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# Development and psychometric analysis of the Patient Perceptions of Patient-Empowering Nurse Behaviours Scale (PPPNBS)

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## **Abstract**

**Aim:** To (1) develop and psychometrically test the Patient Perceptions of Patient-Empowering Nurse Behaviours Scale, which measures patient perceptions of empowering nurse behaviours during hospitalization; and (2) refine to a shorter, more useful form, for measurement in clinical settings.

**Background:** Although patient empowerment has been promoted as a way to engage patients in chronic illness care, there is not a measure reported by patients as recipients of empowering nurse behaviours during hospitalization.

**Design:** Psychometric evaluation of construct and predictive validity, reliability and item reduction.

**Method:** Data gathered during hospitalization and six weeks postdischarge between April 2012 - August 2014 were used to determine the validity and reliability of the long and short-form Patient Perceptions of Patient-Empowering Nurse Behaviours Scale in a sample of 395 chronically ill medical and surgical adult patients.

**Results:** The long and short-form Patient Perceptions of Patient-Empowering Nurse Behaviours Scale demonstrated strong reliability and convergent validity with pre-discharge 13-item Patient Activation Measure scores. Both forms of the Patient Perceptions of Patient-Empowering Nurse Behaviours Scale predicted postdischarge 13-item Patient Activation Measure scores and the long-form predicted physical health status. Confirmatory factor analysis demonstrated improved model fit for the short-form instrument when compared with the long-form fit. The short-form Patient Perceptions of Patient-Empowering Nurse Behaviours Scale explained 98% of the variance of the long-form Patient Perceptions of Patient-Empowering Nurse Behaviours Scale.

**Conclusion:** The results provide evidence supporting reliability and validity of both forms. While the scales measure patient reports and not direct observation of empowering nurse behaviours, incorporating patients' experiences as recipients of care is necessary to validate the contribution of nursing care to patients' engagement in chronic illness management.

**Why is this research needed?**

- Patient empowerment has been promoted as an international healthcare priority to improve chronic illness outcomes by engaging chronically ill patients in managing their care.
- There is not a validated measure reported by patients as recipients of empowering nurse behaviours during hospitalization.

**What are the key findings?**

- Both long and short-form Patient Perception of Patient-Empowering Nurse Behaviour Scale (PPPNBS) had acceptable psychometric properties in a sample of chronically ill hospitalized adult patients.
- The positive relationship demonstrated between PPPNBS score and Patient Activation Measure 13-item score (PAM13) and physical health quality of life provides preliminary support for the contribution of nursing care processes to patient engagement in chronic illness care.

**How should the findings be used to influence policy/practice/research/education?**

- Through their patient-empowering behaviours, clinical nurses have a unique opportunity during acute hospitalization to engage patients in their care.
- The short form of the PPPNBS can be used as a process metric of nursing care to encourage nurses' intentional use of patient-empowering behaviours.

## Introduction

Chronic illnesses currently account for 60% of deaths worldwide, with that number expected to grow to 73% by the year 2020 (World Health Organization (WHO) [2016](#)). Over half of Americans have at least one chronic illness and 5% of Americans with multiple chronic illnesses account for 50% of all healthcare spending. By 2030, healthcare expenditures may reach \$8600 per person (up from \$5300 in 2015) (Partnership to Fight Chronic Disease [2016](#)). With recent global emphasis on patient engagement in chronic illness self-management, focus has been placed on patient empowerment as a way to improve the patient experience and decrease the burden of chronic illness care (Institute for Healthcare Improvement [2014](#), WHO [2015](#)). With over 25 million medical and surgical hospital discharges per year and an average length of stay of 5.2 days in the US (Steiner *et al.* [2013](#)), inpatient hospitalizations provide an opportune time for nurses to begin engaging patients in their chronic illness care through the use of patient-empowering behaviours.

The Patient Perceptions of Patient-Empowering Nurse Behaviours Scale (PPPNBS) was designed to measure the process of empowerment, which is viewed within Laschinger *et al.*'s ([2010](#)) integrated conceptual model of nurse-patient empowerment. Laschinger *et al.*'s ([2010](#)) model was guided by Kanter's ([1993](#)) theory of structural power of organizations. Empowering nurse behaviours are defined as behaviours that provide patients with the resources needed to develop competence and confidence to engage in successful self-management of chronic illness activities following hospital discharge (Laschinger *et al.* [2010](#)). Kanter's theory of structural power of organizations has been supported in the nurse work environment (Laschinger & Finegan [2005](#)) and nursing academia (Siu *et al.* [2005](#), Ledwell *et al.* [2006](#)), but has not yet been tested in the context of the nurse-patient relationship in acute care. The PPPNBS is a measure reported by patients as recipients of empowering nurse behaviours during hospitalization.

## *Background*

Patients with chronic illnesses frequently experience feelings of powerlessness (Aujoulat *et al.* 2007) secondary to complex treatment regimens, symptoms from the illness, lack of social support, inability to fulfil roles and decreased quality of life (McCorkle *et al.* 2011). Empowerment is defined as a sense of power that results from a patient-centred process occurring in the provider–patient relationship that is based on mutual trust and respect (Jerofke 2013). Empowered patients may demonstrate behavioural manifestations such as increased knowledge and strengthened skills and confidence in chronic illness self-management (referred to as patient activation) (Hibbard *et al.* 2005, Jerofke 2013). Furthermore, greater engagement in chronic illness self-management has been associated with higher quality of life (Barnason *et al.* 2011). In their many encounters with patients, inpatient nurses can empower patients by: (1) providing them access to information, support, resources and opportunities for engaged participation; (2) facilitating collaboration with providers, family and friends; and (3) respecting flexibility and autonomy in decision-making (Laschinger *et al.* 2010).

The majority of published instruments for measuring empowerment measure outcomes such as knowledge, experience, self-efficacy, ability to self-manage and autonomy (Anderson *et al.* 2000, Herbert *et al.* 2009), rather than patient perceptions of the process of empowerment. Existing instruments are not specific to nursing care (Bulsara *et al.* 2006), are illness specific such as the Diabetes Empowerment Scale (Anderson *et al.* 2000), or lack good evidence of both reliability and validity (Herbert *et al.* 2009). Conceptualizing and measuring empowerment solely as an outcome fails to recognize the contribution of nursing care to the process of patient empowerment and the collaboration between the provider and patient that occurs during the process of empowerment.

Initiating and measuring the process of empowerment in the hospital is important, as nurses are responsible for ensuring that patients have the skills and knowledge they need before discharge so they can transition from being cared for in the hospital to caring for themselves at home (Foust 2007). Measurement of nursing processes

linked to patient outcomes will provide evidence supporting the contribution of nursing care to patient outcomes, with the long-term goal of improving nursing effectiveness in refining the patient experience of care, health outcomes and costs of care for the growing chronic illness population.

## **The study**

### *Aims*

The aim of this study was twofold: (1) to develop and test the psychometric properties of the Patient Perceptions of Patient-Empowering Nurse Behaviours Scale (PPPNBS), a measure reported by patients as recipients of empowering nurse behaviours during hospitalization; and (2) refine to a shorter, more useful form for measurement in clinical practice settings.

### *Methodology*

The development of the PPPNBS was based on a concept analysis of empowerment (Jerofke [2013](#)) and Laschinger *et al.*'s ([2010](#)) integrated conceptual model of nurse-patient empowerment. Patient care examples provided by Laschinger *et al.* ([2010](#)), along with data from the review of the literature, were used to develop items for inclusion in the PPPNBS. A pilot study was then completed to assess the content validity, internal reliability and test-retest reliability of the PPPNBS. Five content experts (one nurse researcher with expertise in self-management, two surgical patients with chronic conditions and two staff nurses) were asked to rate how relevant each item of the PPPNBS was to the theoretical framework using the following rating system: (1) not relevant; (2) unable to assess relevance without item revision; (3) relevant but needs minor alteration; or (4) very relevant. Internal reliability and test-retest reliability of the PPPNBS was then assessed in a small sample of surgical oncology and cardiac patients. Patients were asked to complete the instrument within four hours before discharge and then two weeks following discharge during a telephone interview. A two-week interval for test-retest was used to limit patients' recall of their prior answers, while decreasing the likelihood that their perceptions would change (DeVellis [2012](#)).

Following completion of the pilot study, the data for this psychometric analysis were collected during a two-phase prospective, correlational study examining predictors and outcomes of patient perceptions of patient-empowering nurse behaviours. In the first phase, construct validity, known group comparisons, convergent validity, predictive validity and reliability of the PPPNBS were examined in medical and surgical patients hospitalized due to symptoms, exacerbations or complications from a chronic illness. In the second phase, item reduction was conducted to achieve a shorter version of the PPPNBS for easier application to clinical evaluation of practice with additional psychometric testing of validity and reliability.

### *Phase one*

Trained undergraduate nursing students served as research assistants (RAs) and assisted in enrolment, data collection and data entry. Patients were enrolled up to 2 days prior to discharge, at which time they completed the demographic and pre-discharge PAM13 measure. Within four hours before discharge, patients completed the PPPNBS so that nursing care provided on the day of discharge was reflected on the survey. RAs conducted 6-week postdischarge telephone interviews to complete the postdischarge PAM13 and the SF-36 measures.

Confirmatory factor analysis (CFA) was selected for construct validity assessment to test the *a priori* theoretical structure (Polit & Yang 2014). As part of the construct validity testing, contrasted group comparisons were examined based on the following hypotheses:

- Caucasian patients will have higher perceptions (scores) on the PPPNBS than patients who are not Caucasian, based on research indicating differences among race/ethnicity groups on patient experience of care variables, including trust in providers (Halbert *et al.* 2006, Stepanikova *et al.* 2006).
- Younger patients will have lower perceptions (scores) on the PPPNBS than older patients, as they will expect more engagement in their care (Deber *et al.* 2007).
- Patients who were recently diagnosed with a chronic illness will have lower perceptions (scores) on the PPPNBS than patients who have been living with a chronic illness longer, as it may

take time to adjust and adapt to a chronic illness diagnosis (Kralik *et al.* 2004).

- Patients who have a longer length of stay will have higher perceptions (scores) on the PPPNBS than those with shorter lengths of stay because they have a longer period of time to create therapeutic relationships with the nursing staff.

Convergent validity was assessed by examining the correlation between total PPPNBS scores and baseline patient activation, measured with the 13-item Patient Activation Measure (PAM13). The PAM13 (Hibbard *et al.* 2005) measures patients' beliefs, knowledge and confidence with respect to active participation in their health care. Therefore, scores on the PAM13, administered at the same time as the PPPNBS, were hypothesized to correlate with PPPNBS scores because highly activated patients were expected to interact more with the nursing staff and facilitate the use of empowering behaviours by the nursing staff.

Predictive validity was assessed by examining the association between total PPPNBS score and patient activation and quality of life (measured with the SF-36) at 6-weeks post discharge. Six weeks postdischarge marks a transitional period from postoperative recovery or hospital discharge to living with and managing a life-threatening chronic illness (Taylor *et al.* 2010), making it an appropriate time to measure patient activation and functional health status while limiting the likelihood of immediate postdischarge recovery factors influencing outcome measures. The SF-36 was used as a predictive measure because engagement of patients in their care through empowering interventions has been associated with improved health condition and function (Kinney *et al.* 2003, Tu *et al.* 2006, Chen *et al.* 2008). Once the factor structure was confirmed through CFA, internal consistency was assessed for each of the subscales and the total scale.

### *Phase two*

Identification of items for a shorter form of the PPPNBS was accomplished by examining the loading factors of each item on its respective subscale and retaining the items with the highest loadings in each subscale (Widaman *et al.* 2010). Validity and reliability testing was then conducted as it was in phase one.

## *Sample/participants*

The sample for the pilot study included 38 surgical oncology and cardiac patients. The sample for both psychometric phases included 395 adult medical and postsurgical cancer and cardiac patients (with diagnoses including cancer, coronary artery disease, valve disease, arrhythmia, heart failure, hypertension, diabetes, COPD, asthma, sickle cell and cystic fibrosis). The surgical sample was part of an earlier initial study of the relationships between PPPNBS and patient outcomes (Jerofke *et al.* [2014](#)). An additional sample of medical patients ( $n = 235$ ) was then enrolled to increase the size and diversity of the sample. The sample size used for analysis exceeded the recommended 300 patients and the Kaiser–Meyer–Olkin value of 0.96 exceeded the recommended value of 0.60 (Tabachnick & Fidell [2007](#)).

The following inclusion criteria were used: (1) 18 years of age or older; (2) able to speak and read English fluently, (3) length of stay at least 2 nights; (4) discharged to home; and (5) telephone availability for postdischarge data collection. Patients who were enrolled in palliative or hospice care (unless only referred for management of pain medications) or had documented cognitive or developmental delays in their medical record were excluded. Data were collected from 8 medical and surgical units at two hospitals in the Midwestern United States between April 2012–August 2014: (1) a 500-bed Magnet<sup>®</sup>-designated academic-medical and trauma centre; and a (2) 317-bed Magnet<sup>®</sup>-designated urban hospital.

## *Instruments*

### *PPPNBS*

The PPPNBS includes the following subscales derived from Kanter's theory: (1) providing access to information; (2) providing access to support; (3) providing access to resources; (4) providing access to opportunities to learn and grow; (5) the development of informal power systems (collaborations inside and outside the healthcare system); and (6) the development of formal power systems (flexibility and autonomy in decision-making). Underlying ethical principles of the process of empowerment include autonomy and

respect for persons (Falk-Rafael [2001](#), Alegria *et al.* [2008](#)); therefore, a seventh subscale of 'initiation' was added to the PPPNBS to measure the extent that patients felt they were encouraged to be active participants in their health and treatment planning. Following pilot and psychometric testing during phase 1, the original instrument was reduced from a 46-item scale to a 42-item scale.

Items ask how often patients felt the nursing staff performed each empowering behaviour and are scored on an 11-point Likert scale with 0 meaning 'never' and 10 meaning 'always'. Using an 11-point Likert scale allows patients to indicate their varying degrees of perception of each item that is stated as a declarative statement (DeVellis [2012](#)). Items were summed to calculate total and subscale scores; greater scores indicated higher perceptions of exposure to patient-empowering nurse behaviours. The PPPNBS was written at a sixth-grade reading level and took patients between eight and fifteen minutes to complete.

### *Demographic and treatment characteristics*

The following data were collected for the purposes of contrasted group comparisons: race, age, length of time since initially diagnosed with the chronic illness related to admission and length of stay. The following data were also collected for sample description purposes: gender, education level, marital status, whether they lived alone, whether they were hospitalized for the same reason previously, admitting diagnosis and comorbidities.

### *13-item patient activation measure (PAM13)*

Patient activation was measured with the PAM13 (Hibbard *et al.* [2005](#)), a 13-item scale that measures patients' beliefs, knowledge and confidence with respect to active participation in their health care. Items are scored on a scale from 1-4 with 1 indicating 'strongly disagree' and 4 meaning 'strongly agree'. Patients are assigned a total raw score, which is then converted to an activation score of 0-100, with higher scores indicating a higher degree of patient activation. Higher activation scores are associated with engagement in self-managing behaviours such as healthy eating, treatment plan adherence, increased communication with providers and exercise,

leading to decreased healthcare use and an improved quality of life (Hibbard *et al.* [2015](#)). Cronbach's alpha reliability estimate for the PAM13 in a sample of 855 multi-morbid adults was 0.87 (Skolasky *et al.* [2011](#)). The instrument has been used in patients with various chronic illnesses including diabetes, heart disease, COPD, cancer and multiple sclerosis (Insignia Health [2015](#)).

### *SF-36*

The SF-36 was used to measure quality of life. The SF-36 is the most widely used measure of health-related quality of life (McHorney *et al.* [1994](#)). The SF-36 consists of three levels: 36 items, eight subscales and two summary measures (Ware & Sherbourne [1992](#)). The two summary measures, mental component summary [MCS] (including social functioning, general mental health, emotional role limitations and vitality subscales) and physical component summary [PCS] (including physical functioning, physical role limitations, bodily pain and general health subscales) (Ware & Sherbourne [1992](#)), were used in analyses.

### *Ethical considerations*

Approval to conduct the study was obtained from university and participating hospital Institutional Review Boards. The patients received verbal and written information about the study and informed consent was obtained. All data were treated confidentially and a de-identified data set was used for the psychometric analyses.

### *Data analysis*

Item and scale statistics were calculated using descriptive statistics. Patient level missing data ranged from 0.25-2%, therefore missing values were imputed using a switching regression iterative multivariable technique (Van Buuren *et al.* [1999](#)).

### *Pilot study*

The content validity index (CVI) for each item was calculated by determining the proportion of five experts that gave each item a rating

of '3' or '4' (Lynn [1986](#)). Internal reliability was assessed by examining Cronbach's alpha reliability estimates for the subscales and total scale scores. The Pearson's *r* correlation coefficient between PPPNBS score at discharge and two weeks after discharge was used to assess test-retest reliability.

### *Phase one*

Construct validity was assessed by conducting a confirmatory bi-factor analysis with maximum likelihood estimation with robust standard errors. Bi-factor analysis allowed the researcher to retain the single common construct of empowerment while also recognizing the multidimensionality of the items and subscales (Reise *et al.* [2007](#)). Goodness of fit indices were assessed including Chi square test (not ideal test in models with large sample size and large correlations), CFI (closer to 1.0 implies good model fit), RMSEA (<0.08 indicates acceptable fit) and SRMR (<0.08 indicates reasonable fit) (Brown [2006](#)). Contrasted group comparisons were examined using four separate independent samples *t* tests, with groups split by the median value for continuous variables (age, time since initial diagnosis and length of stay) and race grouped as Caucasian/Non-Caucasian. Due to the large range in times since initially diagnosed with the primary/admitting chronic illness (1 day-55 years) the variable was recoded to a dichotomous variable indicating newly diagnosed in the past year. Convergent validity was assessed by examining Pearson's *r* correlation coefficients between total PPPNBS scores and pre-discharge PAM13 scores. Predictive validity was assessed through bivariate linear regression, by setting total PPPNBS score as the predictor variable and postdischarge PAM13, MCS and PCS as dependent variables. Internal consistency reliability of the instrument was assessed by examining Cronbach's alpha reliability estimates.

### *Phase two*

The PPPNBS was reduced to a shorter form during phase two by selecting items with the highest loadings on the common factor underlying the items, to obtain items most closely aligned with the factor (Widaman *et al.* [2010](#)). This was accomplished by first implementing a 25% item factor reduction and then proceeding with an additional 25% item factor reduction using Mplus Version 7.13.

Following item reduction, psychometric analysis methods from phase one were applied to the shortened form of the instrument.

## Results

### *Pilot Study*

The CVI was 1·0 for 20 of the 46 items. The other 26 items were examined further and panel feedback was incorporated. One item regarding hospital orientation was eliminated from the instrument and five items were reworded. The remaining 20 items were not altered because the patient experts both thought they were relevant and they were taken with permission directly from Laschinger *et al.*'s (2010) framework of patient-empowering nurse behaviours.

Cronbach's alpha reliability estimates for PPPNBS subscales and the total scale exceeded the 0·70 criterion considered acceptable for new instruments (DeVellis 2012). PPPNBS scores were significantly correlated between discharge and two weeks postdischarge ( $r = 0\cdot76$ ,  $P < 0\cdot001$  for the total scale;  $r = 0\cdot63\text{--}0\cdot82$ ,  $P < 0\cdot001$  for the subscales), supporting test-retest reliability. Based on these preliminary findings, further testing with a larger sample was warranted.

### *Phase 1: PPPNBS long form*

Of the 422 eligible patients enrolled, 395 patients completed pre-discharge measures and 317 patients completed the six-week postdischarge phone interview. PPPNBS scores were not significantly different between those that did (mean = 352·1) and did not (mean = 345·8) complete the study in its entirety ( $t = 0\cdot69$ ,  $P = 0\cdot49$ ). Patients were on average 57·6 years old, 66·1% were Caucasian and 62·5% had at least some degree of postsecondary education. The majority of patients ( $n = 349$ ) had at least one comorbid condition, 45·3% had a prior hospitalization for the same reason and 42·8% had been diagnosed with a chronic illness less than a year prior to the hospitalization (Table 1).

**Table 1.** Sample characteristics

Sociodemographic characteristics	Total sample <i>n</i> = 395	
	Mean	SD
Age	57.6	14.6
Length of Stay	5.7	4.0
Number of comorbidities	2.9	2.3
	<i>N</i>	%
Gender		
Female	201	50.9
Male	194	49.1
Race		
Caucasian	261	66.1
African American	107	27.1
Asian	3	0.8
Hispanic	5	1.3
Other	19	4.8
Education		
Less than high school	47	11.9
High School	105	26.6
Some college/technical degree	124	31.4
Bachelor Degree	77	19.5
Graduate Degree	42	10.6
Marital status		
Married	203	51.4
Single	102	25.8
Other	90	22.8
Lives alone		
No	320	81.0
Yes	75	19.0
Patient type		
Surgical	160	40.5
Medical	235	59.5
New chronic illness diagnosis (<1 year)		
Yes	166	42.8
No	222	57.2
Prior Hospitalization for same reason		
No	216	54.7
Yes	179	45.3
Chronic Illness related to Admission		
Cancer	172	43.5
Cardiac (CAD, valve, CHF, arrhythmia)	118	29.9
Hypertension	32	8.1
Pulmonary (COPD/asthma)	23	5.8

Sociodemographic characteristics	Total sample <i>n</i> = 395	
	Mean	SD
Diabetes	37	9.4
Sickle Cell	11	2.8
Cystic Fibrosis	2	0.5

### Item and subscale analyses

Item-item correlations were examined to evaluate redundancy between items and ranged between  $r = 0.12$  and  $0.86$ . Correlations larger than  $0.8$  were examined further ( $n = 4$ ) and the items were retained, as they were felt to represent distinct content domains consistent with the *a priori* theoretical structure. In addition, corrected item-subscale total correlations were examined. Most correlations were between  $r = 0.60$ - $0.80$ . Item means were negatively skewed (between  $6.5$  and  $9.2$ ), indicating higher perceptions of receiving empowering nurse behaviours. Item descriptions and means by subscale are listed in Table 2.

**Table 2.** Item & subscale means, standard deviations, and corrected item-subscale and item-total correlations

Subscale & Item Descriptions	Item	Mean	sd	Corrected Item-Subscale Correlation 42 item	Corrected Item-Total Scale Correlation 42 item	Corrected Item-Subscale Correlation 22 item	Corrected Item-Total Correlation 22 item
Initiation							
Recognition of the right to make health decisions	1	8.3	2.3	0.81	0.71		
Recognition of capability of decision-making	2	8.3	2.3	0.85	0.73	0.74	0.72
Increase awareness of health	3	8.3	2.2	0.81	0.72		
Increase awareness of treatment plan	4	8.4	2.1	0.81	0.77	0.81	0.76
Realization of ability to participate in treatment planning	5	8.2	2.3	0.82	0.76	0.84	0.76
Access to information							
Provide useful information	6	8.8	1.8	0.72	0.81	0.79	0.80

<b>Subscale &amp; Item Descriptions</b>	<b>Item</b>	<b>Mean</b>	<b>sd</b>	<b>Corrected Item-Subscale Correlation 42 item</b>	<b>Corrected Item-Total Scale Correlation 42 item</b>	<b>Corrected Item-Subscale Correlation 22 item</b>	<b>Corrected Item-Total Correlation 22 item</b>
Provide clear answers to questions	7	8.8	1.7	0.71	0.78	0.80	0.79
Provide care only after explaining what he/she is doing	8	8.5	2.2	0.56	0.58		
Explain treatments including medications before administration	9	9.1	3.9	0.29	0.26		
Familiarize with normal unit routine	11	7.8	2.6	0.61	0.73		
Provide information for postdischarge care	12	8.5	2.2	0.67	0.77	0.70	0.75
Access to support							
Ask about thoughts/feelings pertaining to health	13	7.7	2.7	0.62	0.74		
Listen to concerns	14	9.0	1.6	0.78	0.75	0.74	0.75
Ask about unanswered questions	16	8.8	2.1	0.77	0.71		
Respect right to be decision-maker	17	8.8	2.0	0.79	0.78	0.78	0.79
Offer encouragement for achieving goals	18	8.7	2.1	0.81	0.79	0.82	0.81
Address complaints	20	8.7	2.1	0.68	0.66		
Answer call lights in timely fashion	21	8.7	2.0	0.63	0.60		
Create supportive environment to make partners	22	8.7	2.0	0.83	0.81	0.82	0.81
Feel as though nurses and I are partners	45	8.8	2.1	0.78	0.78	0.78	0.79
Access to resources							
Suggest ways to find out more about health	10	7.3	2.9	0.72	0.68		
Help identify people who could offer support at home	15	7.4	2.9	0.75	0.69	0.66	0.68

<b>Subscale &amp; Item Descriptions</b>	<b>Item</b>	<b>Mean</b>	<b>sd</b>	<b>Corrected Item-Subscale Correlation 42 item</b>	<b>Corrected Item-Total Scale Correlation 42 item</b>	<b>Corrected Item-Subscale Correlation 22 item</b>	<b>Corrected Item-Total Correlation 22 item</b>
Help identify resources in community	23	6.5	3.5	0.71	0.65		
Familiarize with healthcare team	24	8.3	2.4	0.61	0.66		
Give enough time to complete tasks	25	9.1	1.7	0.53	0.68		
Help focus on strengths	27	8.1	2.6	0.75	0.77	0.82	0.79
Give enough time to make decisions	28	8.5	2.3	0.69	0.77	0.70	0.78
Access to opportunities to learn & grow							
Help realize they have skills to manage care	26	8.4	2.3	0.74	0.77		
Help learn in jargon-free language	29	8.5	2.5	0.59	0.65		
Provide time to practice new skills	30	7.9	2.9	0.79	0.76	0.81	0.75
Help build on knowledge	31	8.0	2.7	0.83	0.79	0.81	0.78
Informal power							
Include family/friends in discussions	19	8.5	2.5	0.69	0.68		
Answer questions from family/friends	32	8.5	2.4	0.74	0.72	0.68	0.71
Help create relationships with healthcare team	34	7.4	3.1	0.62	0.68		
Encourage inclusion of family/friends in care	35	7.6	3.1	0.83	0.76	0.80	0.74
View patient as important member of team	36	8.4	2.5	0.74	0.77	0.70	0.78
Work well with family/friends	38	8.3	2.7	0.77	0.69		
Formal power							
Flexible with schedule	39	8.6	2.3	0.73	0.75	0.67	0.75
Recognize more than one way to do something	40	8.0	2.7	0.70	0.74		
Let patients decide on timing of day	41	8.9	1.9	0.60	0.51		

Subscale & Item Descriptions	Item	Mean	sd	Corrected Item-Subscale Correlation 42 item	Corrected Item-Total Scale Correlation 42 item	Corrected Item-Subscale Correlation 22 item	Corrected Item-Total Correlation 22 item
Respectful of needs	43	9.2	1.6	0.64	0.64	0.66	0.64
Encourage decision-making	44	8.6	2.1	0.75	0.79	0.68	0.79

Corrected item-subscale correlations and corrected item-total scale correlations ranged between 0.29-0.85 and 0.26-0.81 respectively. Correlations between subscales and subscales with total scale scores ranged between 0.69-0.85-0.85-0.94 respectively (all  $P < 0.001$ ). Three items (from different subscales) were eliminated due to consistent scoring at the positive or negative poles, creating dichotomous measurement not consistent with the rest of the instrument. This resulted in a 42-item instrument that was used in analyses for phase one.

### Construct validity

Bi-factor confirmatory factor analysis using Mplus Version 7.13 was conducted to test the scale model fit. Model fit statistics were as follows:  $\chi^2 (764) = 1913.49$ ,  $\chi^2/d.f.$  ratio = 2.50, CFI 0.84, RMSEA 0.062 with a 90% confidence interval of 0.058-0.065 and SRMR 0.107. All of the items had statistically significant parameters on the designated factor with the exception of one item (which was scored considerably higher than the other items in the subscale), indicating that the items were assigned to the correct subscales. Items also had statistically significant parameters on the global factor of empowerment. Item factor loadings on their perspective subscales and on the global factor of empowerment (total scale) are listed in Table 3.

**Table 3.** PPPNBS factor loadings on subscales and total scale

Item	PPPNBS Long Form – 42 items Subscale Loadings	PPPNBS Long Form – 42 items Total Scale Loadings	PPPNBS Short Form – 22 items Subscale Loadings	PPPNBS Short Form – 22 items Total Scale Loadings
1. * $P \leq 0.05$ ; ** $P \leq 0.01$ ; *** $P \leq 0.001$ .				
Initiation				
1	0.51***	0.51***		
2	0.59***	0.56***	0.50***	0.50***
3	0.61***	0.53***		
4	0.74***	0.46***	0.76***	0.48***

Item	PPPNBS Long Form – 42 items Subscale Loadings	PPPNBS Long Form – 42 items Total Scale Loadings	PPPNBS Short Form – 22 items Subscale Loadings	PPPNBS Short Form – 22 items Total Scale Loadings
5	0.68***	0.52***	0.75***	0.48***
Access to information				
6	0.65***	0.48***	0.61***	0.62***
7	0.78***	0.37***	0.61***	0.61***
8	0.51***	0.28**		
9	0.59***	0.37***		
11	0.37***	0.62***		
12	0.47***	0.62***	0.29*	0.74***
Access to support				
13	0.37***	0.70***		
14	0.69***	0.37***	0.62***	0.49***
16	0.63***	0.38***		
17	0.62***	0.47***	0.51***	0.61***
18	0.61***	0.53***	0.50***	0.65***
20	0.60***	0.32***		
21	0.57***	0.25*		
22	0.65***	0.50***	0.62***	0.56***
45	0.69***	0.41***	0.74***	0.44***
Access to resources				
10	0.35***	0.65***		
15	0.27***	0.69***	0.35***	0.64***
23	0.15*	0.73***		
24	0.44***	0.45***		
25	0.75***	0.21*		
27	0.37**	0.73***	0.51***	0.71***
28	0.49***	0.61***	0.49**	0.67***
Access to opportunities to Learn & Grow				
26	0.46***	0.65***		
29	0.37**	0.53***		
30	0.43***	0.72***	0.36***	0.79***
31	0.44***	0.74***	0.37***	0.83***
Informal power				
19	0.46***	0.45***		
32	0.54***	0.54***	0.41***	0.62***
34	0.33***	0.62***		
35	0.51***	0.68***	0.54***	0.60***
36	0.57***	0.52***	0.81***	0.42***
38	0.69***	0.40***		
Formal power				
39	0.50***	0.46***	0.47***	0.55***
40	0.41***	0.63***		
41	0.52***	0.22*		
43	0.75***	0.17	0.68***	0.30***
44	0.61***	0.53***	0.62***	0.50***

## Reliability

Cronbach's alpha for the total scale and subscales are listed in Table 4; the total and subscale reliability estimates all exceeding 0.80.

**Table 4.** Cronbach's alpha reliability estimates

Subscale	PPPNBS Long Form – 42 items (N = 395)	PPPNBS Short Form – 22 items (N = 395)
Initiation	0.93	0.90
Access to Information	0.90	0.88
Access to Support	0.93	0.92
Access to Resources	0.89	0.85
Access to Opportunities to Learn & Grow	0.88	0.90
Informal Power	0.90	0.85
Formal Power	0.86	0.81
Total Scale	0.98	0.97

## Phase 2: PPPNBS short form

A 22-item short form resulted after retaining items in each subscale that had the highest factor loadings while reducing the subscales by 25% and then repeating the process by further reducing by another 25% (50% total reduction). Fit indices improved for the 22-item PPPNBS:  $\chi^2(174) = 378.11$ ,  $\chi^2/d.f.$  ratio = 2.17, CFI 0.94, RMSEA 0.054 with a 90% confidence interval of 0.047-0.062 and SRMR 0.09. The initial model loadings for the 42-item scale and the 50% reduced model loadings can be found in Table 3. The 22-item PPPNBS explained 98% of the variance of the 42-item PPPNBS. Reliability estimates for the short form can be found in Table 4.

## Contrasted group, convergent and predictive validity for long and short forms

Results of the contrasted group comparisons are presented in Table 5. Given the negative skew in 42-item and 22-item-total scores, Box-Cox power transformations were used on total scale scores prior to analysis (Box & Cox 1964). The Box-Cox algorithm reduced skewness in the 42-item scale from  $-1.40$  -  $-0.49$  and from  $-1.60$  -  $-0.60$  in the 22-item scale. The hypothesized differences were supported for group comparisons by race and length of stay, with

Caucasian patients and those with longer length of stay having higher PPPNBS score. There were no differences by age or time since diagnosis.

**Table 5.** Contrasted groups comparisons

Characteristic	N	PPPNBS Long Form – 42 items Mean (sd)	t	P	PPPNBS Short form – 22 items Mean (sd)	t	P
1. * $P \leq 0.05$ .							
Race							
Caucasian	261	357.42 (63.56)	-2.07	0.039*	189.78 (33.75)	-2.38	0.018*
Non-Caucasian	134	338.11 (84.64)			177.81 (46.44)		
Age							
20-57	194	346.38 (75.32)	-1.23	0.220	182.96 (40.94)	-1.37	0.170
58-95	201	355.20 (68.32)			188.38 (36.70)		
New chronic illness diagnosis (<1 year)							
Yes	166	357.49 (63.87)	-1.31	0.192	189.31 (34.52)	-1.34	0.181
No	222	345.96 (76.96)			183.05 (41.67)		
Length of stay							
2-4 days	196	342.26 (78.48)	-2.08	0.038*	181.21 (42.58)	-2.10	0.037*
5-30 days	199	359.34 (63.82)			190.15 (34.40)		

The 42-item PPPNBS score was significantly, positively correlated with pre-discharge PAM13 ( $r = 0.25$ ,  $P < 0.001$ ), as was the 22-item PPPNBS score ( $r = 0.25$ ,  $P < 0.001$ ), providing evidence of convergent validity. Both 42-item and 22-item PPPNBS scores were significantly, positively associated with postdischarge PAM-13 scores, providing evidence of predictive validity. The 42-item PPPNBS scores were also significantly, positively associated with PCS scores; however, the 22-item PPPNBS scores were not. There was not a significant association between either the 42-item or 22-item PPPNBS scores and MCS scores (Table 6).

**Table 6.** Predictive validity linear regression results

	Postdischarge PAM13			MCS			PCS		
	B	se B	$\beta$	B	se B	$\beta$	B	se B	$\beta$
PPPNBS Long Form – 42 items	0.029	0.011	0.142	0.011	0.008	0.074	0.016	0.008	0.116
$R^2$	0.020			0.005			0.013		
F	6.476			1.740			4.290		
P	0.011			0.188			0.039		
PPPNBS Short Form – 22 items	0.055	0.021	0.145	0.021	0.015	0.077	0.028	0.015	0.104
$R^2$	0.021			0.006			0.011		
F	6.751			1.896			3.467		
P	0.010			0.170			0.064		

## Discussion

The PPPNBS has preliminary evidence of validity and reliability, setting the stage for its use in measuring nursing behaviours as a metric of patient experience with care (Heslop & Lu [2014](#)). CFA confirmed the *a priori* 7-factor structure of the PPPNBS. The method used to refine the PPPNBS to a shorter, more useful form for measurement in clinical practice settings was similar to that used by Parry *et al.* ([2008](#)). The shortened, 22-item scale explained 98% of the variance of the 42-item PPPNBS scores. More importantly, goodness of fit indices improved with item reduction and indicated a reasonable fit for the 22-item short form of the PPPNBS. The development of the 22-item short-form PPPNBS will improve clinical utility and patient compliance with item completion, as some patients did complain about the length and chose to skip questions. Because the 22-item short form of the PPPNBS was derived and tested in conjunction with the longer form, it requires further testing to validate its psychometric properties when administered independently.

Construct validity was partially supported through contrasted group analyses of both the long and short forms. Two of the four contrasted group hypotheses were supported, indicating the instrument has the ability to discriminate between groups known to be high and low in characteristics that impact the process of empowerment. There were no statistically significant differences in mean PPPNBS scores based on length of time since chronic illness diagnosis and patient age; however, relationships were in the expected direction. While not supporting the contrasted group comparison hypotheses, this finding can be interpreted as favourable, as it provides evidence that nurses exhibit the same level of empowering behaviours regardless of when the patient was diagnosed with a chronic illness or patient age.

Although statistically significant, the size of the correlation between PPPNBS scores and pre-discharge PAM13 scores indicates that only 6.25% of the relationship is explained by the linear correlation. The weak relationship could indicate that nurses may not tailor their nursing care to level of patient activation in care, which has been reported by patients repeatedly in the literature (Tobiano *et al.*

2015). In addition, PPPNBS scores account for a small percentage (2%) of the variance in postdischarge PAM13 scores. Prior statistical modelling demonstrated that other patient and illness factors such as baseline PAM13 scores, race and length of stay also significantly contributed to the variance in postdischarge PAM13 scores (Jerofke *et al.* 2014). The weak association of long and short-form PPPNBS scores with postdischarge PAM13 scores could also be attributed to challenges patients may face in assuming the responsibility of chronic illness self-management following hospital discharge (Lapum *et al.* 2011). Future studies should be conducted to examine the association between PPPNBS scores and PAM13 scores postdischarge when nurses are intentionally engaging in empowering behaviours or deliver empowering behaviours tailored to patient activation level, as previous studies have demonstrated greater changes over time in activation scores in patients who were in the lower stages of activation at baseline (Harvey *et al.* 2012, Shively *et al.* 2012).

The weak association between long-form PPPNBS scores and physical health quality of life (PCS) may be reflective of strengthened self-management behaviours postdischarge in patients who had higher perceptions of nurse empowering behaviours; however, PCS scores were not measured at baseline so the impact of PPPNBS scores on change in PCS scores cannot be determined. The association of the short-form PPPNBS and PCS approached but did not achieve statistical significance criteria; this finding may be related to sample size or reduced predictive ability of the instrument in the shortened form.

While there was not a significant relationship demonstrated between long or short-form PPPNBS score and mental health quality of life, prior analyses indicated there was an indirect relationship between long-form PPPNBS score and mental health quality of life through postdischarge patient activation in a surgical sample (Jerofke *et al.* 2014). Health quality of life was measured at 6-weeks postdischarge using the SF-36, which asks patients to report their functioning over the last four weeks. Future studies should examine the relationship between PPPNBS scores and quality of life measured at a larger time interval, such as 12 weeks postdischarge, as both physical and mental health quality of life can be influenced by severity of illness and postdischarge challenges, especially in surgical patients who may face

activity limitations, pain, or fatigue (Suwanno *et al.* [2009](#), Taylor *et al.* [2010](#)).

The positive relationship demonstrated in this study between PPPNBS scores and postdischarge PAM13 and PCS scores provides preliminary, although weak, support for the role of inpatient acute care nursing in promoting patient engagement in outpatient chronic illness self-management. Findings from this study add to prior quantitative evidence demonstrating significant relationships between patient experience measures and quality care outcomes such as engagement in self-management behaviours, improved patient safety and lower healthcare use (Doran & Pringle [2011](#), Price *et al.* [2014](#)). Bedside nurses must be educated about their role in improving the patient chronic illness experience and promoting positive postdischarge outcomes through the use of patient-empowering nurse behaviours and their potential contribution to reduction in the burden on patients and healthcare systems from increasing chronic illness prevalence.

### *Limitations*

Limitations of this study included the sampling method and heterogeneity of the sample. Convenience sampling was used; however, all patients who were eligible to participate in the study on days of enrolment were approached to take part in the study. Future studies should be conducted testing the relationship between PPPNBS scores and patient outcomes in a randomly selected sample. While the heterogeneous sample representing common chronic illnesses in the US population provided the opportunity to measure patient reports as recipients of empowering nurse behaviours during hospitalization in patients who may have differing chronic illness experiences, the sample was insufficient for analyses by diagnosis, patient type (medical or surgical) or severity of illness. Patients with various health conditions and different levels of health burdens or lifestyle changes may perceive empowerment, self-management demands and quality of life differently and future studies should be conducted looking at differences in outcome measures between groups.

Reliability estimates for the total long and short-form PPPNBS scores were high (0.98 and 0.97), which could indicate item redundancy. High reliability estimates could also be reflective of the

number of items in the scale. In addition, RMSEA statistics were high for both forms of the scale; however, it can be influenced by sample size and degrees of freedom. In complex models with larger sample sizes ( $N > 200$ ), CFI is a more reliable index to use and was indicative of an acceptable fit ( $>0.90$ ) for the short form (Brown [2006](#)). Future research is necessary to explore the possibility of further item reduction along with analyses of model fit.

The PPPNBS asks patients to report how often they felt they received empowering behaviours. The PPPNBS does not measure the actual delivery of those behaviours. Future studies must be conducted measuring patient perception of patient-empowering nurse behaviours and patient outcomes following nurses' intentional delivery of patient-empowering nurse behaviours. This study does not measure nurses' perceptions of applying nurse empowering behaviours to patient care or the convergence or lack of convergence with patient perception. Nurse and patient perceptions of empowerment may differ (Jerofke [2013](#)).

## Conclusion

The findings from this study provide preliminary evidence supporting the reliability and validity of both the long and short-form PPPNBS. Construct validity testing supported the *a priori* structure of the instrument derived from the integrated model proposed by Laschinger *et al.* ([2010](#)). The significant but weak relationship between patient perceptions of patient-empowering nurse behaviours and postdischarge patient activation and physical health status provides further quantitative evidence supporting the relationship between quality nursing care and postdischarge patient outcomes. While the scales measure patient reports and not direct observation of empowering nurse behaviours, the short form of the PPPNBS can be used in future studies as a process metric of nursing care to encourage nurses' intentional use of patient-empowering behaviours during hospitalization.

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## Conflict of interest

No conflict of interest has been declared by the authors.

## Author contributions

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (<http://www.icmje.org/recommendations/>)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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