

ORIGINAL ARTICLE

Competence and confidence in rural and remote nursing practice: A structural equation modelling analysis of national data

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Abstract

Aims and objectives: To empirically test a conceptual model of confidence and competence in rural and remote nursing practice.

Background: The levels of competence and confidence of nurses practising in rural settings have been highlighted as essential to the quality of health outcomes for rural peoples. However, there is limited research exploring these constructs in the context of rural/remote nursing practice.

Design: Structural equation modelling was used to verify the conceptual model with data from the cross-sectional pan-Canadian Nursing Practice in Rural and Remote Canada II Survey. The STROBE guidelines for cross-sectional research were followed in the design/reporting of this analysis. The sample consisted of 2,065 registered nurses and nurse practitioners who were working in direct rural/remote nursing practice.

Results: The maximum likelihood ratio $\chi^2 = 0.0822$, $df = 2$, $p = 0.959$ indicated model fit, with final model estimates explaining 53% of the variance in work confidence and 17% of the variance in work competence. The model also accounted for 40% of the variance in work engagement, 39% of the variance in burnout and 15% of the variance in perceived stress. The complexity of competence and confidence in rural nursing practice was evident, being influenced by nursing experience in rural settings, rural work environment characteristics, community factors and indicators of professional well-being.

Conclusions: The factors influencing nurses' competence and confidence in rural/remote nursing practice are more complex than previously understood. Our model, created and tested using structural equation modelling, merits further research, to extend our understanding of how nurses can be prepared and supported for practice in rural and remote settings.

Relevance to clinical practice: This study highlights the importance of supporting new nurses' exposure to rural nursing experiences, reducing professional isolation and improving decision-making support for those who are working at a greater distance from colleagues and/or those with fewer opportunities for interprofessional collaboration.

KEYWORDS

burnout, competence, confidence, cross-sectional survey, perceived stress, rural/remote nursing, structural equation modelling, work engagement

1 | INTRODUCTION

In 2016, 11.3% (44,724) of the regulated nurses working in Canadian provinces worked in a rural or remote area, with 17.3% of the population living in these areas in 2015. A further 34.4% (567) of the regulated nurses working in the Canadian territories worked outside of the capital cities (Whitehorse, Yellowknife, Iqaluit) where 51.8% of the population lived (CIHI, 2017). Similar figures are noted for the USA and globally, with up to half of the world's population living in rural and remote areas where the most acute shortages of nurses and other healthcare professionals are occurring (WHO, 2010). Early research suggested that there is a need to recognise the unique knowledge and skills required to practise in rural and remote settings and that nurses' ongoing competence should be supported as a crucial element of quality health outcomes for rural peoples (Beatty, 2001). There is also supportive evidence that rural-specific professional development programmes not only improve the level of competence of rural healthcare workers, but also may help to increase their desire to stay and practise in those settings (WHO, 2010). The contextual realities of rural nursing practice include professional and geographical isolation (Hunt & Hunt, 2016), an ageing workforce (Bushy & Winters, 2013), community diversity (Kulig & Williams, 2012), expanded knowledge base (Crooks, 2012) and blurred personal/professional boundaries (Bushy & Winters, 2013). These realities highlight the need to better understand and develop a confident, competent and engaged nursing workforce in rural and remote settings. Although a few studies have examined factors associated with competence in rural nursing practice (e.g., Morgan et al., 2016), they are mainly descriptive in nature and examine small, linear elements of proposed relationships. There is a need for deeper exploration of competence and confidence in rural and remote nursing practice using multivariate modelling.

2 | BACKGROUND

2.1 | Defining competence and confidence in nursing practice

The concepts of nursing competence, and less commonly nursing confidence, have been used to describe nurses' preparedness for and level of performance in nursing practice (Garside & Nhemachena, 2013; Ulrich et al., 2010), but remain elusive concepts to define (Bradshaw & Merriman, 2008). Nursing competence has been conceptualised as the development/performance of skills and understanding of patient care through a sound educational base and experiential learning (Benner, 1984). Subsequent research has embraced a holistic viewpoint involving both performance and

What does this paper contribute to the wider global community?

- Urban-based studies of nursing competence and confidence do not adequately address the complexities and unique nature of rural and remote nursing practice.
- Competence and confidence in rural nursing practice are multifaceted, being influenced by exposure to rural nursing opportunities, rural work environment characteristics, community factors and indicators of professional well-being (i.e., work engagement, burnout, perceived stress).
- This study highlights the need to reduce professional isolation and improve decision-making support for those who are most remote and may have fewer opportunities for ongoing interprofessional collaboration and access to mentorship in leadership roles.

capability (Garside & Nhemachena, 2013), with the need to consider a combination of knowledge/skills, attitudes, values and critical thinking (Smith, 2012). Self-assessed confidence has been identified as one of the key indicators that competence has been achieved (Smith, 2012; Ulrich et al., 2010), along with safe practice and holistic care (Smith, 2012). Work-related confidence is a concept most often studied in the context of nursing students' or novice nurses' performance of core nursing skills (Bradshaw & Merriman, 2008; Lea & Cruickshank, 2015; Zieber & Sedgewick, 2018). It has been suggested that "experienced" rural nurses expect novice nurses to both self-identify the need for and independently seek collegial guidance, the success of which is highly dependent on their level of confidence (Lea & Cruickshank, 2015). Earlier research supports this notion, suggesting that competence without confidence is insufficient and that a nurse's ability to fully demonstrate their competence is completely dependent on their self-confidence to persevere in the face of difficulties (Ulrich et al., 2010). Confidence, therefore, may be viewed as distinct, but complementary to nurses' perceptions of their overall competence (Ulrich et al., 2010; Zieber & Sedgewick, 2018) and preparedness to practice.

2.2 | The context of rural nursing practice

There is considerable work supporting the premise that health professionals' scope of competence should be explored within a lens relevant to the context of their work environment (Garside & Nhemachena, 2013; Ulrich et al., 2010). The context of rural and

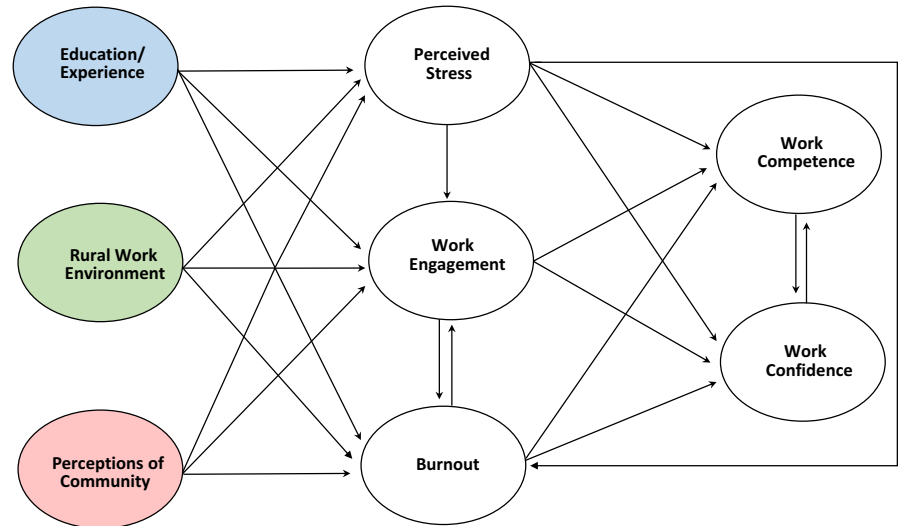


FIGURE 1 Conceptual framework of competence and confidence in rural nursing practice. Three exogenous latent variables on the left each have more than one observed indicator. Five remaining endogenous latent variables each have one observed indicator

remote nursing practice is distinct, the complexity of which has been largely underestimated (MacLeod, Kulig, Stewart, Pitblado, & Knock, 2004). Rural nurses are typically expected to work as competent generalists with an expanded scope, often in sparsely populated communities that are isolated and/or under-resourced (Birks, Davis, Smithson, & Cant, 2016; Bushy & Winters, 2013; Hanvey, 2005). Rural and remote nurses have identified significant personal (e.g., financial)-, organisational (e.g., workload, lack of relief staff)- and community (e.g., travel distance)-related barriers that impact their access to continuing education (Penz et al., 2007). There are also concerns about the inadequacy of educational offerings, specifically that they lack relevance or are insufficient in terms of topic or scope (Jukkala, Henly, & Lindeke, 2008; MacLeod, Lindsey, Ulrich, Fulton, & John, 2008). Considering the interwoven nature of rural nurses' personal lives and work lives, community factors should also be considered when examining their competence and confidence.

2.3 | Developing a model of rural nursing competence and confidence

Based on the evidence on the context of rural nursing practice and the bivariate and multivariate studies of nursing competence and confidence that are summarised in the following section, we developed a conceptual model (Figure 1), where factors thought to influence rural nurses' levels of work competence and work confidence in their practice are grouped into six categories: education/experience, rural work environment, perceptions of community, perceived stress, work engagement and burnout. The variables included in our analysis are either exogenous (i.e., background variables that do not receive effects from other concepts, but are thought to influence endogenous concepts) or endogenous (i.e., acted on by other variables within the model), with our hypothesised effects indicated by the arrows between conceptual categories. Note that all variables in Figure 1 are considered latent factors (unobserved), with the three exogenous latent variables on the left each having more than one observed indicator, and the five remaining endogenous latent variables

each having one observed indicator. Use of structural equation modelling in the present analysis allows for more complex testing of the relationships between variables while simultaneously accounting for estimations of measurement error.

Education/experience was included in the model in relation to the notion that nurses are often not viewed as prepared to take on the challenges of rural nursing practice, partially due to the urban focus of many nursing education programmes (Harmon, 2013). The degree of community and patient variability (e.g., experience) may also impact the way rural nurses develop confidence and competence in their roles (Yonge, Myrick, Ferguson, & Quinn, 2013). A number of studies have highlighted the importance of rural nursing experience and age as linked to increased competence in rural nursing practice (Bratt, Baernholdt, & Pruszynski, 2014; Hodge, Miller, & Skaggs, 2017; Mills, Field, & Cant, 2011). In a study involving 318 newly graduated Finnish nurses, age was a significant predictor of nursing competence, but only when combined with a longer work experience (Numminen, Leino-Kilpi, Isoaho, & Meretoja, 2015). This was supported by Hodge et al. (2017), who found that age and experience both influenced rural nurses' perceptions of their readiness to deal with rural-specific disaster events. Interestingly, for nurses with the same level of experience, the odds of perceived readiness decreased with every year of age, and for nurses who were the same age, the odds increased with every year of experience (Hodge et al., 2017).

The rural work environment was included in the model in relation to the evidence that supports the potential impact that the work environment may have on competence (Hodge et al., 2017; Mills et al., 2011; Numminen et al., 2015, 2016) and confidence (Smith, 2012; Ulrich et al., 2010) in practice. For newly graduated nurses in Finland, perceptions of a positive work environment were significantly associated with increased nursing competence (self-assessed using the 73-item Nurse Competence Scale), particularly in relation to positive collegial relations, nurse manager abilities, collaboration and leadership (Numminen et al., 2016). Nurses with lower competence also had less positive perceptions of staffing and resource adequacy

compared to nurses with higher perceived competence (Numminen et al., 2016). Further, there are concerns with rural nurses' lack of familiarity with appraising critical resources, use of online sources with varying quality, and reliance on experiential and collegial knowledge sources (Hodge et al., 2017; Mills et al., 2011).

Perceived stress, work engagement and burnout were included in the model as variables related to personal/professional well-being that may also have an influence on nursing confidence and competence (Bratt et al., 2014; Numminen et al., 2016; Walker & Campbell, 2013). In a comparison of rural and urban nurses enrolled in nurse residency programmes, similar competence between groups was found over time; however, rural nurses were significantly older and had significantly higher job satisfaction and lower job stress when compared to the urban nurses (Bratt et al., 2014). Job satisfaction has been found to be both an independent and dependent variable related to nursing competence, whereby nursing competence predicted job satisfaction (Walker & Campbell, 2013), and in combination with age, job satisfaction explained 6.3% of the variance in nursing competence (Numminen et al., 2016). A potentially more relevant concept to explore in the context of rural nursing practice is level of work engagement. In a study involving 747 rural acute care RNs, 17% of the variance in their work engagement was predicted by a combination of a positive practice environment (e.g., resource adequacy, leadership) and direct decisional involvement (Havens, Warshawsky, & Vasey, 2013). In a study involving 751 nurses in two University hospitals in Belgium, two multivariate models with burnout and work engagement as mediators explained between 52%–62% of the variance in job outcomes (i.e., job satisfaction, intent to stay) and quality of care (Bogaert et al., 2017). Although nursing competence was not measured in the above two studies, the findings highlight the need to explore a more complex model of nursing confidence and competence that simultaneously examines variables related to the work environment and those related to personal/professional well-being.

Community variables were also included in the model even though it is difficult to predict the potential relationships between these and rural nursing competence or confidence, as the majority of research has taken place in urban settings where perceptions of community are not usually considered (Bratt et al., 2014). A grounded theory study exploring rural nurses' experiences of mentoring emphasised that their perceived knowledge base cannot be isolated from what is occurring in their communities (Mills, Francis, & Bonner, 2007). Nurses in rural practice often integrate within the community, with close-knit environments often viewed as positive factors in their personal and professional well-being. However, not all rural practice settings are homogeneous with a positive integration of healthcare professionals (Kulig & Williams, 2012). Little is known about the potential impact that community-related factors may have on rural nurses' perceptions of their level of confidence and competence in their practice.

In summary, although it has been suggested that nurses' level of confidence is a key indicator of their competence in practice (Smith, 2012; Ulrich et al., 2010), there is less evidence to support this notion

from a rural nursing perspective. The findings of the above studies are also limited in their scope with some either lacking a rural focus, or using mainly descriptive or correlational analyses to explore nursing competence. This is problematic since some concepts such as nursing competence, confidence, work engagement, burnout and perceived stress could be viewed as either independent variables or dependent variables, and only simplistic, linear relationships have been tested. The relationships between confidence and competence from the perspective of rural and remote nurses will be explored through our multivariate conceptual model, taking into account the potential influence of indicators of personal/professional well-being (i.e., work engagement, burnout and perceived stress) and important community-related variables which have not been studied to date.

2.4 | Purpose

The purpose of this study was to test a multivariate model of rural and remote RN/NP confidence and competence using data from a national study on the nature of nursing practice in rural and remote Canada.

3 | METHODS

3.1 | Design

The data used to test the proposed model were from a pan-Canadian study "Nursing Practice in Rural and Remote Canada II" (RRNII) (MacLeod et al., 2017), with results reported according to the STROBE guidelines for cross-sectional studies. The RRNII national survey questionnaire totalled 27 pages and consisted of five main sections of individual characteristics, work community, workplace, nursing practice and personal/professional well-being. A target sample of 10,072 rural and/or remote practising regulated nurses (registered nurses [RNs], nurse practitioners [NPs], licensed or registered practical nurses [LPNs], and registered psychiatric nurses [RPNs]) were sought. Initial ethical approval for the study was received from our university ethics board (E2013.0320.037.02), with subsequent approvals received from the ethics review boards of the University of Saskatchewan, University of Lethbridge, Laurentian University, Hôpital Maisonneuve-Rosemont (affiliate of the Université de Montréal), Dalhousie University, Aurora College, Nunavut Research Institute and the Prince Edward Island Research Ethics Board. Through collaboration with the provincial and territorial nursing associations across Canada, the research centre at the University of Northern British Columbia distributed paper copies (i.e., mail return) and online versions of the survey using Dillman's tailored design method (Dillman, Smyth, & Christian, 2014). From April 2014–August 2015, a total of 3,822 out of 9,622 eligible participants completed the survey, for an overall response rate of 40%. There were 450 potential participants who were ineligible based on incorrect addresses, duplicate registrations or retirement. The response rate was 40% for the RN participants (2,082/5,196 eligible) and 58% for the NP participants (163/281 eligible), with a 99% confidence level

TABLE 1 Characteristics of the sample ($n = 2,065$)

Characteristics	n (%) or mean (SD, range)
Gender ($n = 2,015$)	
Female	1,893 (93.9)
Male	122 (6.1)
Age (years) ($n = 1,993$)	47.7 (± 11.9 , 22–84)
Nurse type ($n = 2,065$)	
Registered nurse (RN)	1,909 (92.4)
Nurse practitioner (NP)	156 (7.6)
Highest attained nursing education ($n = 2,034$)	
Diploma	961 (47.2)
Bachelor's degree	937 (46.1)
Master's/doctoral degree	136 (6.7)
Primary position ($n = 2,065$)	
Manager	240 (11.6)
Staff nurse	1,570 (76.0)
NP/CNS ^a	255 (12.3)
Current area of practice ^b ($n = 2,062$)	
Acute care	989 (48.0)
Primary care	330 (16.0)
Community health	425 (20.6)
Long-term care	350 (17.0)
Home care	220 (10.7)
Hospice/palliative/end of life care	132 (6.4)
Mental health	134 (6.5)
Shift length worked most often ($n = 2,001$)	
≤ 8 -hr shifts	1,248 (62.4)
12-hr shifts	753 (37.6)
Distance to basic referral centre ($n = 2,014$)	
0–99 km	1,162 (57.7)
100–499 km	604 (30.0)
500 km or more	248 (12.3)
Distance to advanced referral centre ($n = 2,008$)	
0–99 km	268 (13.3)
100–499 km	1,032 (51.4)
500–999 km	212 (10.6)
1,000 km or more	496 (24.7)
General health ($n = 2,004$)	3.9 (± 0.8 , 1–5)
Mental health ($n = 2,003$)	3.8 (± 0.8 , 1–5)
Work engagement ($n = 1,991$)	38.7 (± 9.3 , 0–54)
Burnout ($n = 1,977$)	2.7 (± 1.3 , 0–6)
Perceived stress ($n = 1,993$)	8.8 (± 2.9 , 4–19)
Satisfaction with work community (2,033)	4.1 (± 0.7 , 1–5)
Level of work competence ($n = 2,010$)	3.3 (± 0.5 , 1–4)
Level of work confidence ($n = 2,014$)	3.2 (± 0.5 , 1–4)

^aNurse practitioner/clinical nurse specialist. ^bMay add up to more than 100% as some may practise in more than one area.

that the survey sample of rural RN and NP respondents is representative of rural Canada RNs and NPs as a whole (margin of error 2%). The present analysis used a subsample of 2,065 RNs and NPs who were currently working in direct nursing practice (i.e., managers, staff nurses, nurse practitioners and clinical nurse specialists). Those excluded from the analysis were all the LPN and RPN respondents, and those who were working as an educator, researcher and/or as a policy consultant/analyst at the time of the survey. The STROBE guidelines for cross-sectional research were followed in the design/reporting of this study (von Elm et al., 2008) (See Supporting Information File S1). Details on the full survey methodology are available elsewhere (MacLeod et al., 2017). See Table 1 for sample characteristics for the present analysis.

3.2 | Determining variables to include in the multivariate model

Due to the limited literature supporting the complexity of our model, bivariate analyses (e.g., Pearson's correlation, t tests) were conducted to examine the relationship between each of 46 potential variables (within our conceptual categories) and competence and/or confidence. A total of 41 variables met our cut-off criteria (significance level $p \leq 0.05$) following bivariate analyses. We examined the covariance correlation matrix of each pair of the 41 potential exogenous variables, and from each pair that was correlated at ≥ 0.40 , we removed the variable with the smaller variance (cut-off of ≤ 0.10) to reduce redundancy. Following this process, a total of 20 variables were retained in the multivariate model, with the measurement of each being described below. A priori power analysis indicated that for a structural equation modelling with 20 observed variables (including eight latent variables), a minimum sample size of 1,889 would be required to detect a significant effect (with small effect size of 0.1) with a power of 0.80 and an alpha of 0.05 (Cohen, 1988; Soper, 2018; Westland, 2010).

3.3 | Instruments/measures

In relation to our conceptual model, measures of education/experience included four variables: the total number of rural communities worked in for 3 months or longer (1–3, 4–6, 7–9 and ≥ 10 communities), highest level of nursing education attained (bachelor's degree vs. other), duration of time with primary employer and years since first registered to practice in Canada. Thirteen measures in the category of rural work environment were examined in this analysis: job resources (24 items on a five-point Likert scale) (Penz et al., 2018), job demands (22 items on a five-point Likert scale) (Penz et al., 2018), total number of disciplines represented in their professional support network (e.g., LPNs, RNs, RPNs, NPs, physicians), interprofessional collaboration (able to share and exchange ideas in a team discussion on a seven-point Likert scale from *not at all* to *a very great extent*) (King, Shaw, Orchard, & Miller, 2010) and frequency of use of online/electronic information sources to make decisions in practice (six-point Likert scale

TABLE 2 Covariance and correlation matrix^a (n = 2,065)

	Work confidence	Work competence	Work engagement	Burnout	Perceived stress	Number of rural communities worked	Duration of time with primary employer	Education (bachelor's degree in nursing)	Years since first registered	Professional support network	Distance to advanced referral centre
Work confidence	0.268	0.765	0.198	-0.180	-0.145	0.098	0.213	-0.076	0.246	0.072	-0.031
Work competence	0.203	0.262	0.172	-0.142	-0.138	0.077	0.173	-0.073	0.212	0.101	-0.051
Work engagement	0.952	0.818	86.651	-0.414	-0.318	0.107	0.013	-0.018	0.071	0.071	0.020
Burnout	-0.118	-0.092	-4.869	1.593	0.426	-0.058	-0.034	0.040	-0.224	-0.016	0.011
Perceived stress	-0.217	-0.205	-8.578	1.561	8.416	-0.025	-0.007	0.012	-0.098	-0.007	0.002
Number of rural communities worked	0.034	0.026	0.664	-0.048	-0.050	0.451	-0.031	-0.016	0.142	-0.048	0.167
Duration of time with primary employer	0.201	0.161	0.215	-0.078	-0.039	-0.038	3.322	-0.274	0.558	0.051	-0.181
Education (bachelor's degree in nursing)	-0.020	-0.019	-0.085	0.025	0.017	-0.005	-0.249	0.248	-0.414	-0.090	0.115
Years since first registered	1.676	1.424	8.695	-3.692	-3.709	1.246	13.324	-2.704	171.84	0.064	-0.118
Professional support network	0.056	0.078	0.996	-0.030	-0.031	-0.050	0.143	-0.069	1.292	2.377	0.008
Distance to advanced referral centre	-0.022	-0.036	0.252	0.019	0.007	0.151	-0.448	0.078	-2.091	0.017	1.841
Job resources	0.867	0.807	40.686	-6.679	-10.093	-0.347	1.001	-0.020	24.022	1.035	-1.285
Job demands	-1.139	-0.990	-28.105	5.151	8.817	0.780	-2.194	-0.068	-18.745	-0.835	1.676
Online sources for decision-making	0.167	0.204	13.507	-0.157	-0.156	0.686	-2.467	0.361	-12.921	0.792	1.995
Leadership activities	0.113	0.121	0.305	0.201	0.281	0.062	0.311	-0.008	-0.108	0.353	0.025
Shift length (12 hr)	-0.015	-0.010	-0.945	0.084	0.084	-0.033	-0.065	0.003	-1.016	0.061	0.007
Scope of practice (below/within)	0.005	0.008	-0.165	-0.023	-0.014	-0.014	0.073	-0.009	0.552	-0.007	-0.072
Interprofessional collaboration	0.134	0.113	3.437	-0.209	-0.506	-0.011	0.138	0.020	-0.107	0.313	-0.070
On-call	0.014	0.012	0.408	0.000	-0.001	0.054	-0.034	-0.006	0.279	0.008	0.133
Experienced emotional abuse	-0.012	-0.010	-0.446	0.134	0.205	0.003	-0.045	-0.006	-0.469	0.081	0.022
Psychological sense of community	0.438	0.330	13.266	-0.931	-1.381	-0.308	2.278	-0.083	8.588	0.498	-0.514
Work community satisfaction	0.058	0.038	2.459	-0.272	-0.398	-0.012	0.134	0.004	1.019	0.036	-0.069

(Continues)

TABLE 2 (Continued)

	Job resources	Job demands	Online sources for decision-making	Leadership activities	Shift length (12 hr)	Scope of practice (below/within)	Interprofessional collaboration	On-call abuse	Experienced emotional abuse	Psychological sense of community	Work community satisfaction
Work confidence	0.132	-0.221	0.045	0.137	-0.059	0.034	0.194	0.059	-0.050	0.143	0.152
Work competence	0.124	-0.195	0.056	0.148	-0.040	0.052	0.167	0.051	-0.043	0.109	0.101
Work engagement	0.346	-0.314	0.205	0.021	-0.209	-0.058	0.279	0.092	-0.102	0.242	0.359
Burnout	-0.419	0.415	-0.018	0.100	0.137	-0.059	-0.125	0.000	0.226	-0.124	-0.293
Perceived stress	-0.275	0.307	-0.008	0.061	0.060	-0.016	-0.132	-0.001	0.150	-0.080	-0.186
Number of rural communities worked	-0.041	0.108	0.146	0.057	-0.103	-0.065	-0.012	0.170	0.010	-0.079	-0.025
Duration of time with primary employer	0.043	-0.123	-0.191	0.106	-0.074	0.125	0.057	-0.039	-0.052	0.211	0.099
Education (bachelor's degree in nursing)	-0.003	-0.014	0.102	-0.010	0.013	-0.054	0.030	-0.026	-0.026	-0.028	0.011
Years since first registered	0.145	-0.146	-0.139	-0.005	-0.160	0.131	-0.006	0.045	-0.077	0.110	0.105
Professional support network	0.055	-0.056	0.074	0.145	0.083	-0.014	0.158	0.011	0.112	0.055	0.033
Distance to advanced referral centre	-0.075	0.127	0.207	0.012	0.011	-0.166	-0.039	0.208	0.034	-0.064	-0.069
Job resources	161.300	-0.657	0.072	-0.077	-0.203	0.087	0.356	-0.030	-0.297	0.217	0.426
Job demands	-82.494	98.028	0.057	0.046	0.170	-0.127	-0.340	0.152	0.281	-0.302	-0.408
Online sources for decision-making	6.475	3.960	50.563	0.129	-0.048	-0.118	0.135	0.134	0.064	0.038	0.024
Leadership activities	-1.554	0.728	1.456	2.604	0.119	0.063	0.167	0.066	0.121	0.071	0.009
Shift length (12 hr)	-1.247	0.795	-0.166	0.092	0.235	0.009	-0.102	-0.157	0.130	-0.075	-0.139
Scope of practice (below/within)	0.330	-0.398	-0.258	0.033	0.001	0.104	-0.017	-0.189	-0.004	0.067	0.030
Interprofessional collaboration	5.886	-4.532	1.252	0.350	-0.065	-0.007	1.746	0.024	-0.077	0.167	0.270
Experienced emotional abuse	-0.180	0.726	0.453	0.050	-0.036	-0.027	0.015	0.225	0.051	-0.042	0.014
Psychological sense of community	-1.783	1.305	0.212	0.091	0.030	-0.001	-0.047	0.011	0.219	-0.069	-0.140
Work community satisfaction	16.130	-17.762	1.620	0.681	-0.212	0.127	1.302	-0.118	-0.191	35.331	0.427
Work community satisfaction	4.002	-2.998	0.126	0.011	-0.050	0.007	0.264	0.005	-0.049	1.877	0.550

^aCovariance is in lower left half of matrix; variance is on diagonal of matrix; correlation is in upper right half of matrix.

from *never* to *daily*). Rural work environment variables also consisted of most often work day shift (yes or no), level of development of competence in rural nursing practice (*novice, developing, accomplished or expert*), the total number of leadership activities in which they were involved, shift length worked most often (≤ 8 hr

vs. 12 hr), perceived scope of practice (below/within scope vs. beyond scope), required to be on-call (yes or no), had experienced emotional abuse (yes or no) or had experienced physical assault (yes or no) at work within the past 4 weeks. Three variables related to our category of perceptions of the work community were

TABLE 3 Maximum likelihood estimates and standardised estimates for the effects

Effect		Maximum likelihood estimate	Standardised estimate	R ² or blocked-error R ^{2a}
To	From			
Work engagement	Perceived stress	-0.598**	-0.186**	0.40
	Burnout	-1.467**	-0.210**	
	Number of rural communities worked in	1.072**	0.083**	
	Duration of time with employer	0.025	0.005	
	Education (bachelor's degree nursing)	-0.844**	-0.048**	
	Years since first registered	-0.042**	-0.062**	
	Professional support network	0.192	0.033	
	Distance to advanced referral centre	-0.083	-0.013	
	Job resources	0.058*	0.080*	
	Job demands	-0.009	-0.010	
	Online sources for decision-making	0.202**	0.159**	
	Leadership activities	0.076	0.014	
	Shift length (12 hr)	-2.123**	-0.119**	
	Scope of practice (below/within)	-1.658**	-0.061**	
	Interprofessional collaboration	0.737**	0.112**	
	On-call	0.718*	0.039*	
Experienced emotional abuse	0.534	0.028		
Sense of community	0.171**	0.112**		
Work community satisfaction	1.902**	0.160**		
Burnout	Work engagement	-0.010 (fixed)	-0.070	0.39
	Perceived stress	0.138**	0.300**	
	Number of rural communities worked	-0.065**	-0.035**	
	Duration of time with employer	0.069**	0.099**	
	Education (bachelor's degree nursing)	-0.035	-0.014	
	Years since first registered	-0.019**	-0.196**	
	Professional support network	-0.005	-0.006	
	Distance to advanced referral centre	-0.021	-0.023	
	Job resources	-0.015**	-0.145**	
	Job demands	0.024**	0.179**	
	Online sources for decision-making	-0.003	-0.015	
	Leadership activities	0.030*	0.039*	
	Shift length (12 hr)	-0.007	-0.003	
	Scope of practice (below/within)	-0.075	-0.019	
	Interprofessional collaboration	0.063**	0.067**	
	On-call	-0.025	-0.010	
Experienced emotional abuse	0.163**	0.060**		
Sense of community	0.008	0.035		
Work community satisfaction	-0.146**	-0.086**		

(Continues)

TABLE 3 (Continued)

Effect		Maximum likelihood estimate	Standardised estimate	R ² or blocked-error R ^{2a}
To	From			
Work confidence	Work engagement	0.002	0.032	0.53
	Burnout	-0.016**	-0.040**	
	Work competence	0.655**	0.648**	
	Number of rural communities worked	0.029**	0.037**	
	Duration of time with employer	0.016**	0.055**	
	Education (bachelor's degree nursing)	0.011	0.011	
	Years since first registered	0.003**	0.072**	
	Professional support network	-0.007	-0.020	
	Distance to advanced referral centre	0.006	0.015	
	Job resources	-0.004**	-0.099**	
	Job demands	-0.006**	-0.110**	
	Online sources for decision-making	0.001	0.013	
	Leadership activities	0.008	0.024	
	Shift length (12 hr)	0.012	0.011	
	Scope of practice (below/within)	-0.024	-0.015	
	Interprofessional collaboration	0.022**	0.056**	
	On-call	0.023	0.022	
	Experienced emotional abuse	0.006	0.005	
	Sense of community	0.001	0.010	
Work community satisfaction	0.024*	0.034*		
Work competence	Perceived stress	-0.009**	-0.051**	0.17
	Work engagement	0.004**	0.065**	
	Work confidence	0.230 (fixed)	0.233	
	Number of rural communities worked	0.029*	0.038*	
	Duration of time with employer	0.011	0.037	
	Education (bachelor's degree nursing)	0.010	0.009	
	Years since first registered	0.005**	0.119**	
	Professional support network	0.016**	0.046**	
	Distance to advanced referral centre	-0.015*	-0.039*	
	Job resources	-0.003**	-0.081**	
	Job demands	-0.009**	-0.164**	
	Online sources for decision-making	0.004**	0.053**	
	Leadership activities	0.029**	0.091**	
	Shift length (12 hr)	0.026	0.025	
	Scope of practice (below/within)	0.028	0.018	
	Interprofessional collaboration	0.018**	0.047**	
	On-call	0.050**	0.047**	
	Experienced emotional abuse	-0.009	-0.008	
	Sense of community	0.000	0.001	
Work community satisfaction	-0.027	-0.039		

(Continues)

TABLE 3 (Continued)

Effect		Maximum likelihood estimate	Standardised estimate	R ² or blocked-error R ^{2a}
To	From			
Perceived stress	Number of rural communities worked	-0.179*	-0.044*	0.15
	Duration of time with employer	0.106**	0.070**	
	Education (bachelor's degree nursing)	0.040	0.007	
	Years since first registered	-0.019**	-0.091**	
	Professional support network	0.017	0.009	
	Distance to advanced referral centre	-0.051	-0.025	
	Job resources	-0.012	-0.052	
	Job demands	0.086**	0.299**	
	Online sources for decision-making	-0.006	-0.014	
	Leadership activities	0.074	0.043	
	Shift length (12 hr)	-0.225	-0.040	
	Scope of practice (below/within)	0.113	0.013	
	Interprofessional collaboration	-0.032	-0.016	
	On-call	-0.206	-0.036	
	Experienced emotional abuse	0.299*	0.051*	
	Sense of community	0.018	0.037	
Work community satisfaction	-0.221*	-0.060*		

Notes. The covariances among the exogenous variables are not presented since they are approximated by the corresponding data covariances. The significance of the standardised effects is simply a repeat of the significance of the corresponding unstandardised effects (maximum likelihood estimates).

Goodness of fit statistics: Maximum likelihood ratio $\chi^2 = 0.0822$ (p value = 0.9597) with two degrees of freedom. SRMR = 0.000325, CFI = 1.0, RMSEA = 0.0.

^aThe blocked-error R² is explained by Hayduk, Olson, Quan, Cree, and Cui (2010). *Coefficient exceeds 1.7 times its standard error from zero (significant at $p \leq 0.10$). **Coefficient exceeds twice its standard error from zero (significant at $p \leq 0.05$).

measured by: the total distance of the work community from an advanced referral centre (from 0–99– $\geq 1,000$ km), psychological sense of community (nine items on a five-point Likert scale from *strongly disagree* to *strongly agree*) (Buckner, 1988) and satisfaction with the work community (single item measured on a five-point Likert scale from *strongly disagree* to *strongly agree*).

Measures of the endogenous variables of perceived stress, work engagement and burnout related to personal/professional well-being that were included in our conceptual model were the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), Utrecht Work Engagement Scale—short form (Schaufeli, Bakker, & Salanova, 2006), and a single item measuring how often participants felt burnout out from their work (seven-point Likert scale from *never* to *always*). The endogenous variables of work confidence and work competence were both measured on four-point Likert scales: I would describe my level of confidence/competence as: *extremely low*, *somewhat low*, *somewhat high* and *extremely high*.

3.4 | Structural equation modelling analyses

Structural equation modelling (SEM) (Hayduk, 1987) was used to evaluate our hypothesised model in LISREL 9.20 (Joreskog &

Sorbom, 2014). Structural equation modelling involves the exploration of “specific theory-based causal connections between latent variables and between those latents and relevant indicator variables” (Hayduk, Cummings, Boadu, Fazderka-Robinson, & Boulianne, 2007, p. 843), in which appropriately specified models should lead to nonsignificant differences between the model-implied and data covariance matrices (Hayduk, 1987). Fixed effects were set for the reciprocal relationships between two pairs of endogenous variables (Hayduk, 1987), confidence and competence, and work engagement and burnout based on the literature and conceptual understanding of the research team. We speculated that a weaker effect existed from confidence to competence, than from competence to confidence, and a weaker effect was thought to exist from work engagement to burnout. Each indicator/variable was also assigned an error variance ranging from 1% (e.g., binary/single indicators)–15% (e.g., scales), which is reflective of the model theory and the psychometric properties of measures functioning as an adjustment for measurement error (Hayduk, 1987). For each indicator within the model, the setting of the error variance depends on how closely each is tied to the conceptual model, the theoretical understanding of the causal world and how well survey items measure each latent concept (Hayduk, 1987). Through an iterative process, we

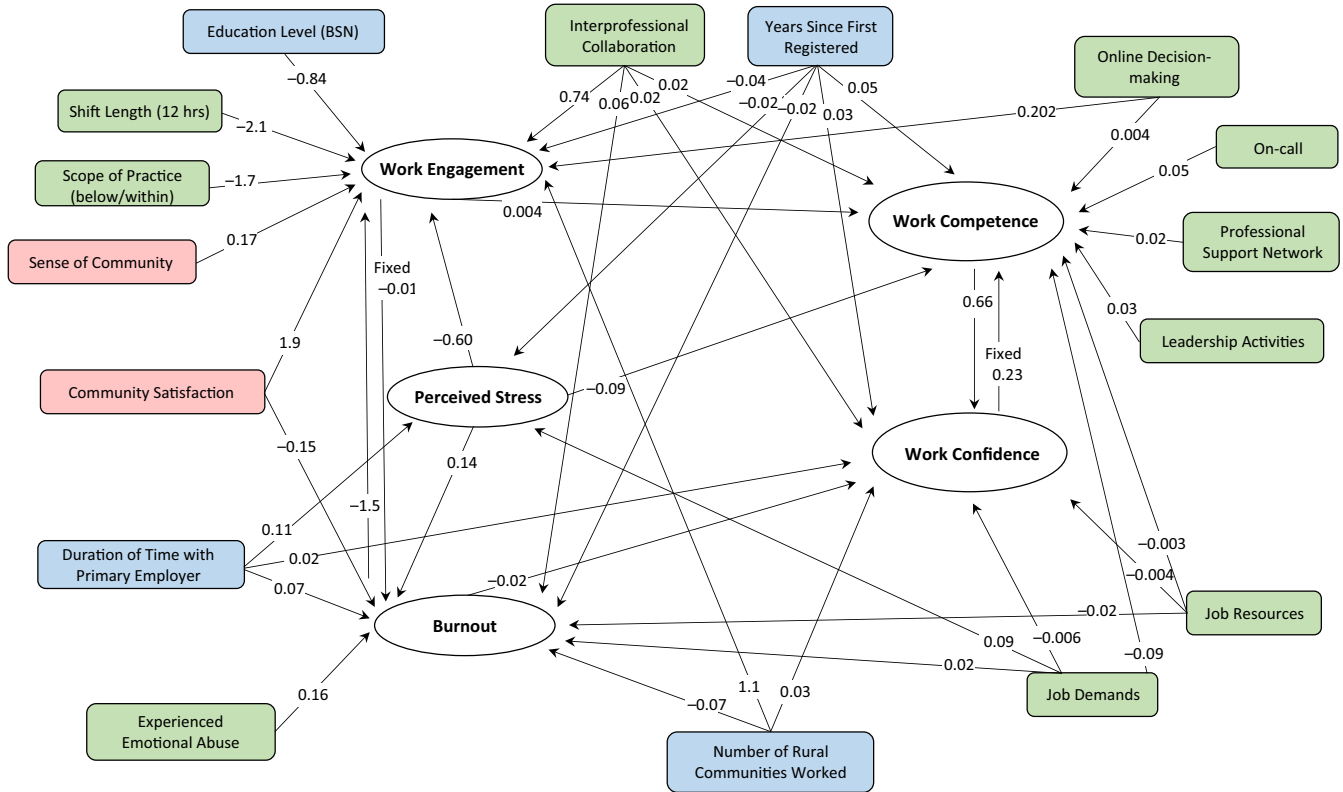


FIGURE 2 Significant direct effects within the final model ($p \leq 0.05$)

estimated the error variance for each of the 20 exogenous indicators and the five endogenous indicators through examination of their clarity within the survey, potential for misinterpretation, proximity to other concepts measured in the same area of the survey (potential for response bias), standardised versus newly developed items, and single-indicator versus indicators using summated scores of multiple items. In terms of handling of missing data, pairwise N calculation was used in LISREL. Specifically, the number of observations should be the average number of cases used in calculating all the covariances. Using this method, we had a total number of 2,964 missing data points across all analysis variables (3%), with an average of 1936/2065 cases contributing to each covariance calculation. Model fit was evaluated using the maximum likelihood ratio chi-square statistic and relevant fit indices. The model is determined to be a potential representation of the causal world if the differences between the implied-model covariance matrix and observed data covariance matrix are small and chi-square is nonsignificant ($p > 0.05$) (Hayduk, 1987). Following initial run of the model, three variables contributed weakly and were removed, being deemed constructs that may not be relevant to all respondents (i.e., type of shift [days]) or overlapped with other variables (i.e., experienced physical assault; level of competence [novice to expert]). Following this greater specification, the final analysis included 17 exogenous variables and five endogenous variables. See Table 2 for the covariances and correlations for the variables within the final model.

4 | RESULTS

The maximum likelihood ratio $\chi^2 = 0.0822$, $df = 2$, $p = 0.959$, SRMR = 0.000325, CFI = 1.0, RMSEA = 0.0 indicated a fitting model, with the final model estimates explaining 53% of the variance in rural nursing work confidence and 17% of the variance in rural nursing work competence. Table 3 outlines the maximum likelihood estimates, standardised estimates and R^2 for the effects for all 17 exogenous and five endogenous variables within the model. To simplify the relationships within the model, only the significant direct effects ($p \leq 0.05$) are portrayed in Figure 2. Work confidence was positively and directly influenced by three education/experience variables, namely greater number of rural communities worked for three months or longer, longer duration of time with the primary employer and higher number of years since first being registered. For the variables related to the rural work environment, confidence was positively influenced by having more opportunities for interprofessional collaboration and negatively influenced by higher job demands. In addition to the expected direct positive effect from competence to confidence, there was also a direct negative effect from burnout to confidence and no significant effects from either work engagement or perceived stress to confidence.

For work competence, two education/experience variables with direct effects were years since first registered (significant at $p \leq 0.05$) and number of rural communities worked for 3 months or longer (significant at $p \leq 0.10$). Rural work environment variables that influenced competence included more frequent use of online/

electronic information sources for decision-making, being required to be on-call for work, greater number of disciplines represented in their professional support network and increased number of leadership activities. Having more opportunities for interprofessional collaboration and lower job demands and resources were additional rural work environment variables directly influencing work competence. To a lesser degree, the community variable of a greater distance away from an advanced referral centre had a direct negative influence on competence (significant at $p \leq 0.10$), with both work engagement (positive effect) and perceived stress (negative effect) directly influencing work competence.

Notably, the model also explained 40% of the variance in work engagement, 39% of the variance in burnout and 15% of the variance in perceived stress. As expected, there was a direct negative effect from both burnout and perceived stress to work engagement. Work engagement in particular was also positively influenced by higher community satisfaction, increased interprofessional collaboration, more frequent use of online decision-making and greater number of communities worked in for 3 months or longer. Interestingly, work engagement was also positively influenced by a greater psychological sense of community, working ≤ 8 -hr shifts, working above the perceived scope of practice, with a negative effect of having a bachelor's degree in nursing (vs. a diploma or master's/doctoral degree in nursing), with the above four variables not having a direct effect on any of the other variables within the model. Direct negative effects to burnout (i.e., lower burnout) were noted from work community satisfaction, job resources, greater number of rural communities worked for 3 months or longer, and more years since first being registered. Higher levels of burnout were directly influenced by increased job demands, higher perceived stress, longer duration of time with current primary employer, experienced emotional abuse and more opportunities for interprofessional collaboration. Significant direct effects to increased perceived stress included a longer duration of time with the current employer, fewer years since first registered and higher job demands. In addition to the direct negative effect from perceived stress to competence and work engagement, perceived stress also had a direct positive effect on burnout.

5 | DISCUSSION

The results suggest that the development of competence and confidence in rural nursing practice is highly complex and influenced by nurses' level of experience in, and exposure to practice in rural setting, the characteristics of their work environment, community factors and indicators of their professional well-being (i.e., work engagement, perceived stress, burnout). It is also important to note that the findings of this analysis are stronger for rural nurse confidence, which may be partially explained by the challenges of measuring a multidimensional concept (i.e., work competence) which includes behavioural elements not captured by self-report data. Education level did not directly influence confidence or competence, which although suggested as part of our conceptual model, we acknowledge may be

less important in the context of rural versus urban nursing practice where older, more competent nurses often have lower nursing qualifications (Hodge et al., 2017). A particularly important contribution of this study is a better understanding of the role of work engagement, perceived stress and burnout as acting directly and/or as potential intervening variables linking experience/exposure, rural work environment and community variables to rural nursing confidence and competence. The effect noted from work engagement and perceived stress to competence, but not to confidence, and the direct effect from burnout to confidence, but not to competence in our model, also support the complexity of rural nursing work life and the importance of allowing for reciprocal effects within multivariate models.

Consistent with previous research (Bennet, Jones, Brown, & Barlow, 2013; MacLeod & Place, 2015; Murray, Havener, Davis, Jastremski, & Twichell, 2011), our model supports the conclusions that increased exposure to a diversity of rural practice experiences and developing expertise over time are important factors in both confidence and competence in rural nursing practice. As noted in our results, those nurses who had the greatest number of years since first being registered (e.g., older nurses) experienced lower levels of work engagement, lower perceived stress, lower burnout, higher competence and higher confidence. However, the longer duration of time that an RN or NP had been working with the same employer, the higher their level of burnout and perceived stress, indicating that as nurses gain more experience over time, maintaining a sense of confidence and competence is not necessarily assured when they are practising in highly stressful or unsupportive environments. Although nurses who had been registered for fewer years (e.g., younger nurses) had higher levels of work engagement, it is important to note that they were also at a greater risk for burnout and perceived stress, with this risk decreasing as the total number of communities worked in for 3 months or longer increased.

Working below/within (vs. beyond) their perceived scope of practice and working 12-hr shifts negatively influenced nurses' work engagement. The latter finding is consistent with research involving RNs in 2,170 general medical/surgical units in 12 European countries, which emphasised that nurses who work shifts equal to or >12 hr were more likely to experience burnout and job dissatisfaction (Dall'Ora, Griffiths, Ball, Simon, & Aiken, 2015). Shift length did not have a direct influence on any other variable in our model, which is consistent with a systematic review, suggesting that there is insufficient evidence to determine the overall effects of shift length (12-hr vs. 8-hr) on healthcare provider outcomes (Estabrooks et al., 2009). More attention should be given to rural nurses who stay and practise in the same community over time, who may be expected to be on-call, and who have potentially inadequate amounts of rest when working longer shifts. They may have fewer opportunities to take time off to participate in continuing education or broaden their rural nursing knowledge/experience, and may be more likely to contend with blurred personal and professional boundaries. This is especially important considering the direct influence of increased community satisfaction and psychological sense of community on

work engagement, and increased community satisfaction on decreased levels of burnout that were noted in our model. It is crucial to explore how rural nurses can be better supported to engage in positive ways in their work communities, which may also alleviate some of the chronic turnover in these settings. Increased opportunities for professional development that are relevant and accessible are also necessary to maintain their confidence and level of work engagement, prevent burnout and indirectly improve their overall competence in rural practice.

A number of rural work environment characteristics affected competence and confidence, including aspects related to both teamwork and independent information-seeking behaviours. Interprofessional collaboration directly and positively impacted both competence and confidence, with increased access to a professional support network of colleagues and increased involvement in leadership activities also having a direct positive influence on competence. Using online/electronic information sources more often (e.g., daily, at least once a week) to make decisions in practice also directly influenced both work engagement and competence. Although the importance of rural evidence-based practice has been well founded, one of the main concerns inherent in many rural work environments is the scarcity of research initiatives and lack of information resource accessibility (Hodge et al., 2017; Mills et al., 2011). There is room for improvement in ensuring that younger or less experienced nurses are not put into leadership positions too early, are offered adequate mentorship and are supported in accessing quality information sources.

Although work engagement directly influenced rural nursing competence in a positive way, we must also attend to the potential stronger and negative impact of perceived stress, job demands and burnout on both competence and confidence. Interprofessional collaboration, increased job demands (e.g., unsafe or mentally/physically challenging working conditions, isolation), decreased job resources (e.g., collegial support, staffing, autonomy and control), experience of emotional abuse at work and increased perceived stress all directly increased burnout, which may have a negative indirect effect on confidence. Work competence was also directly influenced negatively by higher perceived stress and increased job demands. To determine the specific improvements that need to be made within rural work environments to foster competence and confidence, further research is necessary to identify the particular demands and resources that have the greatest impact on rural nurses' perceived stress and burnout, even in the presence of higher levels of work engagement.

Our study provides evidence that the greater the distance of the work community to an advanced referral centre, the lower the nurses' perceptions of their level of work competence. In previous research on predictors of intent to leave a nursing (RN) position in rural and remote Canada (Stewart et al., 2011), three of eleven significant predictors were working in a remote setting, performing advanced decisions in practice and being required to be on-call. Remote practitioners have described themselves as working on the edge of their competence, with the potential for differences between some practitioners who equate experience with education,

while others may feel inferior to those with more formal training (O'Neill, Koehn, George, & Shepard, 2016). This finding highlights the importance of attending to nurses' perceptions of their level of competence rather than assuming their competence based on the potential degree of independence in their practice. Although nurses' own assessment of their level of competence may be viewed as subjective, data on nurses' perceived competence may assist nurse managers to better understand and support them, while attending to the various contextual challenges within the work setting (Meretoja & Leine-Kilpi, 2003). The remaining community variables of work community satisfaction and psychological sense of community did not have a direct effect on either confidence or competence; however, indirect pathways may be important to consider in future research. Burnout may act as an intervening variable between community satisfaction and confidence, with work engagement similarly acting as a potential intervening variable between both sense of community and community satisfaction, and competence in rural practice. Rural nurses manage a complex web of community relationships and interactions through their multiple roles as community members, formal care providers and healthcare consumers (Mills et al., 2007), with lifestyle preferences being significantly linked to perceptions of preparedness for rural practice (Molinari, Jaiswal, & Hollinger-Forrest, 2011). These are important findings, as no previous studies have explored the potential impact of community characteristics on rural nurses' confidence or competence, and further support our finding that aspects of professional well-being (i.e., work engagement, perceived stress, burnout) are important considerations in rural nurses' confidence and competence.

5.1 | Limitations

We acknowledge that this study is not without limitations. First, although structural equation modelling attempts to create a theoretical understanding of the causal world (Hayduk, 1987), our data are cross-sectional; therefore, true causality cannot be assured within this model. Although our sampling frame and response rate were favourable for reporting on a representative sample of nurses across rural and remote practice settings, we also acknowledge the potential for nonresponse bias, which is the case with any cross-sectional survey research. We also acknowledge that due to limits on the overall length of the survey questionnaire, we used a single-item indicator of burnout, rather than a burnout scale with established psychometric properties. Finally, we measured rural nurses' "perceived" level of confidence and competence, and acknowledge that rural nursing competence has a behavioural component in clinical practice situations that may not have been adequately captured using self-report data.

6 | CONCLUSIONS

With the urban focus of many baccalaureate nursing education programmes, nurses may not be prepared to contend with the contextual

challenges of practicing in rural settings (e.g., expanded knowledge base, isolation, travel distance). Supporting rural and remote nurses in their development of confidence and competence is crucial to the quality of care that is provided to rural peoples. This is the first study of its kind to explore the relationships between unique characteristics of rural nursing practice and confidence and competence. A strength of this study is our use of structural equation modelling, which allowed for complex testing of related variables while accounting for measurement error. The results support the complexity of nurses' self-assessment of their work competence and confidence, which is influenced directly and/or indirectly by the level of exposure to rural nursing, experience over time, specific characteristics of the work environment, community factors and indicators of professional well-being. Although there is more compelling evidence in this analysis regarding rural work confidence, the findings suggest that there is a need to explore the potential role of work engagement, perceived stress and burnout acting directly and as possible intervening variables linking experience/exposure, rural work environment and community variables to rural nursing confidence and competence.

7 | RELEVANCE TO CLINICAL PRACTICE

This study identifies contextual factors that influence rural and remote nurses' perceived competence and confidence. In relation to improving their preparedness for rural clinical practice, more exposure to rural nursing should be offered within nursing education programmes. Newer graduates or nurses new to rural practice, despite their higher levels of work engagement observed within this study, were at greater risk of experiencing higher perceived stress and burnout and would benefit from greater mentorship. More attention should also be focused on reducing professional isolation and improving decision-making support for those who are working at a greater distance from and are most isolated from their colleagues (e.g., working alone), and those with fewer opportunities for ongoing interprofessional collaboration. It is also important that rural nurses' satisfaction with their work community or their psychological sense of being engaged as active community members are acknowledged in rural-focused research. The effects between community variables and rural nurses' professional well-being (i.e., work engagement and burnout) noted in this study highlight the multiple roles that rural and remote nurses fulfil as practitioners and community members, and the need to better support them in establishing healthy personal/professional boundaries. Finally, the evidence presented in this study can inform the development and implementation of rural-specific professional development programmes, which may contribute to improving rural nurses' intent to stay in those settings.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the author(s).

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REFERENCES

- Beatty, R. M. (2001). Continuing professional education, organizational support, and professional competence: Dilemmas of rural nurses. *Journal of Continuing Education in Nursing*, 32(5), 203–209. <https://doi.org/10.3928/0022-0124-20010901-05>
- Benner, P. (1984). *From novice to expert: Excellence and power in clinical nursing practice*. Menlo Park, CA: Addison-Wesley.
- Bennett, P., Jones, D., Brown, J., & Barlow, V. (2013). Supporting rural/remote primary health care placement experiences increases undergraduate nurse confidence. *Nursing Education Today*, 33(2), 166–172. <https://doi.org/10.1016/j.nedt.2012.02.015>
- Birks, M., Davis, J., Smithson, J., & Cant, R. (2016). Registered nurse scope of practice in Australia: An integrative review of the literature. *Contemporary Nurse*, 52(5), 522–543. <https://doi.org/10.1080/10376178.2016.1238773>
- Bogaert, P. V., Peremans, L., Heusden, D. V., Verspuy, M., Kureckova, V., Van de Cruys, Z., & Franck, E. (2017). Predictors of burnout, work engagement and nurse reported job outcomes and quality of care: A mixed method study. *BMC Nursing*, 16(5), 1–14. <https://doi.org/10.1186/s12912-016-0200-4>
- Bradshaw, A., & Merriman, C. (2008). Nursing competence 10 years on: Fit for practice and purpose yet? *Journal of Clinical Nursing*, 17(10), 1263–1269.
- Bratt, M. M., Baernholdt, M., & Pruszyński, J. (2014). Are rural and urban newly licensed nurses different? A longitudinal study of a nurse residency programme. *Journal of Nursing Management*, 22, 779–791. <https://doi.org/10.1111/j.1365-2834.2012.01483.x>
- Buckner, J. C. (1988). The development of an instrument to measure neighborhood cohesion. *American Journal of Community Psychology*, 16, 771–791. <https://doi.org/10.1007/BF00930892>
- Bushy, A., & Winters, C. A. (2013). Nursing workforce development, clinical practice, research, and nursing theory: Connecting the dots. In A. Winters (Ed.), *Rural nursing: Concepts, theory, and practice* (pp. 449–469). New York, NY: Springer Publishing Company.
- Canadian Institute for Health Information (CIHI) (2017). *Regulated nurses, 2016: Canada and jurisdictional highlights*. Ottawa, ON: CIHI.
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385–396. <https://doi.org/10.2307/2136404>
- Crooks, K. (2012). Is rural nursing a specialty? *Online Journal Rural Nursing and Health Care*, 4(1), 3–4.

- Dall'Ora, C., Griffiths, P., Ball, J., Simon, M., & Aiken, L. H. (2015). Association of 12 h shifts and nurses' job satisfaction, burnout and intention to leave: Findings from a cross-sectional study of 12 European countries. *British Medical Journal Open*, 2015(5), e008331. <https://doi.org/10.1136/bmjopen-2015-008331>
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: Wiley.
- Estabrooks, C. A., Cummings, G. G., Olivo, S. A., Squires, J. E., Giblin, C., & Simpson, N. (2009). Effects of shift length on quality of patient care and health provider outcomes: A systematic review. *BMJ Quality & Safety in Health Care*, 18(3), 181-188.
- Garside, J., & Nhemachena, J. Z. Z. (2013). A concept analysis of competence and its transition in nursing. *Nurse Education Today*, 33(5), 541-545. <https://doi.org/10.1016/j.nedt.2011.12.007>
- Hanvey, L. (2005). *Rural nursing practice in Canada: A discussion paper*. Ottawa, ON: Canadian Nurses Association.
- Harmon, L. M. (2013). Rural model dedicated education unit: Partnership between college and hospital. *Journal of Continuing Education in Nursing*, 44(2), 89-96. <https://doi.org/10.3928/00220124-20121217-62>
- Havens, D. S., Warshawsky, N. E., & Vasey, J. (2013). RN work engagement in generational cohorts: The view from rural US hospitals. *Journal of Nursing Management*, 21, 927-940. <https://doi.org/10.1111/jonm.12171>
- Hayduk, L. A. (1987). *Structural equation modeling with LISREL*. Baltimore, MD: Johns Hopkins University Press.
- Hayduk, L., Cummings, G., Boadu, K., Fazderka-Robinson, H., & Boulianne, S. (2007). Testing! testing! one, two three - Testing the theory in structural equation models. *Personality and Individual Differences*, 42, 841-850. <https://doi.org/10.1016/j.paid.2006.10.001>
- Hayduk, L. A., Olson, K., Quan, H., Cree, M., & Cui, Y. (2010). Temporal changes in the causal foundations of palliative care symptoms. *Quality of Life Research*, 19(3), 299-306. <https://doi.org/10.1007/s11136-010-9603-y>
- Hodge, A. J., Miller, E. L., & Skaggs, M. K. D. (2017). Nursing self-perceptions of emergency preparedness at a rural hospital. *Journal of Emergency Nursing*, 43(1), 10-14. <https://doi.org/10.1016/j.jen.2015.07.012>
- Hunt, S., & Hunt, E. (2016). Barriers to practice of rural and remote nursing in Canada. *European Scientific Journal*, 12(36), 7857-7881. <https://doi.org/10.19044/esj.2016.v12n36p56>
- Joreskog, K. G., & Sorbom, D. (2014). *LISREL 9.20*. Chicago, IL: Scientific Software International.
- Jukkala, A. M., Henly, S. J., & Lindeke, L. L. (2008). Rural perceptions of continuing professional education. *Journal of Continuing Education in Nursing*, 39(12), 555-563. <https://doi.org/10.3928/00220124-20081201-08>
- King, G., Shaw, L., Orchard, C., & Miller, S. (2010). The interprofessional socialization and valuing scale: A tool for evaluating the shift toward collaborative care approaches in health care settings. *Work*, 2010, 77-85. <https://doi.org/10.3233/WOR-2010-0959>
- Kulig, J., & Williams, A. (2012). *Health in rural Canada*. Vancouver, BC: UBC Press.
- Lea, J., & Cruickshank, M. T. (2015). Supporting new graduate nurses making the transition to rural nursing practice: Views from experienced rural nurses. *Journal of Clinical Nursing*, 24(19-20), 2826-2834. <https://doi.org/10.1111/jocn.12890>
- MacLeod, M. L., Kulig, J. C., Stewart, N. J., Pitblado, J. R., & Knock, M. (2004). The nature of nursing practice in rural and remote Canada. *Canadian Nurse*, 100(6), 27-31.
- MacLeod, M. L. P., Lindsey, E., Ulrich, C. H., Fulton, T., & John, N. (2008). The development of a practice-driven, reality-based program for rural acute care registered nurses. *Journal of Continuing Education in Nursing*, 39(7), 298-304. <https://doi.org/10.3928/00220124-20080701-03>
- MacLeod, M., & Place, J. (2015). Rural-focused nursing education: A summative evaluation of RNs' experiences of the rural nursing certificate program. *Quality Advancement in Nursing Education*, 1(2), 1-14. <https://doi.org/10.17483/2368-6669.1029>
- MacLeod, M. L. P., Stewart, N. J., Kulig, J. C., Anguish, P., Andrews, M. E., Banner, D., ... Zimmer, L. (2017). Nurses who work in rural and remote communities in Canada: A national survey. *Human Resources for Health*, 15(34), 1-11. <https://doi.org/10.1186/s12960-017-0209-0>
- Meretoja, R., & Leino-Kilpi, H. (2003). Comparison of competence assessments made by nurse managers and practicing nurses. *Journal of Nursing Management*, 11(6), 404-409. <https://doi.org/10.1046/j.1365-2834.2003.00413.x>
- Mills, J., Field, J., & Cant, R. (2011). Rural and remote Australian general practice nurses' sources of evidence for knowledge translation: A cross-sectional survey. *International Journal of Evidence-Based Healthcare*, 9, 246-251.
- Mills, J., Francis, K., & Bonner, A. (2007). Live my work: Rural nurses and their multiple perspectives of self. *Journal of Advanced Nursing*, 59(6), 583-590. <https://doi.org/10.1111/j.1365-2648.2007.04350.x>
- Molinari, D. L., Jaiswal, B. A., & Hollinger-Forrest, T. (2011). Rural nurses: Lifestyle preferences and education perceptions. *Online Journal of Rural Nursing and Health Care*, 11(2), 16-26.
- Morgan, D. G., Kosteniuk, J., O'Connell, M. E., Bello-Haas, V. D., Stewart, N. J., & Karunanayake, C. (2016). Dementia-related work activities of home care nurses and aides: Frequency, perceived competence, and continuing education priorities. *Educational Gerontology*, 42(2), 120-135. <https://doi.org/10.1080/03601277.2015.1083390>
- Murray, M. F., Havener, J. M., Davis, P. S., Jastremski, C., & Twichell, M. (2011). The rural pipeline: Building a strong nursing workforce through academic and service partnerships. *Nursing Clinics of North America*, 46(1), 107-121. <https://doi.org/10.1016/j.cnur.2010.10.010>
- Numminen, O., Leino-Kilpi, H., Isoaho, H., & Meretoja, R. (2015). Newly graduated nurses' competence and individual and organizational factors: A multivariate analysis. *Journal of Nursing Scholarship*, 47(5), 446-457. <https://doi.org/10.1111/jnu.12153>
- Numminen, O., Ruoppa, E., Leino-Kilpi, H., Isoaho, H., Hupli, M., & Meretoja, R. (2016). Practice environment and its association with professional competence and work-related factors: Perception of newly graduated nurses. *Journal of Nursing Management*, 24, E1-E11. <https://doi.org/10.1111/jonm.12280>
- O'Neill, L., Koehn, C., George, S., & Shepard, B. (2016). Mental health provision in northern Canada: Practitioners views on negotiations and opportunities in remote practice. *International Journal of Advancement of Counselling*, 38, 123-143. <https://doi.org/10.1007/s10447-016-9261-z>
- Penz, K. L., D'Arcy, C., Stewart, N. J., Kosteniuk, J. G., Morgan, D., & Smith, B. (2007). Barriers to participation in continuing education activities among rural and remote nurses. *Journal of Continuing Education in Nursing*, 38(2), 67-68, 93. <https://doi.org/10.3928/00220124-20070301-03>
- Penz, K. L., Kosteniuk, J. G., Stewart, N. J., MacLeod, M. L. P., Kulig, J. C., Karunanayake, C. P., & Kilpatrick, K. (2018). Development and psychometric evaluation of the job demands in nursing scale and job resources in nursing scale: Results from a national study. *Nursing Open*, 2018, 1-19. <https://doi.org/10.1002/nop.2.215>
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement*, 66(4), 701-716. <https://doi.org/10.1177/0013164405282471>
- Smith, S. (2012). Nurse competence: A concept analysis. *International Journal of Nursing Knowledge*, 23(3), 172-182. <https://doi.org/10.1111/j.2047-3095.2012.01225.x>

- Soper, D. S. (2018). *A-priori sample size calculator for structural equation models [software]*. Retrieved from <https://www.danielsoper.com/statcalc/>
- Stewart, N. J., D'Arcy, C., Kosteniuk, J., Andrews, M. E., Morgan, D., Forbes, D., ... Pitblado, J. R. (2011). Moving on? Predictors of intent to leave among rural and remote RNs in Canada. *Journal of Rural Health, 27*(1), 103–113. <https://doi.org/10.1111/j.1748-0361.2010.00308.x>
- Ulrich, B., Krozek, C., Early, S., Ashlock, C. H., Africa, L. M., & Carman, M. L. (2010). Improving retention, confidence, and competence of new graduate nurses: Results from a 10-year longitudinal database. *Nursing Economics, 28*(6), 363–376.
- von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2008). The strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. *Journal of Clinical Epidemiology, 61*(4), 244–249. <https://doi.org/10.1016/j.jclinepi.2007.11.008>
- Walker, A., & Campbell, K. (2013). Work readiness of graduate nurses and the impact on job satisfaction, work engagement and intention to remain. *Nursing Education Today, 33*(12), 1490–1495. <https://doi.org/10.1016/j.nedt.2013.05.008>
- Westland, J. C. (2010). Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications, 9*(6), 476–487. <https://doi.org/10.1016/j.eleap.2010.07.003>
- World Health Organization (WHO) (2010). *Improving access to health workers in remote and rural areas through improved retention: Global policy recommendations*. Retrieved from http://www.searo.who.int/nepal/mediacentre/2010_increasing_access_to_health_workers_in_rote_and_rural_areas.pdf
- Yonge, O. J., Myrick, F., Ferguson, L. M., & Quinn, G. (2013). Nursing preceptorship experiences in rural settings: "I would work here for free". *Nursing Education in Practice, 13*(2013), 125–131.
- Zieber, M., & Sedgewick, M. (2018). Competence, confidence and knowledge retention in undergraduate nursing students - A mixed method study. *Nursing Education Today, 62*, 16–21. <https://doi.org/10.1016/j.nedt.2017.12.008>

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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