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A structural equation model of empowerment factors affecting nurse practitioners competence

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ABSTRACT

Role competence and patient safety (PS) competence among healthcare professionals are rapidly developing issues due to increasing patient acuity and complexity in the healthcare system. Upon graduation, nurse practitioners (NP) provide autonomous healthcare for populations with complex health needs, thus role and PS competence is imperative. The study aim was to test a hypothesized model of the relationships between educational structural empowerment (SE), psychological empowerment (PE), NP role competence, and PS competence. The sample was drawn from newly graduated NPs from across Canada, accessed through twenty professional nurse organizations. The study survey included socio-demographic questions, the Conditions of Learning Effectiveness Questionnaire, the PE Scale, the NP Competence Survey, and the Health Processional Education in PS Survey. One hundred and ninety Canadian educated NPs who completed their studies in the preceding 2-year time period responded. The study model tested the effect of educational SE on NP role competence and PS competence partially mediated by PE. PE partially mediated the positive relationship for educational SE and PS competence, yet no mediation effect occurred for educational SE and NP role competence. Nurse educators need to consider educational SE strategies as NPs' positive perceptions of role competence have the potential to influence greater levels of PS competence.

1. Introduction

Worldwide, one person in every 300 experiences harm as a result of inadequate healthcare practices (World Health Organization, 2018). Healthcare harm, such as patient safety (PS) error, is complicated by the lack of access to a primary care provider (Statistics Canada, 2019). Given the increasing demand for primary health care providers, the healthcare system needs to better utilize nurse practitioners (NPs), who can provide access to essential services (Sonenberg and Knepper, 2017; Xue et al., 2016). NPs, as registered nurses (RN), are unique healthcare professionals with graduate education, who hold the legal authority to diagnose, order and interpret diagnostic tests, prescribe medications, and perform specific procedures within their scope of practice (Ackerman et al., 1996). As NPs' scope of practice advances, questions about scope of practice occur (Sonenberg and Knepper, 2017), more so when related to PS concerns, such as prescribing medication. The expected role competence and PS competence in newly graduated NPs have not been studied in-depth despite their importance. The aim of this study was to test a model proposing that educational structural empowerment (SE), as mediated by psychological empowerment (PE), will increase NP role competence and PS competence in newly graduated NPs.

1.1. Theoretical framework

1.1.1. Structural empowerment

Kanter's (1977) theory is a framework to understand structures needed for growth and learning that result in empowerment. In her theory of Structural Power in Organizations, Kanter (1977) establishes that organizational structures, such as access to opportunity, support, resources, and information influences engagement in autonomous work behaviours and competence (Kanter, 1977), necessary for performing a role, such as that of an NP. Kanter's theory has been extended to learning environments, whereby students with access to educational empowerment structures (e.g. gain new skills, perform tasks using new skills, gain problem solving help, or time to accomplish learning goals; Siu et al., 2005) develop autonomous work performance (Kanter, 1977). One method to appraise role performance is through competence assessment, which in turn can assist in developing human talent for work (Kanter, 1977). Thus, educational SE with self-perception ratings of specific NP competencies can potentially be a means to appraise role competence.

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Several constructs are used in Kanter's (1977, 1993, 2008) theory to define SE and these have been applied to work and educational learning environments. Educational SE opportunity measures learning new skills or completing activities that include tasks to use new skills (Siu et al., 2005). The SE learning construct of support refers to access to feedback or advice from established networks or sponsors (Kanter, 1977), such as educators commenting on well-performed tasks, or offering helpful problem solving advice (Siu et al., 2005). The construct of information, relates to knowledge or access to system information that contributes to career success (Kanter, 1977); for example, nursing students' formal knowledge that helps to solve patient care problems (Siu et al., 2005). Resources include access to means that allow one to accomplish a task (Kanter, 1977), such as teacher availability to assist with learning (Siu et al., 2005). Thus, health care professionals, including nurses and NPs' perceptions of learning and development in an education program may influence their perceptions of role competence.

1.1.2. Psychological empowerment

Spreitzer (2008), defines PE as an individual's sense of control in one's work, or intrinsic motivation required for a job. The result is that empowered employees are considered competent, effective and productive at their job, who display innovative behavior, and make decisions that fit within their scope of practice and work domain (Spreitzer, 2008). There is substantial literature to suggest that relationships exist with SE when PE is a mediator for outcomes important in nursing (i.e., burnout, job satisfaction, organizational commitment, work attitudes; Hochwälder, 2007; Knol and van Linge, 2009; Laschinger et al., 2001; Stewart et al., 2010; Wagner et al., 2010) and healthcare (i.e., patient satisfaction; Bonias et al., 2010). Additionally, PE as an antecedent is appropriate for a study of new healthcare providers, given the concept has been previously linked to newcomer role performance, role clarity, competence, orientation to a work role, innovative behavior, and for decision-making abilities that fit within a scope of practice and work domain (Spreitzer, 1996, 2008).

Psychological empowerment is a belief state whereby impact, meaning, self-determination, and competence collectively contribute to intrinsic feelings of control in relation to work (Spreitzer, 2008). For example, as NPs acquire meaning and as they gain confidence, self-determination, and competence in role capabilities, a significant impact on the NP role should be evident. Meaning refers to the fit between individuals' work roles and their beliefs, values, and behaviors, or the importance an individual places on his or her work (Spreitzer, 1995a). Self-determination reflects autonomy in initiation and continuation of work behaviours and processes and is measured by perceptions of determining how to do a job or deciding about how to do work, for example, making decisions about work methods, pace, and effort (Spreitzer, 1995b). Confidence refers to one's belief in his or her capability to perform activities and skills, or the capacity to successfully undertake work roles (Spreitzer, 1995b), measured by perceptions of mastering job skills. Impact is the perception of the degree of control one holds within her or his work environment (Spreitzer, 1995b). Together, the four PE cognitions are viewed as a whole to create an active orientation and sense of control to one's work role.

1.1.3. Nurse practitioner competence

Competency-based conceptual models have been developed to provide consistency for nurse regulation and education (Wearing et al., 2010), where the goal of both is to ensure provision of competent care. Competency-based education is used to provide standards for health professionals to measure their own competence in education, to inform curricula, and for employment job descriptions and performance assessment (O'Connell et al., 2014). The Strong Model of Advanced Practice (Ackerman et al., 1996) is one competency-based framework with dimensions common across countries and in Canada. The Strong Model was developed 20 years ago in accordance with established standards for advanced practice, institutional job descriptions for NPs, and a position statement about the role for the clinical nurse specialist (Mick and Ackerman, 2000). In addition to encompassing international competency dimensions (Sastre-Fullana et al., 2014), a content analysis of the Strong Model supports that the domains of practice subsume Canadian NP competencies, capabilities required for NP's practice. The competencies include direct comprehensive care, support of systems, education, research, and professional leadership (Mick and Ackerman, 2002), all of which enhance role clarity and expected practice performance. Empowerment, collaboration, and scholarship are concepts that underpin NP practice (Canadian Nurses Association [CNA], 2010) and are operational throughout each role function in the Strong Model (Ackerman et al., 1996). The Strong Model remains consistent with the CNA's (2010) core NP competencies, thus is a valuable framework to conceptualize competence, education, or regulation.

Patient safety competence The concept for PS competence is the actions, attitudes, and behaviours that demonstrate best safe care practices across health disciplines to reduce unsafe acts within the healthcare system (Ginsburg et al., 2012). Errors in systems, particularly provider attitudes about safety and interpersonal interactions (i.e., human factors), can aid in identifying strengths and weaknesses in healthcare systems (Sexton et al., 2000). There is evidence that education can influence PS behaviors and attitudes, such as adverse event reporting (Ausserhofer et al., 2013), that in turn affect system PS. PS perceptions are captured through care provider attitudes, making use of the six key constructs: working in teams, communicating effectively, managing safety risks, understanding human and environmental factors, recognizing and responding to adverse events, and culture of safety (Ginsburg et al., 2012). These best practice constructs are important for NPs who collaborate and consult with diverse disciplines to advance excellent patient care. Yet, students' and nurses' skills and confidence in managing safety risk (i.e., error-reporting and disclosure and understanding human and environmental factors related to risk) have been found to be lacking, especially in new health professional graduates (Bressan et al., 2015; Doyle et al., 2015; Ginsburg et al., 2013; Stevanin et al., 2015). Given the need to develop competent safe healthcare professionals, research focusing on education components leading to development of competence in both role and PS areas in newly graduated NPs is timely.

1.2. Hypothesis

The theories used to support specification of the hypothesized study model premise is that the development of NP role and PS competence may be explained, at least in part, by the theories of SE (Kanter, 1977) and PE (Spreitzer, 1995a, Fig. 1). The hypotheses included a) H1 newly practicing NPs who are structurally empowered in their educational environments report increased levels of PE; b) H2 newly practicing NPs who are structurally empowered in their educational environments report increased levels of perception of NP role competence; c) H3

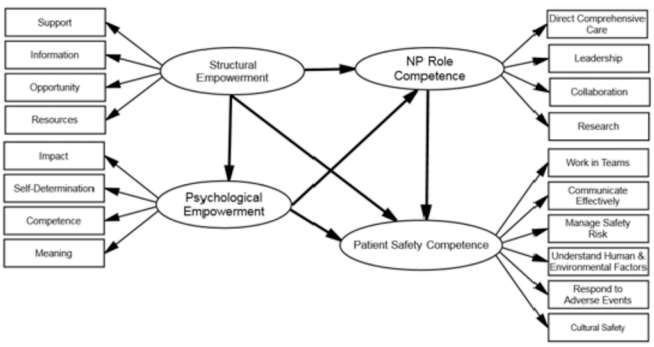

Fig. 1. Hypothesized model being tested, the ellipse shape represents an unobserved latent variable, the rectangle shape represents second-order factor variables.

newly practicing NPs who are structurally empowered in their educational environments report increased perceptions of PS competence; d) H4 PE partially meditates the positive relationship between educational SE and perception of NP role competence, e) H5 PE partially mediates the positive relationship between educational SE and perception of PS competence, and f) H6 newly practicing NPs who are competent in their role report increased levels of perception of PS competence.

2. Method

A non-experimental cross-sectional survey design was used to test the *a priori* hypothesized study model. The study includes a convenience sample of Canadian-educated NPs who completed an NP program during the preceding two years. As NP participants can be considered advanced beginners (Alber et al., 2009; Benner, 2004) with regard to entry to practice. For these purposes, “advanced beginners” are defined as nurses who possess less than two years in practice (Benner, 2004; Markowitsch et al., 2008), and who gain experience in real situations (Dreyfus, 2004), such as newly practicing NPs. However, gaining experience in a role does not permit the same expertise in a related field of tasks; for example, a nurse who does a very good job in an intensive care role may find it difficult to meet the requirements of a job in general surgery (Benner, 2004; Dreyfus, 2004) or a RN who commences a job as an NP. To obtain a sample of advanced beginner NPs, all Canadian provincial nurse regulators and NP associations with a cohort of eligible NP members were contacted for the purpose of recruiting participants. A total of 20 nurse practitioner agencies participated in recruitment of 680 newly graduated NP respondents. The Western University Research Ethics Board reviewed and approved this study. The self-administered study survey that included 120 questions consisted of four standardized, valid and reliable Likert-scale instruments for: (a) Conditions of Learning Effectiveness Questionnaire (CLEQ; Siu et al., 2005), (b) the PE Survey (PES; Spreitzer, 1995b), (c) the Modified-Strong-Advanced Practice Role Delineation tool (M-Strong-APRD tool; Chang et al., 2011), (d) the Health Professionals Education in Patient Safety (H-PEPSS; Ginsburg et al., 2012), and (e) a sociodemographic questionnaire developed specifically for this study.

Structural equation modeling (SEM) analysis is used to test *a priori* hypotheses between latent variable correlation and covariance matrixes, while estimating error variance parameters (Kline, 2016) in order to determine and analyze relationships between theoretical concepts. SEM specification is based on the theoretical framework and model justification of the latent constructs and the psychometric properties for the measures. The data were examined and analyzed for data normality, psychometric properties of educational SE, PE, NP role competence, and PS competence composite variables and goodness of fit, measurement model fit, and SEM analysis. The CLEQ (Siu et al., 2005), PES (Spreitzer, 1995b), M-Strong-APRD tool (Chang et al., 2011), and the H-PEPSS (Ginsburg et al., 2012) tools were used to collect data on the study concepts. SEM is an appropriate analysis tool for this study as the relationships between the constructs (i.e., educational SE & PE with NP role competence & PS competence) are theoretically reasonable, and evidence is available in the nursing research literature to support the proposed relationships.

The manifest variables in the study tools reflect the four theoretical concepts and have demonstrated validity and reliability within nursing populations and nursing subjects. Newly practicing NPs' perceptions of educational SE as applied to conditions for learning were measured using the CLEQ with a Cronbach's alpha 0.90 (Siu et al., 2005). The instrument has 6 latent constructs to measure educational empowerment: access to support (7 items), access to opportunity (6 items), access to information (6 items), access to resources (5 items), informal power (4 items), and formal power (2 items). The instrument included instructions to reflect experiences in NP education. The concept of PE was measured using Spreitzer's (1995b) four factor subscales, each with three items, measure impact, meaning, competence, and self-determination/autonomy. The reliability is reported as: 0.62 to 0.74 (total; Spreitzer, 1995b). The NP role competence measure was a reliable tool in a sample of advanced practice nurses, with an overall Cronbach's alpha coefficient of 0.94 (Chang et al., 2011) to measure direct care, leadership, collaboration, and research. For this study an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was used for data reduction and summarization of the construct validity in Canadian NP respondents, for a Cronbach's alpha 0.92. Last, the PS tool is best suited for health practitioners who recently completed their education program, with coefficient reliabilities ranging from 0.81 to 0.85 in a study of newly practicing health professionals (Ginsburg et al., 2012, 2013). The H-PEPSS is a self-reporting tool used to evaluate attitudes and knowledge that define the quality and safety education for nurse competencies (Ginsburg et al., 2012, 2013). Latent constructs are measured with six-factors for working in teams with other health professionals (3 items); communicating effectively (3 items); managing safety risks (3 items); understanding human and environmental factors (2 items); recognizing and responding to adverse events (2 items); and culture of safety (3 items). The scale scores are computed by taking the mean score of valid responses, with higher scores indicating higher perceptions of the SE, PE, NP role and PS safety competence.

2.1. Analyses

The sample sociodemographic characteristics of sex, age, years of RN experience, education program location and respondent province of registration were collected and examined. Years of RN experience were controlled for in order to isolate the unique effects on the study variables. An EFA was conducted on the NP role competence measure in order to determine: the factor structure, if item reduction was required, if observed variables loaded together as expected, were adequately correlated, met criteria for reliability and validity, and to reduce items for SEM analysis. A CFA was conducted on the educational SE, PE, NP role competence and PS competence to create composite variables for SEM analysis. Additionally, an assessment of construct validity and internal consistency of the variables was conducted after examining the relationship between latent variables for multicollinearity, followed by a CFA of the four composite variables. The following findings for CFA and SEM are reported to examine the relationships between the study variables, which are expected to have relationships with one another (Kääriäinen et al., 2011).

2.2. Findings

Data analysis included 190 (28% response rate) full responses drawn from respondents from a range of NP education programs across Canada (Table 1). The majority of respondents were from Ontario (34%) and Alberta (24%). Means, standard deviations, and reliabilities of the four study instruments are reported in Table 2. Overall, respondents perceived support, opportunity, information and resources as moderately high learning experiences. PE scores from the respondents were, impact, meaning, self-determination, and competence. NP role tasks ranged in competence, from higher levels for direct clinical practice, support of systems, and education tasks, and lower for research and leadership domains. PS responses were lower for work in teams, manage safety risk, and understanding human and environmental factors compared to communicating effectively, recognize, respond and disclose adverse events and culture of safety.

Table 1
Newly practicing nurse practitioners sex, age, years of RN experience.

	n	%	Min	Max	Mean (SD)
Sex (n = 190)					
Male	11	6			
Female	179	94			
Age Group (n = 190)			26	62	42 (10)
26–30 years	36	19			
31–35 years	70	37			
36–40 years	28	15			
41–45 years	18	9			
46–50 years	21	11			
51–55 years	17	9			
> 55					
Years of RN experience (n = 190)			2	42	19 (10)
0–5	19	10			
6–10	92	48			
11–15	29	15			
16–20	17	9			
21–25	13	7			
26–30	12	6			
> 31	8	5			

2.3. Model estimation

To establish model fit, predictive fit, comparative fit, or parsimonious fit, an acceptable standard is to report four model fit indicators as best practice (Hu and Bentler, 1999). All measurement models achieved the recommended levels of fit, with a sample of 190. Overall, the sample for the CFA models range from adequate to robust fit. All parameter estimates for latent variable CFAs and second-order CFAs were determined to be statistically significant (Byrne, 2010) as reported in Table 3.

The measurement model loadings (educational SE, PE, NP competence, & PS competence) were above the recommended 4.0 threshold (Hair et al., 2014) both in the CFA and second order CFA composite variable models, with a sample size of 190, with most averaging 0.80 Cronbach's alphas values. Standardized factor loadings in measurement models should fall between 0 and 1, with higher values suggesting better indications of the observed variables for the latent variable. The NP competence construct factor loadings averaged 0.71; educational SE factor loadings average 0.84; PE factor loadings averaged 0.76, and PS factor loadings averaged 0.81. In this study, all standardized loadings are in the 0.70 average range, signifying that the items are satisfactory indicators.

Correlations Among SEM Study Variables.

Table 3
Goodness-of-fit index maximum likelihood model evaluation.

Model	χ^2/df	p	SRMR	RMSEA	CFI
Ideal Threshold	1–3	ns	< .06 - < .08	.05–.08	> 0.90
Educational SE CFA	1.55	*	.04	.05	.98
Educational SE Second-order CFA	1.87	***	.05	.07	.96
PE CFA	2.38	***	.06	.09	.97
PE Second-order CFA	2.37	***	.07	.09	.97
PS CFA	1.95	***	.02	.07	.97
PS Second order CFA	2.02	***	.03	.07	.96
1st Measurement Model CFA	2.47	***	.04	.09	.93
Final Measurement Model CFA	2.33	***	.04	.08	.94
1st SEM	2.36	***	.05	.09	.93
SEM no PE Mediation	1.84	***	.03	.07	.97
Final SEM	2.27	***	.04	.08	.94

Note. χ^2 = Chi-square; df = degrees of freedom; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CFI = comparative fit index; ***p < 0.001; *p < 0.05; ns = not significant; SE = structural empowerment; CFA = confirmatory factor analysis; PE = psychological empowerment; PS = patient safety; SEM = structural equation model.

Table 2
Manifests & scales statistics prior to EFA and CFA factor reduction for SEM analysis.

Instrument	Items	Manifest	α	M (SD)	Min - Max
CLEQ (range 1–5)			0.94		
	7	Support	0.87	3.55 (0.97)	3.33–3.87
	6	Information	0.88	3.65 (0.95)	3.07–3.71
	5	Resources	0.76	3.52 (0.96)	3.30–3.91
	6	Opportunity	0.87	3.52 (0.92)	3.22–3.93
PES (range 1–7)			0.92		
	4	Impact	0.87	5.11 (1.71)	4.90–5.50
	4	Meaning	0.91	6.12 (0.97)	6.04–6.27
	4	Confidence	0.88	4.80 (1.24)	4.34–5.10
	4	Self-determination	0.92	5.35 (1.87)	5.26–5.51
M-Strong-APRD (range 0–4)			0.96		
	16	Direct Care	0.93	2.91 (0.60)	2.36–3.30
	9	Support of Systems	0.91	2.04 (1.25)	2.90–1.28
	5	Education	0.85	2.01 (1.09)	1.47–3.02
	6	Research	0.90	1.32 (1.18)	0.94–1.94
	6	Leadership	0.93	1.36 (1.29)	1.22–1.51
H-PEPSS (range 1–5)			0.94		
	3	Work in Teams	0.89	4.04 (0.79)	3.93–4.19
	3	Communicating	0.91	4.45 (0.44)	4.38–4.50
	3	Manage Safety Risk	0.90	4.08 (0.69)	3.98–4.21
	2	Understand Factors	0.92	3.96 (0.95)	3.87–4.04
	2	Recognize Harm	0.94	4.23 (0.70)	4.22–4.24
	3	Culture of safety	0.89	4.25 (0.65)	4.00–4.38

Note. α Cronbach's Alpha, Min minimum, Max maximum, CLEQ = Conditions for Learning Effectiveness Questionnaire (Siu et al., 2005), PES = Psychosocial Empowerment Survey (Spreitzer, 1995b), M-Strong-APRD = Modified Strong Advanced Practice Role Delineation tool (Chang et al., 2011), H-PEPSS = Health Professional Education in Patient Safety (Ginsburg et al., 2012).

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Support	3.49	0.73	–																
2. Information	3.42	0.80	.68**	-															
3. Resources	3.53	0.68	.76**	.73**	-														
4. Opportunity	3.52	0.69	.89**	.70**	.84**	-													
5.Impact	3.68	0.83	.25**	.25**	.25**	.33**	-												
6. Meaning	5.24	0.78	.17*	.13	.19*	.26**	.62**	-											
7. Confidence	3.68	0.78	.23**	.16*	.20**	.27**	.47**	.37**	-										
8. Self-determination	4.21	1.01	.21**	.22**	.22**	.30**	.97**	.57**	.45**	-									
9. Direct Care	2.52	0.47	.22**	.19*	.21**	.26**	.34**	.08	.62**	.32**	-								
10. Collaboration	1.81	1.05	.12	.11	.07	.16*	.24**	.03	.21**	.20**	.37**	-							
11. Research	1.32	0.81	.12	.06	.08	.12	.07	-.07	.11	.05	.24**	.67**	-						
12. Leadership	1.49	0.97	.17*	.04	.11	.13	.06	-.05	.04	.04	.22**	.70**	.75**	-					
13. Work in Teams	3.95	0.75	.25**	.30**	.26**	.32**	.28**	.18*	.30**	.26**	.37**	.29**	.20**	.24**	-				
14. Communicate	4.19	0.56	.33**	.29**	.32**	.39**	.32**	.27**	.29**	.26**	.28**	.19**	.11	.17*	.60**	-			
15. Manage Risk	3.91	0.68	.30**	.25**	.24**	.32**	.32**	.19**	.33**	.28**	.37**	.26**	.15*	.25**	.61**	.70**	-		
16. Understand Factors	3.92	0.83	.28**	.24**	.25**	.33**	.26**	.18*	.22**	.22**	.26**	.21**	.124	.22**	.56**	.63**	.70**	-	
17. Harm Reduction	4.17	0.75	.31**	.29**	.28**	.35**	.30**	.28**	.24**	.26**	.24**	.16*	.16	.16*	.57**	.63**	.71**	.78**	-
18. Culture of Safety	4.06	0.64	.31**	.23**	.30**	.37**	.32**	.22**	.22**	.29**	.36**	.25**	.11	.24**	.56**	.60**	.64**	.72**	.71**

Note. ** correlation is significant at the 0.01 level (2 tailed), *correlation is significant at the 0.05 level (2-tailed).

In order to use the four latent variable model, with 18 constructs in SEM, composite variables were required. Thus, 4 s-order CFAs were undertaken and reported for the four latent variables. NP competence and PS competence factors with a dependence on educational SE and PE were confirmed in the measurement portion of the CFA using composite variables. The GFI for the measurement model and observed data are reported in Table 3. The study measures reliability estimates are above 0.70, which indicate an acceptable level of internal consistency (Kline, 2016, Table 2). Additionally, the CR values for each of the latent constructs in the initial study variable CFAs, and second-order CFAs, average over 0.70 for the corresponding factor construct; the composite variable range is from 0.82 to 0.92, demonstrating convergent validity and internal consistency (Cronbach, 1951). Convergent and discriminant validity of the 4 factors were supported, there was no multicollinearity (Table 4).

2.4. Model identification

Confirmatory factor analysis using maximum likelihood estimation was used to establish the reliability and validity of the construct measurements. The fit indices supported a reasonable fitting model; examination of the indicators standardized loadings, correlation residuals, and modification indices were then considered (Kline, 2016). Theoretically reasonable modifications included covarying the error terms for educational SE information and resources, resulting in an improved model fit. On reiteration, educational SE resources and opportunity error terms were covaried. A final CFA with PE impact and self-determination were covaried, which resulted in fit indices for an acceptable fitting measurement model. Error terms for PS competence communicate effectively and manage safety risks were covaried to account for their correlation, without adding theoretical complexity to the model, given its composite variable structure. The instruments adequately represented the latent variables understudy, where the critical value for the GFI met the thresholds, indicating a sufficient model fit. The parameter paths and estimates are reported in Table 5.

2.5. Hypothesis testing

To test the hypotheses for mediation, a mediation analysis of indirect effects with 2000 bias corrected bootstrapping resamples in AMOS are reported in Table 6. The mediated and non-mediated models achieved suitable fit between the model and the observed data (Table 3). The hypothesized measurement and SEM is described graphically in Fig. 2. All of the relationships were positive, as hypothesized.

Five of six hypotheses are supported (Table 6). As hypothesized, in the mediated model, the direct effect of educational SE on NP competence mediated by PE were significant (ß = 0.38, $p < 0.001$). The hypotheses for a direct effect of educational SE mediated by PE on NP competence were significant prior to adding the mediator (ß = 0.18, $p < 0.05$), but after adding the mediator, the direct effect became nonsignificant. The indirect effect was not significant, thus, no significant mediation occurred. The hypothesis for the direct effect of educational SE mediated by PE on PS was significant prior to adding the mediator (ß = 0.39, $p < 0.001$), and after adding the mediator (ß = 0.28, $p < 0.001$), the indirect effect was positive and significant (ß = 0.30, $p < 0.001$). This indicates that there is partial mediation. The direct effect of NP competence on PS competence was significant (ß = 0.19, $p < 0.01$).

3. Discussion

H1 Structural empowerment and psychological empowerment. This study is the first to determine the impact of educational SE on PE in newly practicing NPs role and PS competence. A direct (ß = 0.38, $p < 0.001$) relationship between educational SE and PE was evident. The results suggest that learning environments shape newly graduated NPs' perceptions of empowerment for learning and PE, similar to

Table 4
Post EFA & CFA Construct Correlations (square root of AVE on the diagonal).

	Mean	SD	CR	AVE	MSV	ASV	1	2	3	4
1. NP Competence	2.15	0.96	0.92	0.75	0.18	0.20	0.87			
2. PE	5.36	1.45	0.82	0.55	0.19	0.12	0.38	0.74		
3. PS	4.18	0.69	0.82	0.56	0.08	0.04	0.17	0.15	0.75	
4. Educational SE	3.51	0.95	0.92	0.65	0.19	0.15	0.42	0.44	0.28	0.81

Note. CR = composite reliability; AVE = average variance extracted; MSV = maximum shared squared variance; ASV = average shared squared variance; NP = nurse practitioner; PE = psychological empowerment; SE = structural empowerment; PS = patient safety.

Table 5
Parameter paths and estimates.

Path	Standardized Estimate	Unstandardized Estimate	p	Standard Error
SE →PE	.381	.414	***	.086
SE →NP role competence	.138	.140	(ns)	.088
PE →NP role competence	.097	.091	(ns)	.086
SE →PS competence	.277	.218	***	.060
PE → PS competence	.298	.215	***	.062
NP role → PS competence	.187	.144	*	.056

Note. p = p-value threshold; ***p < 0.001; *p < 0.01; ns = not significant; PE = psychological empowerment; SE = structural empowerment; NP = nurse practitioner; PS = patient safety.

findings from studies of nursing students educational SE and PE (Lethbridge, 2010; Siu et al., 2005). This study adds the dimension of NP competence and PS competence; additionally, the direct positive relationship of educational SE is important for development of professional nursing practice behaviours in nursing education (Babenko-Mould et al., 2012; Livsey, 2009).

H2 Structural empowerment and nurse practitioner role competence. The direct effect of educational SE on NP competence (ß = 0.18, p < 0.05) was positive and significant while the indirect effect was not statistically significant. As a result, greater changes in educational SE do not necessarily lead to significant indirect changes in NP competence, through changes in PE. Higher initial scores in the mid to moderate range for educational SE (range 3.0–3.7 on a scale of 5) and PE (range 4.8–5.4 on a scale of 7) as factors for job competence may have resulted in smaller changes for NP competence with less variance between scores, where the indirect path is not significant.

H3 Structural empowerment and patient safety competence. The hypothesis that SE learning environments positively relate to PS competence was supported. There was a significant positive direct relationship between educational SE and PS, with evidence of an indirect effect of educational SE on PS competence through PE. These positive findings are consistent with previous studies of SE and PS in nurses (Armellino et al., 2010; Armstrong et al., 2009; Knol and van Linge, 2009) where educational SE maybe an important predictor for PS in the nursing workforce and education.

H4 and H5 Psychological empowerment mediates structural empowerment relationship. This study adds to the body of literature concerning the theoretical and empirical link of PE as a mediator for SE (Chang et al., 2010; Hochwälder, 2007; Knol and van Linge, 2009; Laschinger et al., 2001), and positive outcomes related to nurses' education or practice (Lethbridge et al., 2011; Stewart et al., 2010; Siu et al., 2005; Wagner et al., 2010). The results indicate that newly practicing NPs' education SE resulted in higher levels of PE. The direct and indirect relationships between educational SE and PE were evident in this study. Respondents perceived PE meaning as most important, followed by self-determination, impact, and competence. The high level of PE suggests that newly practicing NPs find their work meaningful, with competence rated the lowest score of the four PE dimensions in this study. Competence is an important indicator for the ability to act empowered, and may be limited by the advance beginner stage (Benner, 1982) where the trajectory for perceiving one's self as competent develops and continues beyond the first two years of practice following an education program in NPs (Alber et al., 2009). Consistent with other NP studies (Alber et al., 2009), continuing competence development beyond graduation and the first two years of practice may be necessary.

The mediation effect of PE is consistent with a study where PE mediates the positive relationship between SE and PS (Bonias et al., 2010). Rather than structures or conditions in the environment, PE encompasses personal perceptions on the ability and confidence to complete tasks autonomously. Thus, PE has the potential to motivate or influence greater levels of PS competence.

H6 Nurse practitioner role competence and patient safety competence. A direct relationship between NP competence and PS competence was positive and significant. The effect size suggests that as NP competence changes so too will PS competence in newly practicing NPs. Thus, NPs' positive perceptions of role competence have the potential to influence greater levels of PS competence. The results of the current study provide support for this integrated model of NP competence and PS competence for NPs, and warrants further study in healthcare graduates.

Additionally, the hypothesis that role competence would result in higher perceived levels of PS competence was supported, as the effect size for PS competence was significant and large. The large effect size suggests that educational environments that enable newly graduated NPs to feel more autonomous in determining how to do a job, ascribe meaning to the work's importance, possess competence in the ability to do the job, and maintain control over what happens in a job, can use the behaviours to develop PS competence. Thus, PE that takes place at an intrapersonal level has the potential to motivate or influence outcomes of PS competence.

3.1. Implications for nursing education

Testing the relationship between NP competence, PS competence, and empowerment was helpful in order to advance nursing education science. The study was grounded in Kanter's Theory of Structural Power in Organizations (1977), Spreitzer's PE (Spreitzer, 1995a) tenets, and the Strong Model of Advanced Practice (Ackerman et al., 1996) conceptualization, to provide a theory-driven research framework.

Table 6
Summary of findings.

Hypothesis	Standardized Direct Effect	Indirect	Result
Educational SE →PE	0.38***		Supported
NP competence → PS competence	0.19*		Supported
Educational SE →PE →NP competence	Direct w/o Med: 0.18** Direct w/Med: 0.14 (ns)	0.10 (ns)	No mediation
Educational SE →PE → PS competence	Direct w/o Med: 0.39*** Direct w/Med: 0.28***	0.30***	Partial mediation

Note. ***p < 0.001, **p < 0.05, *p < 0.01, (ns) not significant, SE structural empowerment, PE psychological empowerment, NP nurse practitioner, PS patient safety.

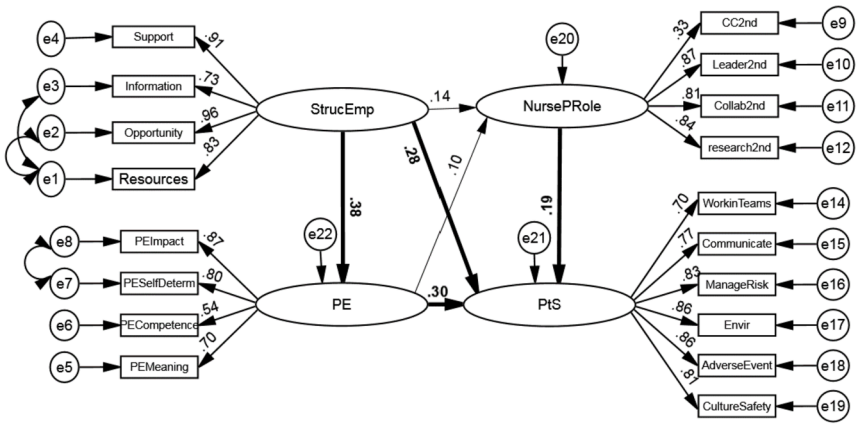

Fig. 2. Structural model (the final model) with second-order factor standardized coefficients. StrucEmp = educational structural empowerment, PE = psychological empowerment, SelfDeterm = self-determination, P = practitioner, CC = clinical competence, 2nd = composite variable, Leader = leadership, Collab = collaboration, PtS = patient safety, Envir = environmental factors, e = error, fine lines indicate non-significant hypothesized pathways, all other pathways significant at 0.38, 0.28, 0.30 ***p < 0.001, 0.19*p < 0.01, χ^2/df = 2.27; ***p < 0.001; SRMR = 0.04; RMSEA = 0.08; CFI = 0.98.

Theoretically grounded research is necessary in order to advance knowledge about nursing education and professional practice, and thus the methods and design used in this study are advantageous for future research.

Nurse practitioner students who perceive access to educational empowerment structures achieved a sense of meaning in their job activities, competence in their job, autonomy for work, and control in their work. Thus, SE nursing education strategies proposed by Siu et al. (2005) may assist educators in fostering empowerment environments, and need to be consider in NP education. For example, distributed learning opportunities or resources such as webinars, online videos, online simulations, or videotelephony rather than face-to-face conferences or education inservices may be advantageous for learners' educational SE.

Nurse educators can directly impact students' perception of educational SE and PE using a variety of strategies. A key tenet for both SE and PE is role clarity; thus if students and educators use competencies to guide individual or group projects, role clarity can foster both SE and PE, in turn developing competence. Further, competencies used as an evaluation process assist newly licensed nurses to identified gaps in education for practice preparation, where gaps are more frequently associated with involvement in errors in the work setting and difficulties with client assignments (Smith and Crawford, 2003). Competency resources to inform curriculum content may afford educators or students the opportunity to develop knowledge and skills, or teaching/learning strategies, to maximize educational SE, and the ability to develop specific competencies such as addressing the lower scores for research, leadership, and understanding human and environmental factors competencies in NP respondents.

3.2. Limitations

Several limitations of this study must be considered when interpreting findings. The questionnaires are self-reported perceptions related to empowerment and competence, where social desirability bias may contribute to overestimation or underestimation of competence. However, long instruments tend to be more reliable (Polit and Beck, 2016); thus, the survey length provides higher confidence for conclusions and findings along with the sound psychometric properties of the study measures. Conversely, a set of data may need simplified in order to easily describe and account for as much variance as possible (Kline, 2016). Thus, an EFA was conducted on the NP role competence measure in order to determine: the factor structure, if item reduction was required, if observed variables loaded together as expected, were adequately correlated, met criteria for reliability and validity, and to reduce items for SEM analysis. The 42 item NP role competence scale was modified to 21 items in order to reliably measure the factor for SEM, therefore the study should be replicated and validated in a different sample. In order to mitigate the social desirability effect, the instructions indicated that the responses were anonymous and grouped to mitigate social undesirability or consequences associated to the respondents responses (Podsakoff et al., 2012). The convenience sampling limits the generalizability of the findings. The design is dependent upon recall of past events, and thus may contribute to information and recall bias. The threats to validity from self-administered surveys include biases related to self-reported data (memory, select recall, responding to look favorable), as well as sample selection and size.

4. Conclusion

The findings support the theoretical premise of Kanter's (1977) and Spreitzer's (1995a) notion for development of competence in work, and offer some explanation as to how newly practicing NPs perceive role and PS competence in newly graduated NPs, from across Canada. In spite of the study's limitations, the results contribute to general knowledge of the associations of SE in nursing education in Canada, and to a growing call for research centred on the education of healthcare providers, particularly NPs. Professional role self-perceptions are fundamental to identifying gaps and areas for improvement, or to address role supplementation needs. Specific factors that provide educational SE and PE are useful for nursing educators, employers, expanding knowledge from previous research, and for new healthcare provider research beyond nursing. Likewise, studies of role and PS competence offer insight for educators and administrators who hire new graduate NPs. This is the first study to test PE mediation of educational SE on NP competence and PS competence, emphasizing the importance of creating SE learning experiences to develop competence in new healthcare providers.

Ethical approval details

The Western University Research Ethic Board reviewed and approved this study of participant data collection using an electronic survey.

Conflicts of interest

None.

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