Received: 2 August 2018 | Revised: 17 April 2019 | Accepted: 17 June 2019

DOI: 10.1111/jjns.12284

JAPAN JOURNAL OF NURSING SCIENCE WILEY

ORIGINAL ARTICLE

The impact of empathy on work engagement in hemodialysis nurses: The mediating role of resilience

Xiaoyi Cao | **Lin Chen**

Hemodialysis Center, Department of Nephrology, West China Hospital, Sichuan University, Chengdu, People's Republic of China

Correspondence
Xiaoyi Cao, Hemodialysis Center, Department of Nephrology, West China Hospital, Sichuan University, Chengdu, Sichuan Province, People's Republic of China.
Email: cao_xiaoyi@126.com

Abstract

Aim: To examine the reciprocal associations between empathy, resilience and work engagement, and to explore the mediating effect of resilience on the empathy and work engagement relationship among hemodialysis nurses in China.

Methods: This was a cross-sectional quantitative study. A convenience sampling was used to investigate 582 hemodialysis nurses in Chengdu, China. Structural equation modeling technique was conducted to analyze the mediating effect of resilience on the association between empathy and work engagement.

Results: Empathy and resilience were direct, positive and significant predictors for work engagement. Empathy also had a direct, positive and significant predictive effect on resilience. Empathy indirectly and significantly affected work engagement via the partial mediating effect of resilience.

Conclusion: Higher empathic ability may lead to greater work engagement by enhancing resilience. Attention should be paid to the development of empathic capacity and resilience to foster work engagement in hemodialysis nurses.

KEYWORDS

empathy, hemodialysis nurses, resilience, work engagement

1 | INTRODUCTION

The rapid growth of the aging population and the increased prevalence of risk factors (e.g., obesity, diabetes, and hypertension) for chronic kidney disease have resulted in the global increased demand for dialysis therapy (Câmara, Iseki, Kramer, Liu, & Sharma, 2017). In China, the prevalence of chronic kidney disease was 11.8% in 2012 (Liu, 2013). Moreover, 447,435 patients with end-stage renal disease (ESRD) received dialysis therapy in 2016, which is about twice as much as those in 2011 (Chen, 2017). The rapidly rising burden of ESRD and a global shortage of nurses underline the importance of developing effective strategies to promote nurse retention in hemodialysis (HD) units (Rosenstock, 2015).

HD nurses play a key role in the delivery of dialysis treatment. When the clients enter a dialysis unit, nurses are required to assume various roles such as technician, educator, caregiver, and advocate (Tranter, Donoghue, & Baker, 2009). They are also required to make intense and prolonged contact with clients for years or even decades until the clients die or transfer to another unit, which can result in a unique nurse-patient relationship (Polaschek, 2003). Furthermore, HD nurses usually work in a highly stressful environment in which dialysis patients are often frail and complex, and nurses are responsible for the safe delivery of dialysis treatments for multiple patients at one time during a patient shift in dialysis units (Bennett, 2011). The continuous relationships with clients, the challenging and technical workplace, and the complicated dialysis procedure have led to increased job burnout, and reduced retention intention in HD nurses (Hayes, Douglas, & Bonner, 2015).

Work engagement is a healthy workplace indicator, which refers to a motivational process including vigor,

dedication, and absorption (Schaufeli & Bakker, 2011). Recent literature reviews showed that the levels of work engagement among nurses varied in different hospital wards, and low levels of work engagement were linked to poor worker (e.g., increased burnout, and reduced intention to remain and career satisfaction), and patient outcomes (e.g., poor patient satisfaction and increased adverse events) (García-Sierra, Fernández-Castro, & Martínez-Zaragoza, 2016; Keyko, Cummings, Yonge, & Wong, 2016). Moreover, the predictors of work engagement in nurses were mainly composed of: (a) demographic data such as sex, age, and occupational tenure; (b) job-related variables such as job stress, role ambiguity, and organizational support; and (c) personal factors such as personality, self-efficacy and coping style (Keyko et al., 2016). However, the majority of previous studies have examined work engagement among nurses in multiple hospital wards, and some studies have focused on nurses employed in a specialty area such as intensive critical care and emergency care (Mason et al., 2014; Siller, 2016); fewer studies have explored work engagement among nurses in HD units. Therefore, to examine the levels of work engagement and its predictors among HD nurses may be beneficial to alleviating their job burnout, and promoting their job satisfaction and intention to remain.

Empathy is defined as a capacity to place oneself in another person's position, and to understand what another person is experiencing from that person's perspective (Bellet & Michael, 1991). Recently, several definitions have been developed for empathy which comprise various emotional states, and the common types are cognitive and affective empathy (Morse et al., 1992). Empathy is an essential competence of healthcare professionals due to the intense and helping relationships between healthcare providers and clients (Duarte, Pinto-Gouveia, & Cruz, 2016). Empirical evidence indicated that empathy was an essential element of good nursing care associated with increased patient satisfaction (Goodarzi, Azma, Tavakolian, & Peyvand, 2015). Furthermore, empathy was related to occupational wellbeing experienced by nurses. For example, empathy had a significant negative association with burnout (Yuguero, Ramon Marsal, Esquerda, Vivanco, & Soler-González, 2017). Positive correlation was confirmed between empathy and life satisfaction, and inverse correlation was demonstrated between empathy and loneliness among nurses providing palliative and home care (Marilaf Caro, San-Martín, Delgado-Bolton, & Vivanco, 2017). Empathy was also a positive contributor to compassion satisfaction among nurses in Portugal (Duarte et al., 2016). In addition, regarding the relationship between nurses' empathy and work engagement, it was found that cognitive empathy was a positive significant predictor for work engagement in Italian hospital nurses (Pohl, Saiani, & Battistelli, 2013). Another study demonstrated that, empathetic concern positively predicted work engagement among assistant nurses in Sweden (Antonia, 2016). There was also a positive significant predictive effect of empathy on engagement in Spanish nursing assistants (Navarro-Abal, López-López, & Climent-Rodríguez, 2018). Long-term therapeutic relationships between HD nurses and their clients may influence their levels of empathy, which may further affect their engagement in work. Nevertheless, no prior studies have been found to explore the association between empathy and work engagement among nurses in HD units until now. Based on the results of previous studies, we hypothesized that empathy positively predicted work engagement in HD nurses.

Resilience represents an adaptation process to difficult experiences such as trauma and adversity (Ozbay et al., 2007). It not only can assist in developing capacity for positive adjustment and promoting personal strengths, but also can help maintain good functional status after exposures to negative experiences (Campbell-Sills & Stein, 2007). The results of earlier studies showed that increased resilience resulted in reduced levels of depression and burnout in nurses (Guo et al., 2018; Hsieh, Chen, Wang, Chang, & Ma, 2016). Resilience perceived by nurses was also a positive significant contributor to compassion satisfaction and job satisfaction, respectively (Hegney, Rees, Eley, Osseiran-Moisson, & Francis, 2015; Zheng et al., 2017). Furthermore, as for the association between resilience and work engagement in healthcare providers, it was reported that higher resilience led to greater work engagement in Japanese healthcare workers (Nishi et al., 2016). There was also a positive significant relationship between resilience and work engagement in Malaysian nurses (Othman & Nasurdin, 2011). In addition, resilience was identified as a factor affecting work engagement among nurses in South Korea (Moon, Park, & Jung, 2013). Nurses in HD units are usually employed in a high-intensity work situation where they are required to manipulate complicated equipment and cope with various dialysis- and treatment-related complications. The levels of psychological resilience in HD nurses when they encountered such workplace stressors may affect their engagement in work. Nevertheless, no studies have examined whether resilience was a positive significant predictor for work engagement among nurses employed in HD units. According to the findings of prior studies, we hypothesized that resilience positively predicted HD nurses' engagement in work.

On the other hand, the significant relationship between empathy and resilience is still discussed. It was found that resilience was influenced by empathy positively and significantly in French medical residents (Morice-Ramat, Goronflot, & Guihard, 2018). However, another study proposed that resilience was not significantly predicted by

empathy in nursing students, although there was significant relationship between empathy and resilience (Mathad, Pradhan, & Rajesh, 2017). It is reported that empathy assists resilience through developing strong supportive relationships (Morice-Ramat et al., 2018). Empathy cultivation offers a new coping strategy that fosters stress reduction, action orientation, and affiliation in the face of negative experiences, which looks like characteristics of resilience (Klimecki, Leiberg, Lamm, & Singer, 2013). The predictive effect of empathy on resilience in HD nurses is still required to be explored. Based on the results of earlier studies, we hypothesized that empathy affected resilience, which further influenced work engagement.

The aims of the study were to explore the reciprocal relationships between empathy, resilience and work engagement, and to analyze the mediating role of resilience on the association between empathy and work engagement in Chinese HD nurses.

2 | METHODS

2.1 | Study design and sample

This was a cross-sectional study. As no previous studies have reported the levels of work engagement which HD nurses perceived, the sample size calculation was based on work engagement scores of Chinese nurses employed in multiple hospital wards due to similar cultural contexts (standard deviation = 1.63) (Wang, Liu, Zou, Hao, & Wu, 2017). A sample size of 255 participants was required with the expected error of estimation to be 0.2, and with a 5% level of significance. Considering a possible non-response rate of 20%, the final sample was required to include at least 306 participants.

The study was conducted in Chengdu, which is located in the southwest region of China. A convenience sampling was used to select HD nurses in 26 hospitals. Nurses with registered nurse licenses were recruited. Nurses with sick leave or maternity leave during the survey were excluded. In conclusion, 676 nurses were eligible and 582 participants volunteered and successfully completed the survey (86.1%) (78 nurses refused to participate, and 16 returned questionnaires had missing data).

2.2 | Instruments

The Jefferson Scale of Empathy assesses empathic qualities in patient care. It encompasses 20 items and three domains (perspective taking, compassionate care, and walking in the patient's shoes). Each item is scored on a seven-point scale from one (strongly disagree) to seven (strongly agree) with 10 items scored in reverse. Cronbach's alpha of the overall scale is .80 (Hojat et al., 2002). The Chinese version has a Cronbach's alpha of .90 (Cheng, Lai, Livneh, & Tsai, 2011). In this study, Cronbach's alpha of the scale was .86.

The 10-item Connor-Davidson Resilience Scale is a unidimensional structure assessing individuals' abilities to cope with adversity. It is based on a five-point scale from zero (not true at all) to four (true nearly all the time) with lower scores showing less resilience. Cronbach's alpha of the scale is .85 (Campbell-Sills & Stein, 2007). Cronbach's alpha and the test–retest reliability of the Chinese version are .91 and .90, respectively (Wang, Shi, Zhang, & Zhang, 2010). Cronbach's alpha of the scale was .87 in this study.

The nine-item Utrecht Work Engagement Scale contains three domains (vigor, dedication and absorption). Each item is rated on a seven-point scale from zero (never) to six (everyday) with higher scores indicating greater work engagement. Cronbach's alpha of the overall scale is .92 (Schaufeli, Bakker, & Salanova, 2006). Cronbach's alpha of the Chinese version ranges from .70 for absorption to .77 for vigor (Fong & Ng, 2012). In this study, Cronbach's alpha ranged from .72 for vigor to .90 for dedication.

In addition, demographic data such as sex, age, education level, marital status, and professional title were also collected.

2.3 | Data collection

After obtaining the approval from the HD unit in each hospital, the questionnaires were delivered to each unit by mail. Twenty-six head nurses of these selected HD units were trained as research assistants through a 2-hour training session. Before the survey, the head nurses informed each potential participant of the purpose and importance of the study. After the informed consent forms were signed, the instruments and a separate envelope were distributed to each participant. These participants were required to complete the questionnaires within a week, and return the finished packet in sealed envelopes to a designated box in each unit. The head nurses were required to deliver the completed packets to the researchers by mail after the data collection procedure was finished. The study was performed from June 1, 2016 to December 31, 2016.

2.4 | Data analysis

The statistical analysis packages used in the study were SPSS 23.0 and AMOS 7.0 (IBM, Armonk, NY, USA). As data was not normally distributed, continuous data are described as median and interquartile range (25th-75th percentile), and categorical data are presented as frequencies and percentages. Mann–Whitney *U* test and Kruskal-Wallis H test were used to compare the differences in work

engagement scores among different subgroups. Spearman correlation analysis was performed to explore the reciprocal associations between empathy, resilience, and work engagement. Hierarchical regression analysis was carried out to analyze the impact of demographic data, empathy and resilience on work engagement. Structural equation modeling technique (bootstrap) was used to examine the mediating effect of resilience on the empathy and work engagement relationship. The goodness of fit index (GFI), comparative fit index (CFI), incremental fit index (IFI), Tacker-Lewis index (TLI), v2/df, and root mean square error of approximation (RMSEA) were adopted to evaluate model fit. The GFI, CFI, IFI, TLI > .90, v2/df < 5, and RMSEA ≤.08 were regarded as a reasonable-fit (Byrne, 2013; Kline, 2015). $P < .05$ was considered as statistically significant (two-tailed test).

2.5 | Ethical approval

The research was approved by the authors' university ethics review board. Ethics approval was obtained from the Human Subjects Ethics Sub-committee of West China Hospital of Sichuan University (No. 201608).

3 | RESULTS

3.1 | Characteristics of sample

Of the respondents, 534 were female (91.8%) and 48 were male (8.2%). The age ranged from 20 to 58 years with the average age of 27 years (25 years, 32 years). The mean occupational tenure in HD units was 5 years (3 years, 10 years) ranging from 1 to 41 years. Over half of the respondents were married (56.7%) and had no children (59.1%), and 47.4% of the respondents had a Bachelor degree or above. Most of the respondents were employed as senior nurses or nurse supervisors (64.9%) (Table 1).

3.2 | Work engagement in HD nurses

The mean score of work engagement perceived by HD nurses was 3.22 (2.56, 4.11). Female nurses reported significantly higher engagement than male nurses. Married nurses had significantly higher scores than single, divorced or widowed nurses. Nurses with children had greater work engagement than those without. Head nurses also reported significantly higher scores than staff nurses. Moreover, significant differences in engagement scores were also reported by nurses with different age groups, occupational tenure in HD units, and professional titles (Table 1).

TABLE 1 Characteristics of sample (N = 582)

Variables	n	%	Work engagement
Sex			
Male	48	8.2	3.83 (3.14, 4.80)
Female	534	91.8	3.22 (2.56, 4.00)
Z (*P*)			−3.786 (.000)
Age, years			
≤25	180	30.9	3.11 (2.44, 3.89)
26–35	314	55.0	3.33 (2.56, 4.11)
>36	88	15.1	3.56 (2.67, 4.30)
χ^2 (*P*)			9.035 (.011)
Occupational tenure, years			
≤5	332	57.0	3.11 (2.33, 3.89)
6–10	110	18.9	3.44 (2.67, 4.22)
>10	140	24.1	3.56 (2.67, 4.22)
χ^2 (*P*)			18.274 (.000)
Education level			
Diploma	32	5.5	2.83 (2.36, 4.06)
Associate	274	47.1	3.11 (2.33, 4.11)
Bachelor or above	276	47.4	3.44 (2.78, 4.11)
χ^2 (*P*)			8.566 (.014)
Marital status			
Single/divorced/widowed	252	43.4	3.11 (2.33, 3.89)
Married	330	56.7	3.33 (2.67, 4.22)
Z (*P*)			−3.212 (.001)
Having children			
Yes	238	40.9	3.44 (2.67, 4.22)
No	344	59.1	3.11 (2.47, 3.89)
Z (*P*)			−2.674 (.007)
Job type			
Staff nurses	550	94.5	3.22 (2.56, 4.11)
Head nurses	32	5.5	3.61 (3.17, 4.00)
Z (*P*)			−2.197 (.028)
Professional title			
Nurse	204	35.1	3.00 (2.33, 3.78)
Senior nurse	290	49.8	3.44 (2.78, 4.22)
Nurse supervisor	88	15.1	3.33 (2.50, 3.86)
χ^2 (*P*)			20.217 (.000)

Z: Mann–Whitney *U* test, χ^2: Kruskal-Wallis H test.

3.3 | Relationships between empathy, resilience, and work engagement

The results of correlation analysis indicated that each subscale of empathy was positively and significantly related to resilience and each dimension of work engagement (r ranged from 0.115 to 0.391, $P < .001$). Resilience had a positive

TABLE 2 Correlations among empathy, resilience, and work engagement (N = 582)

Variables	Resilience	Vigor	Dedication	Absorption	Work engagement
Perspective taking	.297**	.358**	.364**	.357**	.391**
Compassionate care	.161**	.206**	.255**	.233**	.250**
Walking in the patient's shoes	.115**	.264**	.226**	.246**	.263**
Resilience	1.000	.553**	.532**	.535**	.581**

**$P < .001$.

significant association with each subscale and total score of work engagement, respectively (r ranged from 0.532 to 0.581, $P < .001$) (Table 2).

Moreover, the results of hierarchical regression analysis indicated that sex (β = −0.214, $P < .001$) and occupational tenure (β = 0.237, $P < .001$) were significant predictors for work engagement in step 1, which explained 5.6% of the total variable. Next, after controlling the demographic characteristics in step 2, empathy (β = 0.208, $P < .001$) and resilience (β = 0.538, $P < .001$) had significant predictive effects on engagement in work, with the explained variance increased by 37.8%. The predictive effect of occupational tenure was still statistically significant (β = 0.224, $P < .019$) (Table 3).

3.4 | Mediating effect of resilience on the association between empathy and work engagement

In the first step, empathy (independent variable) had a direct, positive and significant predictive effect on work engagement (outcome variable) without resilience (mediating variable) (standardized path coefficient = .340, $P < .001$, adjusted $R^2 = 11.6\%$).

In the second step, after resilience (mediator) was included in the analysis, empathy was a direct, positive and significant contributor to resilience (standardized path coefficient = .215, $P < .001$) and work engagement (standardized path coefficient = .224, $P < .001$), respectively. Resilience had a direct, positive and significant predictive effect on work engagement (standardized path coefficient = .556, $P < .001$). Furthermore, empathy influenced work engagement via the partial mediating effect of resilience (standardized path coefficient = .120, $P < .001$), with a ratio of mediating effect to total effect of 34.9% (Figure 1). Empathy and resilience jointly explained 40.9% of the total variance in work engagement. The mediating effect model indicated a reasonable model fit (GFI = .92, CFI = .90, IFI = .91, TLI = .90, v2/df = 2.38, RMSEA = .049).

TABLE 3 Multivariate regression analyses of demographic data, empathy, and resilience on work engagement (N = 582)

	Work engagement							
	Model 1				Model 2			
Variables	B	SE	β	*P*	B	SE	β	*P*
Demographic data								
Sex (male/female)	−0.890	0.247	−0.214	.000	−0.231	0.203	−0.055	.256
Age (≤25/26–35/>36 years)	−0.111	0.168	−0.064	.511	−0.004	0.134	−0.002	.977
Occupational tenure (≤5/6–10/>10 years)	0.324	0.134	0.237	.016	0.369	0.108	0.224	.019
Educational level (diploma/associate/bachelor or above)	0.058	0.128	0.0030	.652	0.003	0.102	0.002	.975
Marital status (single/divorced/widowed/married)	0.281	0.194	0.122	.148	0.078	0.155	0.034	.616
Having children (yes/no)	−0.172	−0.187	−0.074	.359	−0.071	−0.166	−0.030	.668
Job type (staff nurse/head nurse)	0.096	0.313	0.019	.759	0.125	0.250	0.025	.616
Professional title (nurse/senior nurse/nurse supervisor)	−0.068	0.165	−0.041	.679	−0.029	0.131	−0.017	.823
	Adjusted $R^2 = 0.056$, F = 3.158, $P = .002$							
Empathy					0.324	0.074	0.208	.000
Resilience					1.024	0.093	0.538	.000
					Adjusted $R^2 = 0.434$, F = 20.555, $P = .000$			

B, unstandardized regression coefficient; β, standardized regression coefficient.

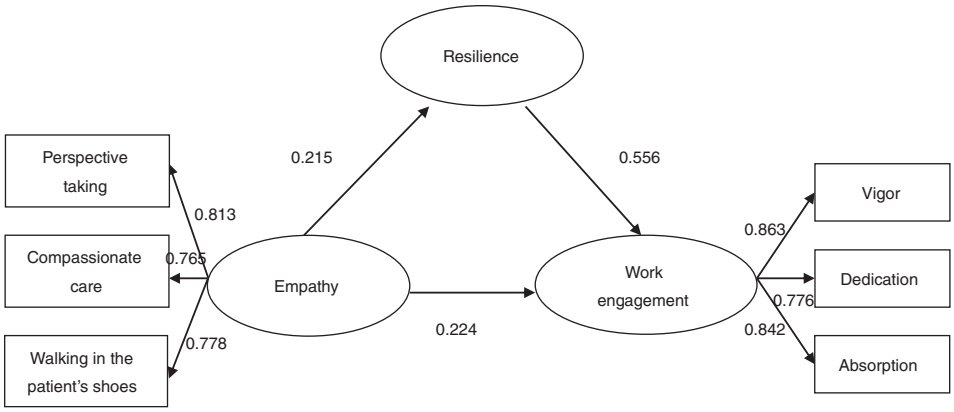

FIGURE 1 Mediating effect of resilience

4 | DISCUSSION

Our study found that occupational tenure was a significant predictor for work engagement among HD nurses. This result is consistent with the finding of a previous study, which showed that nurses with the longest occupational tenure reported the highest levels of work engagement (Aboshaiqah, Hamadi, Salem, & Zakari, 2016). Occupational tenure may serve as a proxy for long-term nurse-patient relationships. Generally speaking, HD nurses who have longer job tenure may practice more professionally and can be more confident of the dialysis care they offer. They may obtain more respect and trust from clients and develop more coordinated nurse-client relationships, which may further contribute to their higher levels of work engagement.

Our study also found that empathy had a positive and significant effect on work engagement among HD nurses. The findings are in parallel with the results of previous studies on nurses (Antonia, 2016; Navarro-Abal et al., 2018; Pohl et al., 2013), indicating that higher levels of empathy led to more engagement in work. Empathy can assist in developing strong therapeutic relationships (Duarte et al., 2016), which can promote trust and positive work attitude (Belcher & Jones, 2009). HD nurses with higher levels of empathy can understand clients' experiences from their perspectives, recognize their needs in depth and provide needs-based care, which can further foster patient satisfaction. On the other hand, positive feedback from dialysis clients can result in positive work status and more engagement in work perceived by HD nurses. Therefore, it is essential to develop effective strategies to enhance empathic capacity among HD nurses in future studies.

Moreover, we found that resilience was a significant positive contributor to work engagement in Chinese HD nurses, which is similar to the findings of prior studies, suggesting that higher levels of resilience resulted in greater work engagement (Moon et al., 2013; Nishi et al., 2016; Othman & Nasurdin, 2011). Psychological resilience is beneficial to assisting nurses in positive adjustment and stress coping when exposed to workplace stressors (Campbell-Sills & Stein, 2007). HD nurses with higher levels of resilience usually enjoy challenging and difficult job experiences and regard these situations as opportunities to learn and develop. When they encounter a variety of job-related stressors such as the presence of disease- and dialysis-related complications, poor vascular access, dialysate disorders and dialysis machine malfunction, they usually have confidence in their abilities to overcome these obstacles and problems they face, adopt positive and effective coping strategies and prefer to ask others for support, which can further promote their engagement in work. Therefore, strategies aiming to enhance psychological resilience are also needed in future studies to promote work engagement in HD nurses.

In addition, we found that empathy not only directly affected work engagement among nurses in HD units, but also indirectly influenced it via a partial mediating role of resilience. Psychological resilience can be enhanced both informally (practicing empathy and compassion in everyday life) and formally (teaching resilience skills) (Jakovljevic, 2018). Empathy is also an essential part of psychological resilience because by putting himself/herself in another's situation, one can learn resilience without even being in and going through the stressful situation (Vinayak & Judge, 2018). Therefore, although there are not workplace stressors, HD nurses who have higher levels of empathy may develop psychological resilience by practicing their own empathic capabilities frequently and informally. Then, higher levels of resilience perceived by HD nurses further foster their work engagement by their confidence in overcoming difficulties, positive coping skills, and strong mutual interaction with supportive resources such as nephrologists, colleagues, friends and family members.

Several limitations were noted. First, a cross-sectional research design cannot explore causality among these three variables. A longitudinal study will be required in future studies. Second, the samples only came from one city in China, and a convenience sampling method was adopted, which can limit generalizability of the results. Finally, only

empathy and resilience were explored as the predictors for work engagement, and other key antecedents such as job stressors, leadership, and personality were not included in the study. More predictors for work engagement in HD nurses are required to be examined in future studies.

5 | IMPLICATION FOR CLINICAL PRACTICE

This study provides new insights into work enhancement and strategies to improve it in clinical settings. Strategies such as empathy-enhancing programs and resilience building programs may be effective methods for the development of positive work engagement. Bry et al. (2016) proposed that communication skills training improved nurses' abilities to respond to patients' feelings with empathy (Bry et al., 2016). Pidgeon, Ford, and Klaassen (2014) found that a retreat-based mindfulness with a Metta training program promoted resilience in human service professionals (Pidgeon et al., 2014). Moreover, Hwang et al. (2017) demonstrated the effectiveness of intensive mindfulness meditation training on resilience (Hwang et al., 2017).

6 | CONCLUSION

To our knowledge, this is the first study to explore the mediating effect of resilience on the empathy and work engagement association in HD nurses. Higher empathic ability may lead to higher work engagement via enhancing resilience. Attention should be paid to the development of empathic capacity and psychological resilience to foster work engagement in HD nurses.

ACKNOWLEDGMENTS

The authors thank all the HD nurses who participated in this study.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

X-Y. C., and L. C. contributed to the conception and design of the study; X-Y. C., and L. C. conducted the data collection and analyses, and wrote the article.

ORCID

Xiaoyi Cao https://orcid.org/0000-0002-6782-3007

REFERENCES

Aboshaiqah, A. E., Hamadi, H. Y., Salem, O. A. & Zakari, N. M. (2016). The work engagement of nurses in multiple hospital sectors in Saudi Arabia: A comparative study. *Journal of Nursing Management.*, 24(4), 540–548.

Antonia, M. (2016). *Assistant nurses work engagement; the role of emotional labor, empathy, and psychosocial conditions*. Växjö & Kalmar, Småland, Sweden: Linnaeus University.

Belcher, M. & Jones, L. K. (2009). Graduate nurses experiences of developing trust in the nurse-patient relationship. *Contemporary Nurse*, 31(2), 142–152.

Bellet, P. S. & Michael, J. M. (1991). The importance of empathy as an interviewing skill in medicine. *Journal of the American Medical Association*, 226(13), 1831–1832.

Bennett, P. N. (2011). Technological intimacy in haemodialysis nursing. *Nursing Inquiry*, 18(3), 247–252.

Bry, K., Bry, M., Hentz, E., Karlsson, H., Kyllönen, H., Lundkvist, M. *et al.* (2016). Communication skills training enhances nurses' ability to respond with empathy to parents' emotions in a neonatal intensive care unit. *Acta paediatrica*, 105(4), 397–406.

Byrne, B. M. (2013). *Structural equation modeling with AMOS: Basic concepts, applications and programming* (2nd edn). New York, NY: Rouledge.

Câmara, N. O., Iseki, K., Kramer, H., Liu, Z. H. & Sharma, K. (2017). Kidney disease and obesity: Epidemiology, mechanisms and treatment. *Nature Reviews Nephrology*, 13(3), 181–190.

Campbell-Sills, L. & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CDRISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress*, 20(6), 1019–1028.

Chen, X.M. (2017). Status quo and outlook among heamodialysis patients in China. 2017 annual conference of blood purification center management branch of Chinese hospital association and the 9th Chinese forum on blood Purification. Beijing, 3–August 6, 2017.

Cheng, J. F., Lai, Y. M., Livneh, H. & Tsai, T. Y. (2011). Establishing reliability and validity of the Chinese version of the Jefferson scale of empathy (healthcare providers version). *Hu Li Za Zhi*, 58(2), 41–48.

Duarte, J., Pinto-Gouveia, J. & Cruz, B. (2016). Relationships between nurses' empathy, self-compassion and dimensions of professional quality of life: A cross-sectional study. *International Journal of Nursing Studies*, 60, 1–11.

Fong, T. C. & Ng, S. M. (2012). Measuring engagement at work: Validation of the Chinese version of the Utrecht Work Engagement Scale. *International Journal of Behavioral Medicine*, 19(3), 391–397.

García-Sierra, R., Fernández-Castro, J. & Martínez-Zaragoza, F. (2016). Work engagement in nursing: An integrative review of the literature. *Journal of Nursing Management*, 24(2), E101–E111.

Goodarzi, N., Azma, K., Tavakolian, E. & Peyvand, P. (2015). Association of nurses' self-reported empathy and Mu suppression with patients' satisfaction. *Journal of Caring Sciences*, 4(3), 197–205.

Guo, Y. F., Luo, Y. H., Lam, L., Cross, W., Plummer, V. & Zhang, J. P. (2018). Burnout and its association with resilience in nurses: A cross-sectional study. *Journal of Clinical Nursing*, 27 (1–2), 441–449.

Hayes, B., Douglas, C. & Bonner, A. (2015). Work environment, job satisfaction, stress and burnout in haemodialysis nurses. *Journal of Nursing Management*, 23(5), 588–598.

Hegney, D. G., Rees, C. S., Eley, R., Osseiran-Moisson, R. & Francis, K. (2015). The contribution of individual psychological resilience in determining the professional quality of life of Australian nurses. *Frontiers in Psychology*, 6, 1613.

Hojat, M., Gonnella, J. S., Nasca, T. J., Mangione, S., Vergare, M. & Magee, M. (2002). Physician empathy: Definition, components, measurement, and relationship to gender and specialty. *American Journal of Psychiatry*, 159(9), 1563–1569.

Hsieh, H. F., Chen, Y. M., Wang, H. H., Chang, S. C. & Ma, S. C. (2016). Association among components of resilience and workplace violence-related depression among emergency department nurses in Taiwan: A cross-sectional study. *Journal of Clinical Nursing*, 25 (17–18), 2639–2647.

Hwang, W. J., Lee, T. Y., Lim, K. O., Bae, D., Kwak, S., Park, H. Y. *et al*. (2017). The effects of four days of intensive mindfulness meditation training (Templestay program) on resilience to stress: A randomized controlled trial. *Psychology, Health & Medicine*, 29, 1–8.

Jakovljevic, M. (2018). Empathy, sense of coherence and resilience: Bridging personal, public and global mental health and conceptual synthesis. *Psychiatria Danubina*, 30(4), 380–384.

Keyko, K., Cummings, G. G., Yonge, O. & Wong, C. A. (2016). Work engagement in professional nursing practice: A systematic review. *International Journal of Nursing Studies*, 61, 142–164.

Klimecki, O. M., Leiberg, S., Lamm, C. & Singer, T. (2013). Functional neural plasticity and associated changes in positive affect after compassion training. *Cerebral Cortex*, 23(7), 1552–1561.

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th edn). New York, NY: Guilford.

Liu, Z. H. (2013). Nephrology in China. *Nature Reviews Nephrology*, 9 (9), 523–528.

Marilaf Caro, M., San-Martín, M., Delgado-Bolton, R. & Vivanco, L. (2017). Empathy, loneliness, burnout, and life satisfaction in Chilean nurses of palliative care and homecare services. *Enfermeria Clinica*, 27(6), 379–386.

Mason, V. M., Leslie, G., Clark, K., Lyons, P., Walke, E., Bulter, C. *et al*. (2014). Compassion fatigue, moral distress, and work engagement in surgical intensive care unit trauma nurses: A pilot study. *Dimensions of Critical Care Nursing*, 33(4), 215–225.

Mathad, M. D., Pradhan, B. & Rajesh, S. K. (2017). Correlates and predictors of resilience among baccalaureate nursing students. *Journal of clinical and diagnostic research*, 11(2), JC05–JC08.

Moon, I. O., Park, S. K. & Jung, J. M. (2013). Effects of resilience on work engagement and burnout of clinical nurses. *Journal of Korean Academy of Nursing Administration*, 19(4), 525–535.

Morice-Ramat, A., Goronflot, L. & Guihard, G. (2018). Are alexithymia and empathy predicting factors of the resilience of medical residents in France? *International Journal of Medical Education*, 9, 122–128.

Morse, J. M., Anderson, G., Bottorff, J. L., Yonge, O., O'Brien, B., Solberg, S. M. *et al*. (1992). Exploring empathy: A conceptual fit for nursing practice? *Image--the Journal of Nursing Scholarship*, 24(4), 273–280.

Navarro-Abal, Y., López-López, M. J. & Climent-Rodríguez, J. A. (2018). Engagement, resilience and empathy in nursing assistants. *Enfermeria Clinica*, 28(2), 103–110.

Nishi, D., Kawashima, Y., Noguchi, H., Usuki, M., Yamashita, A., Koido, Y. *et al*. (2016). Resilience, post-traumatic growth, and work engagement among health care professionals after the great East Japan earthquake: A 4-year prospective follow-up study. *Journal of Occupational Health*, 58(4), 347–353.

Othman, N. & Nasurdin, A. M. (2011). Work engagement of Malaysian nurses: Exploring the impact of hope and resilience. *International Journal of Engineering Management and Economics*, 5(12), 1990–1994.

Ozbay, F., Johnson, D. C., Dimoulas, E., Morgan, C. A., Charney, D. & Southwick, S. (2007). Social support and resilience to stress: From neurobiology to clinical practice. *Psychiatry*, 4(5), 35–40.

Pidgeon, A. M., Ford, L. & Klaassen, F. (2014). Evaluating the effectiveness of enhancing resilience in human service professionals using a retreat-based mindfulness with Metta training program: A randomised control trial. *Psychology, Health & Medicine*, 19(3), 355–364.

Pohl, S., Saiani, L. & Battistelli, A. (2013). Empathy in the emotional interactions with patients. Is it positive for nurses too? *Journal of Nursing Education and Practice*, 4(2), 74–81.

Polaschek, N. (2003). Negotiated care: A model for nursing work in the renal setting. *Journal of Advanced Nursing*, 42(4), 355–363.

Rosenstock, F.N. (2015). The dilemma of dialysis nurse retention. Retrieved from: https://www.nephrologynews.com/dilemma-of-dialysis-nurse-retention

Schaufeli, W., Bakker, A. & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement*, 66(4), 701–716.

Schaufeli, W. B. & Bakker, A. (2011). Defining and measuring work engagement: Bringing clarity to the concept. In: A. B. Bakker & M. Leiter (Eds), *Work engagement: A handbook of essential theory and research* (pp. 10–24). New York, NY: Psychology Press.

Siller, J. (2016). Perceptions of shared governance and work engagement in emergency nurses. *Journal of Emergency Nursing*, 42(6), 470–471.

Tranter, S. A., Donoghue, J. & Baker, J. (2009). Nursing the machine: An ethnography of a hospital haemodialysis unit. *Journal of nephrology and renal transplantation*, 2(3), 28–41.

Vinayak, S. & Judge, J. (2018). Resilience and empathy as predictors of psychological wellbeing among adolescents. *International Journal of Health Sciences & Research*, 8(4), 192–200.

Wang, L., Shi, Z., Zhang, Y. & Zhang, Z. (2010). Psychometric properties of the 10-item Connor-Davidson Resilience Scale in Chinese earthquake victims. *Psychiatry and Clinical Neurosciences*, 64(5), 499–504.

Wang, X., Liu, L., Zou, F., Hao, J. & Wu, H. (2017). Associations of occupational stressors, perceived organizational support, and psychological capital with work engagement among Chinese female nurses. *BioMed Research International*, 1(2), 1–11.

Yuguero, O., Ramon Marsal, J., Esquerda, M., Vivanco, L. & Soler-González, J. (2017). Association between low empathy and high burnout among primary care physicians and nurses in Lleida, Spain. *European Journal of General Practice*, 23(1), 4–10.

Zheng, Z., Gangaram, P., Xie, H., Chua, S., Ong, S. B. C. & Koh, S. E. (2017). Job satisfaction and resilience in psychiatric nurses: A study at the Institute of Mental Health, Singapore. *International Journal of Mental Health Nursing*, 26(6), 612–619.

How to cite this article: Cao X, Chen L. The impact of empathy on work engagement in hemodialysis nurses: The mediating role of resilience. *Jpn J Nurs Sci*. 2020;17:e12284. https://doi.org/10.1111/jjns.12284