be developed, such characteristics need to be considered.

5.2. Relationships among use of the body mechanics principle, clinical-practice fatigue, and practice satisfaction

The use of the body mechanics principle and clinical-practice fatigue showed a moderate negative correlation ($r = -0.379$, $p < 0.001$). In addition, the high-scoring group showed lower clinical-practice fatigue compare to the low-scoring group, whose scores for the use of the body mechanics principle were low (t = 3.879, $p < 0.001$). This can be considered to mean that the degree of clinical-practice fatigue can be low if the body mechanics principle is used well. It is not possible to compare studies on body mechanics and fatigue due to the rarity of such studies, but the result can be considered to be similar to those of correlational studies (Jung & Suh, 2013; Karahan & Bayraktar, 2004) of the relationship between backache and body mechanics in nurses, which showed negative correlations between backache and use of the body mechanics principle. In addition, the results can be considered to be similar to a study (Kim & Choi, 2014) on nursing students in which bad postural habits were found to be the major cause of backache. Because the bodily fatigue felt during nursing students' clinical practice can be reduced if body mechanics are used correctly, educating nursing students about the content and application of the body mechanics method before clinical practice is necessary. At clinical

practice sites, strengthening education on body mechanics for the safety of patients and nurses is also necessary (Karahan, Kav, Abbasoglu, & Dogan, 2009; Motacki & Motacki, 2009).

A moderate positive correlation ($r = 0.341$, $p < 0.001$) was found between use of the body mechanics principle and practice satisfaction with the high-scoring body mechanics group showing higher levels of practice satisfaction than the low-scoring group ($t = -3.338$, $p < 0.001$). This can be considered to indicate that the correct use of the body mechanics principle can have a positive influence on practice satisfaction. Even though it can be speculated that the use of the body mechanics principle will have positive effects on the performance and emotional state of the participant, it is difficult to confirm the effect due to the lack of studies related to body mechanics. Therefore, future research is needed.

In an additional analysis, a negative correlation was found between clinical-practice fatigue and practice satisfaction, which confirms the fact that the reduction of nursing students' clinical-practice fatigue can be connected to an increase in practice satisfaction. It appears to be necessary to consider students' physical health management to improve the negative effects related to nursing students' clinical practice.

5.3. Study limitations

This was a cross-sectional study based on a convenience sample limited to specific regions. Therefore, its results cannot be generalized. There is a need for further research involving nursing students of various regions in the future.

6. Conclusion

This study found that nursing students' use of the body mechanics principle can reduce clinical-practice fatigue and increase practice satisfaction. Various training programs that can increase use of the body mechanics principle among nursing students need to be developed so that they can contribute to the formation of proper habits for physical activities for the safe nursing of patients.

Declaration of conflicting interests

The authors declare no conflict of interest with respect to the research, authorship, and/or publication of this article.

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References

Angelone, A. M., Mattei, A., Sbarbati, M., & Di Orio, F. (2011). Prevalence and correlates for self-reported sleep problems among nursing students. *Journal of Preventive Medicine and Hygiene*, 52(*4*), 201–208.

Choi, H. S. (2009). *Association Between Musculoskeletal Symptom and Work-related Risk Factors Among Nurses* (Unpublished master's thesis). Kimhea, South Korea: Inje University.

Choi, I. Y. (2012). *Relationship of Back Pain with Nursing Activities, Working Environments, the use of Body Mechanics, and Health Behaviors Among Nurses Working in General Hospitals* (Unpublished master's thesis). Daejeon, South Korea: Chungnam National University.

Jung, K. J., & Suh, S. R. (2013). Relationships among nursing activities, the use of body mechanics, and job stress in nurses with low back pain. *Journal of Muscle Joint Health*, 20(*2*), 141–150.

Karahan, A., & Bayraktar, N. (2004). Determination of the usage of body mechanics in clinical settings and the occurrence of low back pain in nurses. *International Journal of Nursing Study*, 41(*1*), 67–75.

Karahan, A., Kav, S., Abbasoglu, A., & Dogan, N. (2009). Low back pain: Prevalence and associated risk factors among hospital staff. *Journal of Advanced Nursing*, 65(*3*), 516–524.

Kim, J. S., & Choi, J. S. (2014). Effects of postural habits and stress on low back pain in nursing students. *Journal of Muscle and Joint Health*, 21(*3*), 165–172.

Kim, S. H. (2010). *Influencing Factors on the Satisfaction of Nursing Students According to the Mental Health Nursing Practice* (Unpublished master's thesis). Gwangju, South Korea: Chosun University.

Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The fatigue severity scale. application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of Neurology*, 46, 1121–1123.

Lee, E., & Noh, H. K. (2016). The effects of a web-based nursing process documentation program on stress and anxiety of nursing students in South Korea. *International Journal of Nursing Knowledge*, 27(*1*), 35–42.

Lee, H. J. (2002a). *The Effects of Tuina Program on Nurses with Low Back Pain* (Unpublished master's thesis). Seoul, South Korea: Hanyang University.

Lee, I. J. (2002b). A study on the physical load related to working posture with nurses in ICU. *Korean Journal Occupational Health Nursing*, 11(*2*), 121–131.

Lee, J. H., Jeong, H. S., Lim, S. M., Cho, H. B., Ma, J. Y., Ko, E., et al. (2013). Reliability and validity of the fatigue severity scale among university student in South Korea. *Korean Journal Biological Psychiatry*, 20, 6–11.

Michalec, B., Diefenbeck, C., & Mahoney, M. (2013). The calm before the storm? Burnout and compassion fatigue among undergraduate nursing students. *Nurse Education Today*, 33(*4*), 314–320.

Motacki, K., & Motacki, L. M. (2009). Safe patient handling and movement in a pediatric setting. *Pediatric Nursing*, 35(*4*), 221–225.

Rahmah, M. A., Rozy, J., Halim, I., Jamsiah, M., & Shamsul, A. S. (2008). Prevalence of back pain among nurses working in government health clinics and hospital in port Dickson, Malaysia. *Malaysian Journal of Community Health*, 14(*2*), 11–18.

Rella, S., Winwood, P. C., & Lushington, K. (2009). When does nursing burnout begin? An investigation of the fatigue experience of Australian nursing students. *Journal of Nursing Management*, 17(*7*), 886–897.

Song, M. O. (2011). *Factors on Backache of Nurses in the Intensive Care Units at a University Hospital* (Unpublished master's thesis). Gwangju, South Korea: Chonnam National University.

Sun, F. K., Long, A., Tseng, Y. S., Huang, H. M., You, J. H., & Chiang, C. Y. (2016). Undergraduate student nurses' lived experiences of anxiety during their first clinical practicum: A phenomenological study. *Nurse Education Today*, 37, 21–26.