

BMJ Open Work engagement among new nurses in China: a latent profile analysis

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ABSTRACT

Objective To identify different work engagement profiles among new nurses in China and explore demographic and personal factors that predict different work engagement profiles.

Design A cross-sectional study.

Methods From 1 April to 30 June 2022, a cross-sectional survey was conducted in 11 tertiary hospitals across five provinces in China. Using a convenience sampling method, 662 new nurses were recruited to participate. Data were collected using standardised instruments, including the Work Engagement Scale, the Difficulties in Emotion Regulation Scale and the Job Crafting Scale. Latent profile analysis was employed to identify latent profiles of work engagement among new nurses, and multinomial logistic regression analysis was used to examine predictors of different work engagement profiles.

Results This study identified three potential profiles of work engagement among new nurses, namely the 'low work engagement group' (15%), the 'moderate work engagement group' (62%) and the 'high work engagement group' (23%). Independent nursing work, emotion regulation training, difficulties in emotion regulation and job crafting were predictors of different work engagement profiles.

Conclusions Nursing supervisors are advised to pay more attention to and help new nurses who work independently, strengthen relevant training on emotion regulation strategies for new nurses and construct intervention strategies based on job crafting, so as to improve the work engagement level of new nurses.

INTRODUCTION

A new report from the International Council of Nurses emphasises that the worldwide shortage of nurses should be treated as a global health emergency.¹ Studies have shown that approximately 40% of the nursing workforce worldwide is expected to retire from clinical practice by 2023, necessitating an additional 12.9 million nurses to fill this gap.² This pressing shortage places an even greater reliance on new nurses, who are vital for sustaining the nursing workforce. However, high turnover rates among new nurses during their early career stages pose a significant challenge.³ Research shows that the 1-year turnover rate among new nurses is 25% in the USA, 44.5% in South Korea and as high as 57% within 2 years in Canada.^{4–6}

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This was a nationwide survey data on the work engagement of new nurses in China.
- ⇒ This study employed latent profile analysis to investigate the heterogeneity subgroups of work engagement among new nurses.
- ⇒ This was a cross-sectional study and was unable to establish causal relationships between variables.
- ⇒ This study was limited by the use of convenience sampling.

In China, 20–70% of new nurses express an intention to leave within their first year.⁷ This high turnover rate undermines the stability of the nursing workforce, compromising both patient safety and care quality.⁸ Therefore, investigating the work engagement of new nurses and the factors influencing it is essential to improve retention and professional stability.

Tertiary hospitals, as the highest-level medical institutions in China, maintain stringent standards for nursing quality.⁹ Their advanced medical resources and high-intensity clinical environment impose unique demands on new nurses. Based on Benner's 'From Novice to Expert' theory, the first three years of a nursing career are vital for new nurses to rapidly develop their skills and adapt to the demands of a high-stress environment.¹⁰ However, due to limited experience and a gap between theoretical knowledge and practice, new nurses in tertiary hospitals are more susceptible to anxiety, depression and other negative emotions, which in turn can impair their clinical performance and increase the risk of burnout.¹¹ Previous studies have shown that negative emotions and burnout are closely related to nurse turnover, whereas work engagement can mitigate burnout and enhance professional adaptation.^{12 13} Work engagement refers to a positive psychological state in which individuals are fully absorbed in their work, demonstrating vigour, dedication and absorption.¹⁴ For new nurses, work engagement not only aids in managing the high-stress environment typical



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of the early career stage but also enhances both professional adaptation and stability.^{15 16} Although some studies have examined work engagement among clinical nurses, there is limited systematic research specifically focused on new nurses. This study, therefore, aims to explore the work engagement characteristics of new nurses and their influencing factors.

Emotional regulation difficulties are a significant personal factor affecting work engagement among nurses, particularly new nurses in high-pressure environments like tertiary hospitals.¹⁷ Emotional regulation difficulties refer to the inadequate capacity to select adaptive emotional regulation strategies and a lack of acceptance and control over negative emotions.¹⁸ For new nurses, poor emotional regulation can lead to emotional exhaustion, reduced work engagement and mental health issues, ultimately impairing job performance and increasing burnout risk.^{19–21} While existing research has extensively explored its effects on anxiety, depression and burnout, the specific impact on work engagement among new nurses remains understudied.^{22 23} Therefore, further investigation into this relationship is crucial.

Job crafting is another key factor significantly impacting work engagement.²⁴ Job crafting is defined as the proactive adjustment of job tasks, relationships and perceptions to achieve higher adaptability at work.²⁵ Due to heavy workloads and challenging doctor-patient relationships, nurses in tertiary hospitals face considerable stress in complex clinical scenarios. New nurses who can actively engage in job crafting to better adapt to job requirements are more likely to develop autonomy and a sense of professional belonging, thereby enhancing their work engagement.²⁶ Although previous studies have explored job crafting behaviours among clinical nurses, research specifically addressing job crafting among new nurses remains limited.²⁴ Thus, examining the effect of job crafting on work engagement among new nurses will provide valuable insights for designing effective support and management strategies.

Latent profile analysis (LPA) is a methodological approach that classifies individuals with similar characteristics into the same category, allowing for the identification of latent profiles based on variations across different dimensions or items.²⁷ Current studies on work engagement among new nurses mostly rely on cross-sectional assessments based on scale scores, often overlooking individual heterogeneity.¹⁷ LPA can identify distinct profiles of work engagement among new nurses and reveal individual differences within this population, enabling more tailored support strategies in tertiary hospitals.²⁸ Therefore, the objective of this study was to (a) identify the different work engagement profiles of new nurses in China and (b) explore demographic and personal factors that predict different work engagement profiles.

METHODS

Study design

A descriptive cross-sectional design was adopted.

Participants

The new nurses were selected by convenience sampling method from 11 tertiary care hospitals in five provinces in China. The inclusion criteria were defined as follows: (a) possession of the nurse professional qualification certificate of the People's Republic of China, (b) ≤ 3 years of work experience in tertiary care hospitals since graduation from school, (c) official employed by the hospital and (d) informed consent and voluntary participation in this research. Participants who were not on duty for various reasons were excluded from the study.

Sample size

Based on the rule of LPA, a minimum of 500 was deemed appropriate for identifying profile quantities.²⁹ Moreover, increasing the number of samples can enhance the statistical capability to accurately identify the actual quantity of latent classes.²⁸ Therefore, the sample size of 662 in this study satisfied this criterion.

Measures

Sociodemographic information and nurses' work-related characteristics questionnaire

The researcher adapted a questionnaire by conducting a literature review on the topic of work engagement among new nurses, which included gender, province of residence, marital status, education level, years of work experience, independent nursing work, monthly income, number of night shifts per month and emotion regulation training.

Utrecht Work Engagement Scale

The Utrecht Work Engagement Scale, developed by Schaufeli *et al*,³⁰ was translated into Chinese by Fong and Siu-Man³¹ to measure participants' work engagement. The scale has a nine-item self-reported instrument with three dimensions: vigour, dedication and absorption. Items were rated on a 7-point Likert scale from 0 ('never') to 6 ('always'). The total score derived by summing the responses to nine items ranged from 0 to 54 with higher values reflecting greater engagement. In this study, McDonald's Omega was $\omega=0.89$ (95% CI: 0.87 to 0.90).

Difficulties in Emotion Regulation Scale

The Difficulties in Emotion Regulation Scale (DERS-16), developed by Bjureberg *et al*,³² was adapted and validated in Chinese by Shi *et al*³³ to assess participants' difficulties in emotion regulation. This 16-item scale comprises five dimensions: inability to engage in goal-directed behaviour when distressed (three items), non-acceptance of negative emotions (three items), lack of emotional clarity (two items), limited access to effective emotion regulation strategies (five items) and difficulty maintaining goal-oriented behaviour (three items). Responses were recorded on a 5-point Likert scale ranging from 1 ('almost never') to 5

(‘almost always’). The total score, calculated by summing the 16 item responses, ranged from 16 to 80, with higher scores reflecting greater difficulties in emotion regulation. In this study, McDonald’s Omega was $\omega=0.88$ (95% CI: 0.86 to 0.90).

Job Crafting Scale

The Job Crafting Scale, originally developed by Dvorak,³⁴ was translated and validated in Chinese by Zhu Shixiao³⁵ to assess participants’ job crafting. This 21-item scale is divided into three dimensions: task crafting (seven items), cognitive crafting (seven items) and relational crafting (seven items). Respondents rated each item on a 5-point Likert scale ranging from 1 (‘strongly disagree’) to 5 (‘strongly agree’). Higher scores reflect greater levels of job crafting. In this study, McDonald’s Omega was $\omega=0.89$ (95% CI: 0.87 to 0.91).

Data collection

The data for this study were collected from 1 April to 30 June 2022. After obtaining approval from the director of the hospital nursing department, eligible new nurses were selected to participate, and the survey’s purpose and significance were explained to them. The researchers convened the participants in a conference room, and the electronic questionnaire was distributed to their cell phones via the ‘Wen Juanxing’ APP, a widely used platform for survey distribution in China, through the WeChat application. Participants completed the survey voluntarily with informed consent and anonymity, and all questions were mandatory before submission. Each account could submit the questionnaire only once to avoid duplicates. To ensure data quality, all questionnaires were rigorously reviewed, and 50 invalid ones were excluded based on predefined quality control criteria. These included extremely short completion times, identical answers across all items and repetitive patterns. Ultimately, 662 valid responses were retained for analysis.

Statistical analysis

Descriptive statistics were used to analyse all variables, while LPA was employed to identify subgroups of work engagement based on responses to each item in the Work Engagement Scale. First, the goodness of fit was evaluated by comparing model fit indices, including Akaike information criterion (AIC), Bayesian information criterion (BIC) and adjusted Bayesian information criterion (aBIC), which measure the discrepancy between expected and observed values; smaller values indicate better fit. Classification accuracy was evaluated using information entropy (Entropy), where values closer to 1 indicated more precise classification. The Lo-Mendell-Rubin likelihood ratio test (LMR) and bootstrap likelihood ratio test (BLRT) were used to compare the goodness-of-fit differences between models with k-1 and k-class models. A significance level of $p<0.05$ for LMR and BLRT indicated the superiority of the k-class model over the k-1 class model. Second, demographic differences between

profile groups were analysed using the χ^2 test and Fisher’s exact test. The χ^2 test was applied when expected cell frequencies exceeded 5, while Fisher’s exact test was used for smaller frequencies. Differences in emotion regulation difficulties and job crafting across profiles were examined using analysis of variance, with Welch’s test applied in cases of unequal variances. Finally, multinomial logistic regression analysis to explore the predictors of new nurses’ work engagement using demographic factors, emotional regulation difficulties scores and job crafting scores as independent variables. The data were analysed using SPSS (V.26.0) and Mplus (V.8.3).

Patient and public involvement

This study did not involve patients or the public in its design, conduct, reporting or dissemination plans.

RESULTS

Participant characteristics

Table 1 shows that 662 new nurses were included from 11 tertiary hospitals in five provinces: Beijing, Zhejiang, Anhui, Hubei and Guangxi. The study participants included 90.9% females, with 66.3% aged <25 years. The province was as follows: Beijing, accounting for 18.3%; Zhejiang, 15.1%; Anhui, 15.8%; Hubei, 27.5%; and Guangxi, 23.3%. Of the participants, 77.3% were unmarried and the majority (56.9%) had a bachelor’s degree or higher, with approximately 43.2% having 2–3 years of nursing experience. Furthermore, 83.5% of new nurses were required to conduct independent nursing work, and 58.9% worked 5–9 night shifts monthly. A monthly income of RMB3000–6000 (equivalent to US\$410–820) was reported by 55.6% of new nurses, and 86.7% of new nurses participated in emotional regulation training.

Differences in demographic characteristics of new nurses among different work engagement profiles

The three work engagement profiles showed statistically significant differences in educational level, independent nursing work, emotion regulation training and province distribution ($p<0.05$), with Cramer’s V values ranging from 0.106 to 0.123, indicating weak to moderate associations, as shown in table 1. Post hoc comparisons revealed that the moderate work engagement group (C2) and the high work engagement group (C3) differed significantly in educational level distribution. Additionally, the low work engagement group (C1) and the high work engagement group (C3) showed significant differences in the distributions of independent nursing work and training participation. For province distribution, the proportion of new nurses from Beijing province in the high work engagement group (C3) was significantly higher than in the moderate work engagement group (C2) and the low work engagement group. Similarly, the proportion of new nurses from Zhejiang province in the high work engagement group (C3) was significantly higher than in the low

Table 1 Demographic results of the new nurses according to different work engagement profiles						
Variables	Total (n=662,100%)	C1 (n=89, 15%)	C2 (n=423, 62%)	C3 (n=150, 23%)	F/ χ^2	P value Cramer's V Post hoc test
Gender, n (%)					1.571*	0.456
Male	60 (9.1)	6 (6.7)	37 (8.7)	17 (11.3)		
Female	602 (90.9)	83 (93.3)	386 (91.3)	133 (88.7)		
Age, n (%)					0.081*	0.970
<25	439 (66.3)	60 (67.4)	279 (66.0)	100 (66.7)		
≥25	223 (33.7)	29 (32.6)	144(34)	50 (33.3)		
Province, n (%)					19.360*	0.013 0.112
Beijing	121 (18.3)	18 (20.2)	64 (15.1)	39 (26.0)		C3>C1, C3>C2
Zhejiang	100 (15.1)	9 (10.1)	78 (8.7)	13 (18.4)		C3>C1, C3>C2
Anhui	105 (15.8)	17 (19.1)	73 (17.3)	15 (10.0)		
Hubei	182 (27.5)	25 (28.1)	110 (27.5)	47 (31.3)		
Guangxi	154 (23.3)	20 (22.5)	98 (23.2)	36 (24.0)		
Marital status, n (%)					1.983*	0.372
Unmarried	512 (77.3)	74 (83.1)	323 (76.4)	115 (76.7)		
Married	150 (22.7)	15 (16.9)	100 (23.6)	35 (23.3)		
Educational level, n (%)					7.392*	0.025 0.106
<bachelor's degree	285 (43.1)	37 (41.6)	169(40.0)	79(52.7)		C2 < C3
≥Bachelor's degree	377 (56.9)	52 (58.4)	254 (60.0)	71(47.3)		C3 < C2
Years of work experience, n (%)					7.354†	0.285
≤6 months	30 (4.5)	2 (2.2)	20 (4.7)	8 (5.3)		
>6 months to ≤1 year	137 (20.7)	13 (14.6)	87 (20.6)	37 (24.7)		
>1 year to ≤2 years	209 (31.6)	30 (33.7)	128 (30.3)	51 (34.0)		
>2 years to ≤3 years	286 (43.2)	44 (49.4)	188 (44.4)	54 (36.0)		
Independent nursing work, n (%)					8.734*	0.012 0.115
Yes	553 (83.5)	83 (93.3)	352 (83.2)	118 (78.7)		C1>C3
No	109 (16.5)	6 (6.7)	71 (16.8)	32 (21.3)		C1<C3
Number of night shifts per month, n (%)					8.898*	0.063
<<4	184 (27.8)	15 (16.9)	128 (30.3)	41 (27.3)		
5~9	390 (58.9)	56 (62.9)	244 (57.7)	90 (60.0)		
≥10	88 (13.3)	18 (20.2)	51 (12.0)	19 (12.7)		
Monthly income , n (%) (RMB)					0.714*	0.951
<3000	101 (15.3)	15 (16.9)	63 (14.9)	23 (15.3)		
3000~6000	368 (55.6)	51 (57.3)	233 (55.1)	84 (56.0)		

Continued

Table 1 Continued

Variables	Total (n=662, 100%)	C1 (n=89, 15%)	C2 (n=423, 62%)	C3 (n=150, 23%)	F/ χ^2	P value	Cramer's V	Post hoc test
>6000	193 (29.2)	23 (25.8)	127 (30.0)	43 (28.7)				
Emotion regulation training, n (%)					9.943*	0.007	0.123	
Yes	574 (86.7)	68 (76.4)	376 (88.9)	130 (86.7)				C3>C1
No	88 (13.3)	21 (23.6)	47 (11.1)	20 (13.3)				C1>C3
Total score of DRES-16, M \pm SD	31.10 \pm 13.74	37.24 \pm 18.07	31.99 \pm 12.83	24.97 \pm 10.78	55.539‡	<0.001§		C1>C2, C1>C3, C2>C3
Total score of job crafting, M \pm SD	72.33 \pm 14.33	56.03 \pm 15.72	71.16 \pm 10.12	85.31 \pm 11.94	222.504‡	<0.001¶		C1<C2, C1<C3, C2<C3

C1: low work engagement group; C2: moderate work engagement group; C3: high work engagement group.
 The bold values indicate statistical significance, with $P < 0.05$ or $P < 0.001$.
 * χ^2 test.
 †Fisher's exact test.
 ‡Welch test. Post hoc comparisons were adjusted using Bonferroni correction.
 § $\eta^2_p=0.075$.
 ¶ $\eta^2_p=0.263$.
 **The bold values represent either $P < 0.05$ or $P < 0.001$.
 DRES-16, Difficulties in Emotion Regulation Scale.

Table 2 Comparison of fit parameter indices of different latent profile models

Model	AIC	BIC	aBIC	Entropy	LMR	BLRT	Latent profile proportion (%)
1	21 259.273	21 340.187	21 283.037	–	–	–	–
2	19 133.361	19 259.229	19 170.328	0.876	<0.001	<0.001	0.58/0.42
3	17 839.678	18 010.499	17 889.847	0.943	<0.001	<0.001	0.15/0.23/0.62
4	17 331.160	17 546.933	17 394.531	0.909	0.014	<0.001	0.07/0.34/0.41/0.18
5	17 109.940	17 370.665	17 186.513	0.901	0.117	<0.001	0.04/0.10/0.40/0.29/0.17

aBIC, adjusted Bayesian information criterion; AIC, Akaike information criterion; BIC, Bayesian information criterion; BLRT, bootstrapped likelihood ratio test; LMR, Lo-Mendell-Rubin.

work engagement group (C1) and the moderate work engagement group (C2).

Furthermore, the Welch test revealed statistically significant differences in both emotion regulation difficulty scores and job crafting scores among the three work engagement groups ($p < 0.05$). For emotion regulation difficulty, post hoc comparisons showed that the low work engagement group (C1) had significantly higher scores than both the moderate (C2) and high work engagement groups (C3), and the moderate group (C2) scored higher than the high group (C3), with $\eta_p^2 = 0.075$. For job crafting, post hoc comparisons revealed that the low work engagement group (C1) scored significantly lower than both the moderate (C2) and high work engagement groups (C3), and the moderate group (C2) scored lower than the high group (C3), with $\eta_p^2 = 0.263$.

Latent profiles of new nurses' work engagement

In this study, model fitting was performed sequentially, increasing the number of categories from one to five. The fitting indices for models with different numbers of latent profiles are presented in [table 2](#). As the number of categories increased, AIC, BIC and aBIC values gradually decreased. However, when the number of categories reached five, the p value of the BLRT exceeded 0.05, indicating that models with five or more categories lacked representativeness. Among the tested models, the three-category model showed the highest entropy value and relatively lower AIC, BIC and aBIC values. Considering both interpretability and parsimony, the three-category model was deemed the most suitable for this study.

The first profile, accounting for 23% of new nurses, showed the highest scores across all work engagement items and was classified as the high work engagement subgroup. The second profile, encompassing 62% of new nurses, displayed moderate scores, representing the moderate work engagement subgroup. The third profile, comprising 15% of new nurses, had the lowest scores, categorising them as the low work engagement subgroup. [Figure 1](#) illustrates the mean scores for the nine work engagement items across the three profiles.

Predictors of work engagement for different profiles

Multinomial logistic regression analysis was conducted to identify predictors of work engagement profiles among

nurses, as shown in [table 3](#). Compared with the high work engagement group (C3), nurses in the low work engagement group (C1) were more likely to perform independent nursing work (OR=3.376, 95% CI: 1.241 to 9.187, $p < 0.05$) and report higher difficulties in emotion regulation (OR=1.022, 95% CI: 1.004 to 1.041, $p < 0.05$). Conversely, they were less likely to have received emotion regulation training (OR=0.487, 95% CI: 0.240 to 0.986, $p < 0.05$) or report higher job crafting scores (OR=0.892, 95% CI: 0.866 to 0.919, $p < 0.001$). For the moderate work engagement group (C2), compared with the high work engagement group (C3), nurses were more likely to report higher difficulties in emotion regulation (OR=1.023, 95% CI: 1.002 to 1.045, $p < 0.05$) and less likely to report higher job crafting scores (OR=0.895, 95% CI: 0.874 to 0.917, $p < 0.001$). Compared with the low work engagement group (C1), nurses in the moderate work engagement group (C2) were more likely to report higher job crafting scores (OR=1.252, 95% CI: 1.206 to

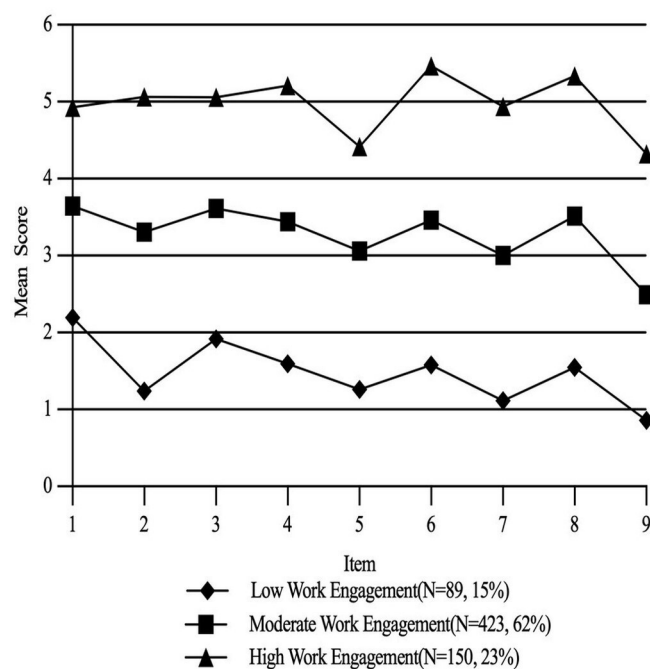


Figure 1 Characteristics of the latent profile in the work engagement of new nurses.

Table 3 Multinomial logistic regression analysis of the factors affecting profile of work engagement

Variables	C1 versus C3		C2 versus C3		C2 versus C1	
	Reference: C3		Reference: C3		Reference: C1	
	β	OR (95% CI)	β	OR (95% CI)	β	OR (95% CI)
Province						
Shandong	0.557	1.745 (0.759 to 4.012)	0.042	1.043 (0.528 to 2.061)	-0.514	0.598 (0.213 to 1.680)
Zhejiang	-0.770	0.463 (0.172 to 1.248)	-0.742	0.476 (0.208 to 1.092)	0.028	1.029 (0.289 to 3.655)
Anhui	0.352	1.422 (0.600 to 3.374)	-0.426	0.653 (0.310 to 1.377)	-0.778	0.459 (0.152 to 1.387)
Hubei	0.085	1.089 (0.580 to 2.333)	0.278	1.321 (0.717 to 2.433)	0.193	1.213 (0.473 to 3.112)
Guangxi (Ref)						
Educational level						
<Bachelor's degree	0.013	1.013 (0.581 to 1.768)	0.409	1.506 (0.528 to 2.061)	0.396	1.486 (0.742 to 2.977)
≥Bachelor's degree (Ref)						
Independent nursing work						
Yes	1.217	3.376* (1.241 to 9.187)	-0.512	0.599 (0.341 to 1.052)	-1.729	0.177** (0.058 to 0.546)
No (Ref)						
Emotion regulation training						
Yes	-0.720	0.487* (0.240 to 0.986)	-0.542	0.582 (0.302 to 1.121)	0.178	1.195 (0.480 to 2.976)
No (Ref)						
Difficulties in emotion regulation	0.022	1.022* (1.004 to 1.041)	0.023	1.023* (1.002 to 1.045)	-0.045	0.956** (0.931 to 0.982)
Job crafting	-0.114	0.892** (0.866 to 0.919)	-0.111	0.895** (0.874 to 0.917)	0.225	1.252** (1.206 to 1.301)

C1: low work engagement group; C2: moderate work engagement group; C3: high work engagement group.
 *p<0.05; **p<0.001.
 Ref, reference category.

1.301, p<0.001) and lower difficulties in emotion regulation (OR=0.956, 95% CI: 0.931 to 0.982, p<0.001).

DISCUSSION

Work engagement is a critical factor influencing health-care quality and workforce stability. In this study, LPA was employed to classify new nurses into three subgroups: low, moderate and high work engagement. This approach provides a novel framework for understanding their professional adaptation. The findings revealed that the majority of new nurses (62%) exhibited a moderate level of work engagement, consistent with prior research.¹⁵ This underscores the need to further enhance work engagement among new nurses. Nursing managers should therefore implement effective and evidence-based strategies to support and improve their engagement. Notably, 15% of new nurses were identified as having low work engagement. This subgroup requires particular attention as targeted interventions are essential to enhance their psychological well-being and work satisfaction, thereby promoting better adaptation to the profession.³⁶

Our findings underscore that independent nursing work is significantly associated with low work engagement among new nurses, consistent with prior studies.¹⁷ New nurses often face heavy workloads but may lack sufficient skills to comprehensively manage critically ill

patients.³⁷ This imbalance between high responsibilities and limited capabilities exacerbates professional stress and fosters negative emotions.³⁸ The study showed that nurses with high workload-related responsibilities experienced an increased risk of burnout, leading to a negative impact on their work engagement.³⁹ Furthermore, the Conservation of Resources theory highlights that excessive demands deplete psychological resources, leading to disengagement.⁴⁰ To address these challenges, nursing managers should optimise task allocation, implement phased training programmes and establish mentorship systems to enhance the competencies and confidence of new nurses, thereby reducing job stress and increasing engagement.^{41 42}

Our study found that emotional regulation plays a crucial role in the career adaptation of new nurses. Nurses who received emotional regulation training demonstrated significantly higher levels of work engagement compared with those who did not undergo such training. Although research specifically focusing on new nurses is limited, existing literature indicates that positive emotional regulation strategies can effectively reduce psychological stress in high-pressure environments and enhance professional adaptation.⁴³ Furthermore, we observed that nurses with difficulties in emotional regulation exhibited lower levels of work engagement,

suggesting that emotional regulation difficulties have a significant negative impact on work engagement. Compared with experienced nurses, new nurses may lack sufficient coping mechanisms and professional experience, which could exacerbate the detrimental effects of emotional regulation difficulties on mental health and work performance.⁴⁴ Previous studies have confirmed that difficulties in emotional regulation deplete psychological resources, leading to burnout and reduced work engagement.¹⁷ Based on these findings, healthcare managers should consider incorporating emotional regulation training, such as cognitive-behavioural therapy or emotion-reconstruction techniques, into on-the-job training programmes to help newly graduated nurses better cope with stress, thereby enhancing their professional adaptation and work engagement.⁴⁵

This study found a significant correlation between job crafting and work engagement among new nurses, with higher levels of job crafting being associated with higher work engagement, consistent with previous research.²⁴ According to Kahn's model of work engagement, psychological meaningfulness, psychological safety and psychological availability are key psychological conditions that influence work engagement.^{14 35} Job crafting effectively alters new nurses' cognitive and emotional responses by adjusting task characteristics, job roles and work environments, thereby enhancing their work engagement.^{46 47} Task crafting and perceptual shifts can boost new nurses' sense of self-worth and foster an emotional connection to their work, thereby increasing work meaningfulness and self-actualisation.⁴⁸ Moreover, job crafting contributes to improving work relationships, promoting personal growth and optimising work processes, enhancing psychological availability and well-being, which further strengthens work engagement.⁴⁹ Unlike previous studies that focused on experienced nurses, this study emphasises the role of job crafting in the early career stages of new nurses. Therefore, nursing managers should provide necessary resources and training to encourage new nurses to engage in job crafting, help them enhance their sense of purpose, establish professional relationships and ultimately improve work engagement, facilitating occupational adjustment.

Strengths and limitations

This is the first study to explore the heterogeneous subgroups of Chinese new nurses' work engagement using the LPA method. The findings provide a foundation for future research on this topic. However, there are several limitations. First, the cross-sectional design precludes causal inferences between variables, underscoring the need for longitudinal studies to clarify causal relationships among emotional regulation difficulties, job crafting and work engagement. Second, convenience sampling may have introduced selection bias, potentially affecting the representativeness of the findings. Future studies should consider random sampling to enhance generalisability. Lastly, this study only included new

nurses from tertiary hospitals, limiting its applicability to primary or community-based settings. Future research should expand the participant scope to improve the findings' generalisability.

CONCLUSION

LPA classifies new nurses' work engagement into three subgroups: low, moderate and high. This study provides important insights into improving work engagement among new nurses. Nursing managers should implement multifaceted strategies, including task optimisation, emotional regulation training and job crafting support, to facilitate the professional adaptation of new nurses and boost their confidence. These measures can enhance the psychological well-being and engagement of individual nurses, improve team stability and ultimately elevate the quality of patient care. Future studies should further explore the effects of work engagement across diverse professional settings and evaluate the efficacy of tailored interventions, providing more targeted management recommendations.

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