Application of Health Belief Model and Theory of Planned Behavior-Based Care in Patients undergoing Surgery for Limb Fractures

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AIM: This retrospective study aimed to evaluate the effectiveness of a nursing model on the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB) in patients undergoing surgery for limb fractures.

METHODS: A total of 100 patients who underwent limb fracture surgery at Zhongnan Hospital of Wuhan University from February 2023 to February 2024 were selected for this study. The research group (n = 58) received nursing care based on the HBM and TPB, while the control group (n = 42) received conventional nursing care. Comparative analyses were conducted on curative effectiveness, the degree of limb swelling, pain intensity (measured by the Visual Analogue Scale [VAS]), symptom recovery time (including pain duration, swelling duration, ambulation time, and length of stay), and self-care management (assessed through behavior management, psychological activities, and status management).

RESULTS: The results indicated no significant differences in curative effectiveness between the two groups ($p > 0.05$). The research group had fewer grade I and II limb swelling cases than the control group ($p < 0.05$). Additionally, the research group reported lower VAS scores on postoperative days 3 and 7, earlier ambulation, shorter pain and swelling durations, and reduced length of hospital stay compared to the control group ($p < 0.01$). Furthermore, self-care management scores, including behavior management, psychological activities, and status management, were significantly higher in the research group after treatment compared to the control group ($p < 0.05$).

CONCLUSIONS: The nursing model based on HBM and TPB provides benefits for patients undergoing limb fracture surgery by reducing swelling, relieving pain, promoting symptom disappearance, speeding up rehabilitation, and enhancing self-care management.

Keywords: Health Belief Model; Theory of Planned Behavior; nursing; limb fracture surgery; application value

Introduction

Limb fractures, often resulting from high-energy trauma, disrupt the structure and integrity of long bones, leading to varying degrees of pain, swelling, deformity, and functional limitations in patients [1, 2]. These fractures can cause severe complications, such as exposed fractures, tissue defects, and wound infections, which exacerbate pain and hinder postoperative recovery [3, 4]. Epidemiological data indicate that limb fractures predominantly occur in men, especially in the lower extremities, with traffic collisions being the leading cause [5]. In the Netherlands, the incidence of limb fractures rose significantly, from 129,188 cases in 2004 to 176,129 in 2012. While surgery is a common treatment, it carries the risk of postoperative limb swelling, which can impede venous return and arterial blood supply, thereby affecting postoperative recovery [6, 7]. Effective nursing care is essential to mitigate these risks and enhance postoperative outcomes.

The Health Belief Model (HBM) is a psychological framework that encourages the development of positive health behaviors by transforming the perceptions of an individual on health and emphasizes the benefits of behavior changes, helping patients develop positive health behaviors [8]. The Theory of Planned Behavior (TPB) is a behavioral theory that uses evidence-based insights to encourage health behaviors that promote disease recovery [9, 10]. A nursing model that integrates HBM and TPB combines these approaches to support patients in adopting proactive health behaviors and effective self-management strategies [11, 12]. This nursing model has been applied in various clinical settings, including ostomy surgery, where it improved patient compliance and reduced complication rates [13]. Additionally, a randomized controlled trial demonstrated that this model enhanced preventive health behaviors, upper limb function, symptom relief, quality of life, and self-efficacy in breast cancer surgery patients [14].

The purpose of this study is to validate the application value of a nursing model centered on HBM and TPB in patients with limb fracture surgery, aiming at providing a better medical experience for such patients.

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Materials and Methods

Patient Information

This retrospective study included 100 patients who underwent limb fracture surgery at Zhongnan Hospital of Wuhan University between February 2023 and February 2024. A total of 58 patients were assigned to the research group, where they received nursing care based on the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB). Meanwhile, 42 patients in the control group received conventional nursing care. The study was conducted in compliance with the Declaration of Helsinki and was approved by the Ethics Committee of Zhongnan Hospital of Wuhan University (Approval No. 2023-06). All participants were fully informed of the objectives of the study and provided written informed consent.

Eligibility and Exclusion Criteria

Inclusion criteria: ① Patients meeting the established diagnostic criteria for limb fractures [15], characterized by symptoms such as pain, deformity, limited mobility, swelling, palpable bony crepitus, scraping sensation, and abnormal movement. ② Availability of complete clinical data.

Exclusion criteria: ① History of previous fractures. ② Presence of vascular injury. ③ Severe neurological and consciousness disorders, psychiatric disorders, or cognitive impairment.

Nursing Model

The research group received a nursing model centered on HBM and TPB. The intervention plan was divided into two parts according to the intervention time: during hospitalization and after discharge.

(1) During hospitalization: It was divided into three parts by the responsible nurse, each part lasting 20–30 minutes. ① Enhancing a sense of crisis: First, to deepen the understanding of the hazards and treatment process of limb fractures among patients and their families and to increase their awareness, they were invited to join the self-management WeChat group of hospitalized patients, where the risk factors for adverse events after limb fracture surgery were explained. ② Raising awareness of the harm of the disease: The nursing staff used pictures or past cases to introduce the negative impact of the disease and related complications on the body and daily life to the patients. In addition, patients' disease awareness, rehabilitation training, drug use, and daily diet were assessed, and the relationship between the above links and the treatment and prognosis of limb fractures was informed. ③ Explaining the role of self-management in limb fractures: The benefits of improving self-management ability of patients and their families were informed, that is, self-management measures such as adhering to reasonable diet, standardized medication, and rehabilitation training can reduce risk factors, improve quality of life, and prevent adverse outcomes. Besides, the hospital invited patients with good prognosis to share their self-management experiences and methods, so as to increase patients' recognition of the current learning content.

(2) After discharge: Patients were followed up every Monday at 19:00 via the WeChat group and phone, with each session lasting 20–30 minutes. ① During weeks 1 and 2 after discharge, the focus was to increase the self-confidence of patients to overcome difficulties in the process of self-management, encourage them to express the main difficulties encountered in the process of self-management, and master their inner changes. Family members were taught to support and encourage patients to participate in daily recreational activities to enhance their confidence in overcoming difficulties in the process of self-management. ② During weeks 3 and 4, importance was attached to improving the patient's subjective norms. Doctors re-emphasized to patients the importance of self-management such as daily rehabilitation exercises and disease management to the treatment and prognosis of diseases to arouse their sufficient attention. Family members and patients were required to learn self-management knowledge together, so that patients could realize their family's concern. ③ During weeks 5–8: The nursing purpose during 5–8 weeks after discharge was to enhance the patient's conscious control ability. Disease control content: Emphasis was placed on the adverse effects of risk factors on the treatment and prognosis of limb fracture surgery. Doctors taught patients the prevention and coping measures for various adverse events at home, and sent the results of each follow-up to the responsible nurse. Rehabilitation exercise content: Rehabilitation therapists explained the methods and precautions of rehabilitation exercises for patients in different periods, and asked patients to send videos of each rehabilitation exercise to the WeChat group so that doctors could give timely guidance. Daily dietary content: Medical staff enhanced patients' attention to daily diet and rest time and encouraged them to change unhealthy living habits. ④ During weeks 9–12: the patients' behavioral intention was strengthened to change their thinking. The performance of the patients was summarized and encouraged on a weekly basis to enhance their enthusiasm for participation. Patients and their families were regularly inquired to understand the relevant knowledge of self-management to ensure their compliance.

The control group received the following routine nursing measures: ① Preoperative: Routine fasting and drinking deprivation, cleansing enema, health education, and psychological intervention were carried out. ② Postoperative: Patients were fasted and water-deprived for 6 hours after surgery, monitored for their vital signs, and encouraged to exercise 12 hours after the operation. ③ After discharge: The patient was instructed on the methods of limb rehabilitation training and medication.

Analysis Indexes

(1) Efficacy [16]: Efficacy was assessed by experienced medical professionals, including doctors and nurses with

relevant professional qualifications in the field of orthopedics. These evaluators assessed the patients based on the following criteria: A cure was indicated by complete resolution of swelling, pain, and other symptoms, with restoration of normal soft tissue function. Effectiveness was measured by partial relief of symptoms and improvement in soft tissue function, while ineffectiveness was indicated by no improvement in soft tissue and joint function, with persistent symptoms. The total efficacy rate was calculated as the sum of the cure and effectiveness rates.

(2) Swelling degree of the affected limb [17]: The evaluation was as follows: Grade I: mild swelling with visible dermatoglyphics; grade II: moderate swelling with redness and tensionless blisters; grade III: severe swelling with elevated skin temperature and tension blisters.

(3) Pain intensity: The pain intensity for the patients was measured using the Visual Analogue Scale (VAS) [18], ranging from 0–10, where higher scores indicate greater pain intensity.

(4) Symptom recovery time: The recovery parameters for the two groups were recorded, including pain duration, swelling duration, ambulation time, and length of stay.

(5) Self-care management: It was assessed through behavior management, psychological activities, and status management. Behavior management assesses adherence to recommended rehabilitation exercises, medication schedules, and lifestyle modifications. Psychological activities were also evaluated, including the ability to cope with the emotional stress of the injury and surgery, motivation, and confidence in the recovery process. Additionally, status management encompassed monitoring and managing physical conditions, recognizing changes in symptoms, and following medical advice on rest and activity levels. A 6-level scoring system (0–5 points) was adopted, with higher scores indicating better self-care ability [19].

Statistical Methods

Independent sample *t*-tests were used to compare measurement data (expressed as mean ± standard deviation) between groups, while paired *t*-tests were employed to compare data within groups before and after treatment. Categorical data, expressed as rate (percentage), were compared using the chi-square (χ^2) test. The choice of test for correlations between categorical variables depended on the sample size and expected frequencies. Pearson chi-square test was applied when the sample size was sufficient, and all expected frequencies were greater than 5. When the expected frequencies were less than 5 but greater than 1, the corrected chi-square test was used, while Fisher's exact test was applied when the expected frequencies were less than 1 or the sample size was too small. Statistical analyses were performed using SPSS 17.0 (SPSS Statistics Inc., Chicago, IL, USA), and differences with a *p*-value less than 0.05 were statistically significant.

Results

General Data Analysis

As shown in Table 1, there were no statistically significant differences between the research and control groups in sex, age, disease duration, weight, education level, and fracture site ($p > 0.05$).

Curative Effect Analysis

Table 2 indicates that the total effective rate was 93.10% in the research group compared to 90.48% in the control group, showing no significant difference ($p > 0.05$).

Analysis of the Swelling Degree of the Affected Limb in Two Groups

As presented in Table 3, the research group had 6 cases of grade I and 1 case of grade II limb swelling, while the control group reported 12 cases of grade I and 6 cases of grade II swelling. The research group had fewer grade I and II limb swelling cases than the control group ($p < 0.05$).

Analysis of Pain Degree

Pain intensity was assessed using the Visual Analogue Scale (VAS). The research group showed lower VAS scores on the 3rd and 7th postoperative days (4.24 ± 1.17 and 3.10 ± 0.91, respectively) compared to the control group (5.88 ± 1.13 and 4.57 ± 0.83, respectively). The differences were statistically significant ($p < 0.01$; Fig. 1).

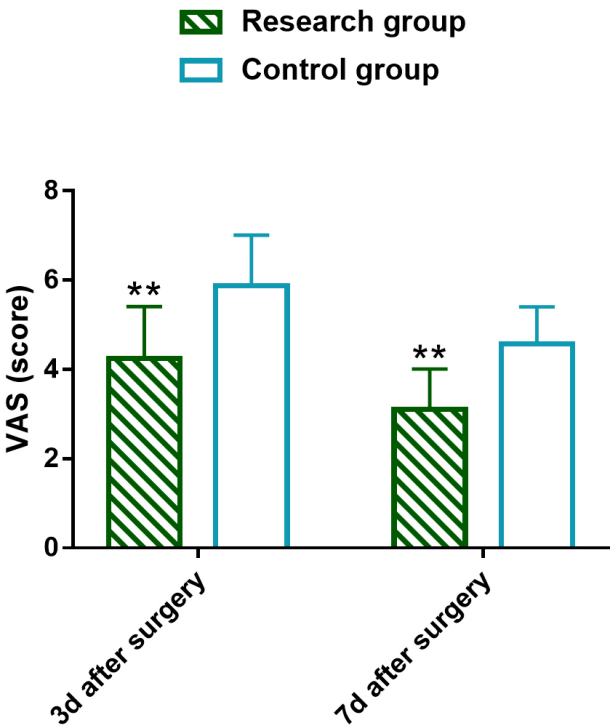

Fig. 1. Analysis of pain intensity. $^{**}p < 0.01$. VAS, Visual Analogue Scale.

Table 1. General data analysis.

Indicators	Research group (n = 58)	Control group (n = 42)	χ^2/t	*p*-value
Gender (male/female)	35/23	25/17	0.007	0.934
Age (years)	42.16 ± 12.11	39.40 ± 14.10	1.050	0.297
Disease course (days)	15.55 ± 2.77	14.86 ± 4.40	0.961	0.339
Weight (kg)	64.78 ± 11.01	64.17 ± 9.03	0.294	0.769
Education level (junior college and above/senior high school and below)	26/32	20/22	0.076	0.782
Fracture site (upper limb/lower limb)	30/28	23/19	0.090	0.764

Table 2. Curative effect analysis.

Indicators	Research group (n = 58)	Control group (n = 42)	χ^2	*p*-value
Cured [n (%)]	29 (50.00)	20 (47.62)		
Effective [n (%)]	25 (43.10)	18 (42.86)		
Ineffective [n (%)]	4 (6.90)	4 (9.52)		
Total effectiveness [n (%)]	54 (93.10)	38 (90.48)	0.011	0.917

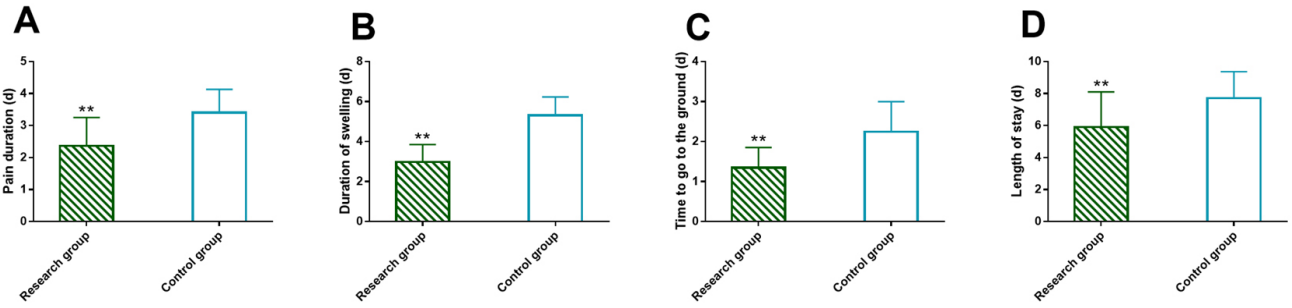

Fig. 2. Analysis of symptom recovery time. (A) Comparison of pain duration; (B) Comparison of swelling duration; (C) Comparison of ambulation time; (D) Comparison of length of hospital stay. $^{**}p < 0.01$.

Analysis of Symptom Recovery Time

The research group demonstrated significantly shorter recovery time across several parameters, including pain duration (2.36 ± 0.89 *vs*. 3.40 ± 0.73), swelling duration (2.97 ± 0.88 *vs*. 5.1 ± 0.92), time to ambulation (1.34 ± 0.51 *vs*. 2.24 ± 0.76), and length of hospital stay (5.91 ± 2.19 *vs*. 7.71 ± 1.66) compared to the control group ($p < 0.01$; Fig. 2).

Analysis of Self-Care Management

Prior to the intervention, there were no significant differences between the two groups in behavior management (2.17 ± 0.50 *vs*. 2.31 ± 0.72), psychological activities (2.05 ± 0.63 *vs*.1.95 ± 0.82), and status management (2.16 ± 0.59 *vs*. 1.95 ± 0.49) ($p > 0.05$). After the intervention, both groups showed improvements in these areas; however, the research group demonstrated significantly higher scores in behavior management (4.81 ± 0.96 *vs*. 2.88 ± 1.06), psychological activities (4.33 ± 1.08 *vs*. 3.48 ± 0.83), and status management (4.62 ± 1.30 *vs*. 2.90 ± 0.85) compared to the control group ($p < 0.05$; Fig. 3).

Discussion

Patients undergoing limb fracture surgery often experience functional limitations due to limb dysfunction [20]. Implementing effective strategies to improve their limb function and promote recovery is crucial for enhancing the daily lives of patients and advancing orthopedic care [21].

In this study, 100 patients who underwent limb fracture surgery were enrolled. Of these, 58 patients in the research group received a nursing care model based on HBM and TPB, while 42 patients in the control group received conventional nursing care. The overall effective treatment rate in the research group was 93.10%, comparable to the control group (90.48%), suggesting that the HBM- and TPB-based care model is as effective as conventional nursing care. Notably, the research group had significantly fewer grade I and II limb swelling cases, indicating that the HBM- and TPB-centered nursing model is more effective in postoperative swelling in patients undergoing limb fracture surgery.

The HBM- and TPB-centered nursing model includes comprehensive health education on disease awareness during hospitalization, emphasizing the importance and benefits of self-management. This approach helps patients develop a heightened sense of urgency about their condition and a better understanding of the impacts of the disease. By enhancing the acceptance and recognition by the patients of self-management, this model improves treatment compliance, care coordination, and the ability to manage clinical manifestations such as pain and swelling [22, 23].

Table 3. Analysis of the swelling degree of the affected limb.

Indicators	Research group (n = 58)	Control group (n = 42)	χ^2	*p*-value
Grade I [n (%)]	6 (10.34)	12 (28.57)	5.483	0.019
Grade II [n (%)]	1 (1.72)	6 (14.29)	4.133	0.042
Grade III [n (%)]	0 (0.00)	1 (2.38)	-	0.420

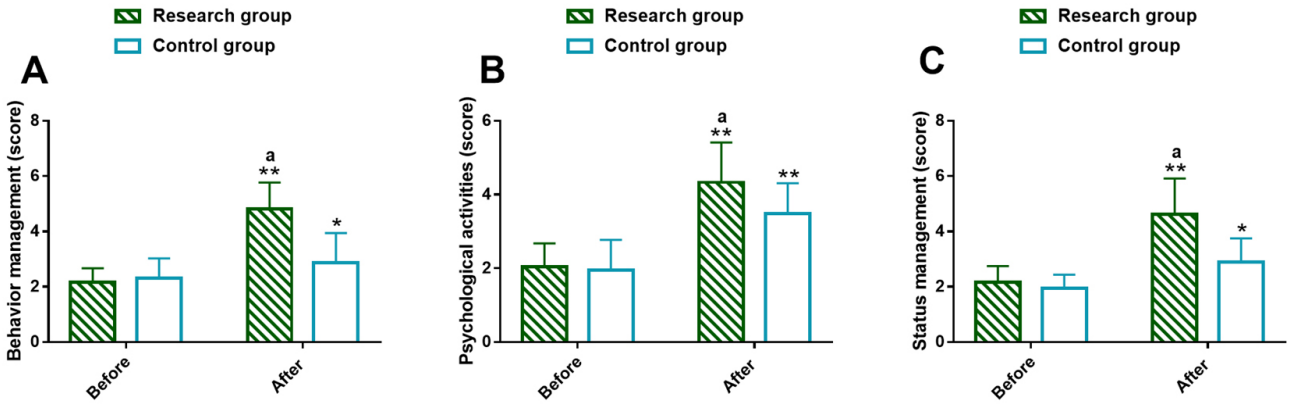

Fig. 3. Analysis of self-care management in the two groups. (A) Comparison of behavior management scores; (B) Comparison of psychological activity scores; (C) Comparison of status management scores. *$p < 0.05$, **$p < 0.01$ versus pre-nursing scores; [a]$p < 0.05$ versus the control group.

The data from the VAS scale revealed significantly lower pain scores on the 3rd and 7th day post-surgery in the research group, indicating that the HBM- and TPB-centered nursing model is highly effective in alleviating postoperative pain. Additionally, the research group demonstrated significantly shorter recovery time in terms of pain duration, swelling duration, ambulation time, and hospitalization length compared to the control group. These findings underscore the positive impact of HBM- and TPB-based care on promoting recovery in patients undergoing limb fracture surgery.

Under the HBM- and TPB-based nursing model, patients received personalized care and targeted interventions to relieve symptoms such as pain and swelling, effectively accelerating recovery [24]. Similar results were observed in a study by Zuo *et al.* [25], where the HBM- and TPB-centered nursing model significantly reduced hospital stay and fracture healing time in early fracture patients. Moreover, Pang *et al.* [26] demonstrated that this nursing model effectively relieved postoperative pain and promoted postoperative rehabilitation in patients with open lower extremity fractures, further supporting our findings.

Furthermore, after nursing care, the research group showed significantly improved scores in behavior management, psychological activities, and status management, highlighting the effectiveness of the HBM- and TPB-based nursing model in enhancing self-care management in patients undergoing limb fracture surgery. This model established health beliefs for patients during hospitalization and reinforced these beliefs post-discharge, improving the self-control abilities of the patients and providing continued guidance for rehabilitation exercises [27]. Additionally, by involving the family members of the patients in the self-management process and offering appropriate encouragement, this model strengthened the confidence and motivation of the patients for self-management [28].

Consistent with our findings, Xu *et al.* [29] reported that the HBM- and TPB-centered nursing model effectively enhanced their self-care abilities and prevented complications in elderly patients with hip fractures. Similarly, research by Shyu *et al.* [30] demonstrated that this nursing model significantly improved the self-care abilities of patients undergoing hip fracture surgery while helping prevent falls and malnutrition.

Conclusions

In conclusion, the nursing model based on HBM and TPB demonstrates significant clinical value for patients undergoing limb fracture surgery. This approach is particularly effective in accelerating symptom and disease recovery, alleviating postoperative pain and swelling, and enhancing the self-care management capabilities of the patients.

Availability of Data and Materials

All experimental data included in this study can be obtained by contacting the first author if needed.

Author Contributions

XYW conceived and designed the experiments; XYW and XQG analyzed the data; XYW contributed to the data curation; XYW wrote-original draft preparation. Both authors contributed to important editorial changes in the manuscript. Both authors read and approved the final

manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was conducted in compliance with the Declaration of Helsinki and was approved by the Ethics Committee of Zhongnan Hospital of Wuhan University (Approval No. 2023-06). All participants were fully informed of the objectives of the study and provided written informed consent.

Acknowledgment

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Conflict of Interest

The authors declare no conflict of interest.

References

[1] Khan K, Mushtaq M, Rashid M, Rather AA, Qureshi OAA. Management of tibial plateau fractures: a fresh review. Acta Orthopaedica Belgica. 2023; 89: 265–273.

[2] Matcuk GR, Jr, Mahanty SR, Skalski MR, Patel DB, White EA, Gottsegen CJ. Stress fractures: pathophysiology, clinical presentation, imaging features, and treatment options. Emergency Radiology. 2016; 23: 365–375.

[3] Al-Hourani K, Pearce O, Kelly M. Standards of open lower limb fracture care in the United Kingdom. Injury. 2021; 52: 378–383.

[4] Lee A, Geoghegan L, Nolan G, Cooper K, Super J, Pearse M, *et al*. Open tibia/fibula in the elderly: A retrospective cohort study. JPRAS Open. 2021; 31: 1–9.

[5] Schultz BV, Watt K, Rashford S, Wylie J, Bosley E. Epidemiology of open limb fractures attended by ambulance clinicians in the out-of-hospital setting: A retrospective analysis. Australasian Emergency Care. 2023; 26: 216–220.

[6] Beerekamp MSH, de Muinck Keizer RJO, Schep NWL, Ubbink DT, Panneman MJM, Goslings JC. Epidemiology of extremity fractures in the Netherlands. Injury. 2017; 48: 1355–1362.

[7] Farhan-Alanie MM, Dhaif F, Trompeter A, Underwood M, Yeung J, Parsons N, *et al*. The risks associated with tourniquet use in lower limb trauma surgery: a systematic review and meta-analysis. European Journal of Orthopaedic Surgery & Traumatology: Orthopedie Traumatologie. 2021; 31: 967–979.

[8] Che Mohamed N, Moey SF, Lim BC. Validity and Reliability of Health Belief Model Questionnaire for Promoting Breast Self-examination and Screening Mammogram for Early Cancer Detection. Asian Pacific Journal of Cancer Prevention: APJCP. 2019; 20: 2865–2873.

[9] Bosnjak M, Ajzen I, Schmidt P. The Theory of Planned Behavior: Selected Recent Advances and Applications. Europe's Journal of Psychology. 2020; 16: 352–356.

[10] Lee S, Vincent C. Analysis and Evaluation of the Theory of Planned Behavior. ANS. Advances in Nursing Science. 2021; 44: E127–E140.

[11] Lin CY, Hou WL, Tseng YH, Lin ML, Griffiths MD. Validity, reliability, and cross-validation of a new questionnaire developed using the Theory of Planned Behavior: The Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ). Heliyon. 2023; 9: e19706.

[12] Ahn S, Oh J. Effects of a health-belief-model-based osteoporosis- and fall-prevention program on women at early old age. Applied Nursing Research: ANR. 2021; 59: 151430.

[13] Cengiz B, Bahar Z, Canda AE. The Effects of Patient Care Results of Applied Nursing Intervention to Individuals with Stoma According to the Health Belief Model. Cancer Nursing. 2020; 43: E87–E96.

[14] Cal A, Bahar Z, Gorken I. Effects of Health Belief Model based nursing interventions offered at home visits on lymphedema prevention in women with breast cancer: A randomised controlled trial. Journal of Clinical Nursing. 2020; 29: 2521–2534.

[15] Sabbagh MD, Morsy M, Moran SL. Diagnosis and Management of Acute Scaphoid Fractures. Hand Clinics. 2019; 35: 259–269.

[16] Akbulut S, Ozer A, Saritas H, Yilmaz S. Factors affecting anxiety, depression, and self-care ability in patients who have undergone liver transplantation. World Journal of Gastroenterology. 2021; 27: 6967–6984.

[17] He L, Li Y, Liao X, Wang Y, Pu L, Gao F, *et al*. Effects of evidence-based nursing combined with enhanced recovery after surgery on shoulder joint function and neurological function after arthroscopic rotator cuff injury repair. Medicine. 2021; 100: e27951.

[18] Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. Pain. 1983; 17: 45–56.

[19] Lawless MT, Tieu M, Chan RJ, Hendriks JM, Kitson A. Instruments Measuring Self-Care and Self-Management of Chronic Conditions by Community-Dwelling Older Adults: A Scoping Review. Journal of Applied Gerontology. 2023; 42: 1687–1709.

[20] Hall J, Llewellyn A, Palmer S, Rowett-Harris J, Atkins RM, McCabe CS. Sensorimotor dysfunction after limb fracture - An exploratory study. European Journal of Pain (London, England). 2016; 20: 1402–1412.

[21] Hussain MS, Avilucea FR, Archdeacon MT. Effectiveness of the Taut-Line Hitch Knot in Reducing and Splinting Lower Extremity Fractures. Journal of Orthopaedic Trauma. 2019; 33: e31–e35.

[22] Hoffman AJ. Enhancing self-efficacy for optimized patient outcomes through the theory of symptom self-management. Cancer Nursing. 2013; 36: E16–E26.

[23] Hamtaeigashti S, Shamsi M, Sahraian MA, Soltani R,

Almasi-Hashiani A. Effect of an educational intervention based on the theory of planned behavior on improving medication adherence in patients with multiple sclerosis treated with injectable disease-modifying drugs: randomized controlled trial. BMC Public Health. 2023; 23: 999.
[24] Brooks JM, Iwanaga K, Chiu CY, Cotton BP, Deiches J, Morrison B, *et al*. Relationships between self-determination theory and theory of planned behavior applied to physical activity and exercise behavior in chronic pain. Psychology, Health & Medicine. 2017; 22: 814–822.
[25] Zuo J, Qian J, Wang T, Ye M, Zhao J. An analysis of implementation of evidence-based nursing model in health education for early fracture patients and its therapeutic influences. American Journal of Translational Research. 2021; 13: 4868–4875.
[26] Pang Z, Shan M, Li Y, Zhang H, Huang A, Liu Y, *et al*. The Efficacy of Rehabilitation Nursing Interventions on Patients with Open Lower Limb Fractures. Journal of Healthcare Engineering. 2022; 2022: 1859747.
[27] Wang X, Chen D, Xie T, Zhang W. Predicting women's intentions to screen for breast cancer based on the health belief model and the theory of planned behavior. The Journal of Obstetrics and Gynaecology Research. 2019; 45: 2440–2451.
[28] Gulley T, Boggs D. Time perspective and the theory of planned behavior: moderate predictors of physical activity among central Appalachian adolescents. Journal of Pediatric Health Care: Official Publication of National Association of Pediatric Nurse Associates & Practitioners. 2014; 28: e41–e47.
[29] Xu X, Han J, Li Y, Sun X, Lin P, Chen Y, *et al*. Effects of Orem's Self-Care Model on the Life Quality of Elderly Patients with Hip Fractures. Pain Research & Management. 2020; 2020: 5602683.
[30] Shyu YIL, Liang J, Tseng MY, Li HJ, Wu CC, Cheng HS, *et al*. Enhanced interdisciplinary care improves self-care ability and decreases emergency department visits for older Taiwanese patients over 2 years after hip-fracture surgery: A randomised controlled trial. International Journal of Nursing Studies. 2016; 56: 54–62.