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The mediating effect of character strengths on the relationship between clinical nurses' mental health literacy and work engagement

Zhao Yuan^{1*}, Li Yuling¹, Shang Linping¹, An Junhong² and Zheng Ruonan²

Abstract

Background As the main force of clinical work, nurses' work engagement level will directly affect nursing quality. A high level of work engagement helps to improve nurses' work performance, quality of nursing, and job satisfaction. Mental health literacy education can effectively improve work engagement. This study focuses on evaluating the relationship between the character strengths, mental health literacy, and work engagement of clinical nurses to improve the mental health literacy of clinical nurses and further improve their work engagement level.

Methods Through convenience sampling, a cross-sectional survey was conducted among 1,660 nurses in five Level III general hospitals in Shanxi, Hubei, and Shandong from November to December 2023. The survey used a personal demographic form, a three-dimensional character strengths questionnaire, a Chinese multiple mental health literacy scale, and a work engagement scale. This study used the SPSS PROCESS macro procedure and the bootstrap method to examine the role of character strengths in the mediation model of mental health literacy versus work engagement.

Results The results showed that the character strengths, mental health literacy, and work engagement scores of 1660 clinical nurses were (55.66 ± 8.83) , (12.01 ± 5.78) and (33.77 ± 6.67) , respectively. The total effect of mental health literacy on work engagement was 0.470 (95% CI: 0.429 ~ 0.509); the indirect effect was 0.313 (95% CI: 0.273 ~ 0.355); the direct effect was 0.157 (95% CI: 0.108 ~ 0.206); the mediation effect accounted for 66.68% of the total effect.

Conclusion Studies have shown that mental health literacy and work engagement were positively correlated among nurses. Character strengths plays a mediating role between nurses' mental health literacy and work engagement. Therefore, nursing managers should pay attention to the mental health literacy of clinical nurses, strengthen the training of mental health knowledge, improve the mental health literacy of clinical nurses, and give full play to the character strengths to further improve the level of clinical work engagement.

Keywords Clinical nurse, Character strengths, Mental health literacy, Work engagement

Introduction and background

In clinical nursing work, nurses, as an important part of the medical team, not only undertake heavy medical tasks but also face great psychological pressure. With the continuous progress of medical technology and the increasing needs of patients, the mental health literacy and work engagement of nurses have become the key factors affecting the quality of care. In recent years, as an important field of psychological research, character strengths has attracted more attention in promoting

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individual mental health and improving work engagement. Therefore, exploring the relationships among character strengths, mental health literacy, and work engagement may help researchers gain insight into the contributing factors and possible interventions for clinical nurses.

Work engagement is described as a positive, fulfilling, and fulfilling psychological state characterized by vitality, concentration, and dedication [1]. Research shows that [2] a high level of work engagement helps improve nurses' work performance, nursing quality, and job satisfaction. As the main force in clinical work, nurses' work engagement level will directly affect the quality of nursing care [2].

Character strengths is a positive and ideal personality trait, manifested as affinity, curiosity, and self-control [3]. Studies show that character strengths can significantly predict work engagement, promote nurses' physical and mental health, and improve self-efficacy [4–7]. The study shows [8] a positive correlation between work engagement and character strengths. The more prominent the character strengths performance, the higher the level of work investment. Character strengths can affect individual physical and mental health. Studies have found that character strengths plays a link mediating role between nurses' work pressure and subjective well-being [9, 10].

In 1997 Australian scholar Jorm put forward the concept of mental health literacy [11], which is personal recognition, management, and prevention of psychological disorders knowledge and belief. Improving the level of clinical nurses' mental health literacy can improve the early identification rate and screening rate, promote early treatment, and reduce the possibility of disease further worse [12]. A randomized controlled experiment by showed that mental health literacy education could effectively improve work participation [13]. All dimensions of character strengths were positively associated with mental health. In addition, character strengths can also buffer the negative impact of psychological stress on mental health, thus further proving the important role of character strengths in maintaining mental health. The improvement of mental health literacy also helps individuals to better manage their emotions and adjust their mentality, so as to further consolidate and develop their character strengths.

As a new branch of the field of positive psychology, American psychologist Martin Seligman (Martin Seligman) [14] is one of the main founders, mainly focusing on human superiority and happiness. As a category of positive psychology research [15], character strengths can help individuals achieve higher happiness and enhance the sense of value and mission of survival, so it has also attracted the attention of relevant scholars all

over the world. Previous studies have shown that [16] allows individuals to obtain and use professional mental health services if they have a high level of mental health literacy. Studies have shown that [17] group counseling based on positive psychology can effectively improve the work engagement level of nursing interns. Therefore, this study proposes the hypothesis: Hypothesis 1: mental health literacy will directly affect the work engagement of clinical nurses. Hypothesis 2: character strengths may play a mediating role between mental health literacy and work engagement in clinical nurses. By analyzing the relationship between character strengths, mental health literacy, and work engagement, the intermediary effect of character strengths between mental health literacy and work engagement of clinical nurses is verified, so as to provide a theoretical basis for improving the clinical work engagement level of clinical nurses.

Materials and methods

Design and participants

A cross-sectional design of 1,660 nurses in five Level III general hospitals in Shanxi, Hubei, and Shandong from November to December 2023. Inclusion criteria: ① caregivers with clinical nurse qualification; those on duty during the ② survey; ③ agreed to participate in the study. Exclusion criteria: ① Nursing staff who did not work in the hospital during the survey, left, left, or left the hospital; ② further study and practice nursing staff.

Ethical considerations

This study met the criteria of the Declaration of Helsinki and was approved by the Ethics Committee of the First Hospital of Shanxi Medical University (NO. KYLL-2023–196).

Sample size

The required sample size was calculated based on the a priori efficacy analysis using version G * Power 3.1. 9.7 [18]. It is based on a small effect size of 0.02, an α of 0.05, and an efficacy of 0.90. Considering the 20% rate of invalid questionnaires, the minimum sample size required is 1155. Finally, 1,660 validated questionnaires were collected.

Data collection

The questionnaire scales involved in this study are all in Chinese and are divided into three parts. First, introduce the study purpose and state that this survey is based on the principle of voluntary anonymity, the questionnaire responses are for the study use only, and there is not any form of profit or other purpose. The second part collects the basic information about the clinical nurses. The third part sets up the scales required for this study.

In October 2023, 30 clinical nurses from a tertiary A general hospital in Shanxi Province were selected for pre-survey to improve the format and content of the questionnaire according to their feedback. Before the formal survey, the Nursing Department contacted the departments of this hospital and other hospitals and explained the purpose of the study, precautions, and confidentiality to the subjects before the survey, and obtained their informed consent. Participants must complete all questions before submitting the questionnaire, and only once per nurse to prevent duplication. Exclude incomplete and less than 15 min. A total of 1684 questionnaires were collected in this study, and 1,660 valid questionnaires were obtained after excluding invalid questionnaires, with a valid questionnaire recovery rate of 98.6%.

Measures

Personal demographic form

There are 12 items, including gender, age, daily disposable study time, whether you have obtained a psychological counselor certificate/psychotherapist certificate, whether you have received psychological-related training, and so on.

Three-dimensional character strengths questionnaire

The questionnaire was revised by Duan and Bu [19] in 2017 with 15 items, including three dimensions of affinity, curiosity, and self-control. Likert 5 score ("1" means very not like me, "5" means very like me). The higher the score, the higher the character strengths. In this study, the Cronbach's α coefficient was 0.946, the affinity dimension Cronbach's α coefficient was 0.938, the curiosity dimension Cronbach's α coefficient was 0.922, and the self-control dimension Cronbach's α coefficient was 0.900.

Chinese multiple mental health literacy scale

This scale was compiled by Jung H et al. [20] and revised by Ming Zhijun et al. [21], with a total of 22 items, including three dimensions of mental health knowledge, belief, and resources. Dichotomous score, knowledge dimension (10 items), "very agree", "agree" 1, other 0; belief dimension (8 items) reverse score, "very disagree", "disagree" 1, other 0; resource dimension (4 items) for right points, 1 point for "yes" and "no" 0. The total score was 0 to 22, with higher scores indicating a higher level of mental health literacy. In this study, the Cronbach's α coefficient was 0.910, the mental health knowledge dimension Cronbach's α coefficient was 0.954, the mental health belief dimension Cronbach's α coefficient was 0.922, and the mental health resource dimension Cronbach's α coefficient was 0.918.

Work engagement scale

This scale was developed by Schaufeli et al. [1] in 2006, with a total of 9 items, including three dimensions: vitality, dedication, and focus. Grade Likert 5 was scored for each entry. Higher scores indicate higher levels of work engagement. In this study, the Cronbach's α coefficient was 0.964, the vitality dimension Cronbach's α coefficient was 0.932, the dedication dimension Cronbach's α coefficient was 0.906, and the focus dimension Cronbach's α coefficient was 0.884.

Data analysis

Statistical analysis was performed using SPSS 25.0. Mean \pm standard deviation was used to analyze count data; univariate was used to analyze the input level of nurses with different characteristics; Pearson correlation to analyze the relationship between character strengths, mental health literacy, and work engagement; and homologous data with common method bias through Harman univariate test. Model 4 in the SPSS PROCESS macro was used to analyze the mediation role of nurse character strengths between mental health literacy and work engagement, and the mediation hypothesis was tested by Bootstrap. All statistical tests used two-sided tests, with a significance level set at $P < 0.05$ to determine significant differences.

Result

Common method bias

Since there are many variable questionnaires involved in this study, all filled in by the same respondent, there may be common method bias. This study was tested by the Harman univariate test. The results showed that the percentage of variance explained by the first common factor was 38.006%, less than 40%, and there were seven common factor feature values greater than 1, so there was no serious common method bias problem.

Participants' demographic characteristics

This study included 72 men, or 4.34%, and 1,588 women, or 95.66%. 0.112 were aged 25, 908 aged 26 – 35, and 528 aged 36 – 45. There were 328 unmarried people and 1,316 married people. Detailed data are detailed in Table 1.

Descriptive statistical analysis of variable scores

The results of the descriptive statistical analysis of the scores of clinical nurse character strengths, mental health literacy, and work engagement for these variables are shown in Table 2.

Table 1 Participants' demographic characteristics ($n = 1660$)

Item	Number	Percentage
Your gender:		
male	72	4.34%
female	1588	95.66%
Your age:		
≤ 25	112	6.75%
26 ~ 35	908	54.70%
36 ~ 45	528	31.81%
≥ 46	112	6.75%
Your marital status		
unmarried	328	19.76%
Be married	1316	79.28%
divorce	16	0.96%
Your final education		
Technical secondary school	4	0.24%
Junior college	40	2.41%
Undergraduate course	1552	93.49%
Master's degree or above	64	3.86%
Your years of service		
≤ 2 years	92	5.54%
2 ~ 5 years	284	17.11%
6 ~ 10 years	496	29.88%
11 ~ 20 years	568	34.22%
≥ 20 years	220	13.25%
Your title		
Nurse	124	7.47%
Nurse practitioner	512	30.84%
Supervisor nurse	976	58.80%
Associate chief nurse and above	48	2.89%
The nature of your work		
Contract system	1328	80.00%
Formal establishment	328	19.76%
other	4	0.24%
If you were in a psychiatric rotation		
Yes	88	5.30%
No	1572	94.70%
Your birthplace		
rural area	378	22.77%
city	1282	77.23%
In addition to work and family care, your daily available study time		
≤ 1 h	732	44.10%
1 ~ 2 h	772	46.51%
3 ~ 4 h	112	6.75%
≥ 4 h	44	2.65%
Do you have a psychologist/therapist license?		
Yes	80	4.82%
No	1580	95.18%
Have you received any training in mental health care in the hospital		
Yes	552	33.25%
No	1108	66.75%

Table 2 Descriptive statistical analysis of variable scores ($n = 1660$)

project	Total score	Item Average
Mental health literacy	12.01 ± 5.78	0.55 ± 0.26
Mental health knowledge	7.47 ± 3.64	0.75 ± 0.36
Mental health beliefs	2.33 ± 2.83	0.29 ± 0.35
Mental Health Resources	2.21 ± 1.78	0.55 ± 0.44
Character Strengths	55.66 ± 8.83	3.71 ± 0.59
Affinity	20.00 ± 3.16	4.00 ± 0.63
curiosity	17.76 ± 3.59	3.55 ± 0.72
Self-control	17.90 ± 3.40	3.58 ± 0.68
Work Engagement	33.77 ± 6.67	3.75 ± 0.74
Focus	11.28 ± 2.27	3.76 ± 0.76
Dedication	11.22 ± 2.36	3.74 ± 0.79
vitality	11.27 ± 2.33	3.76 ± 0.78

Comparison of work engagement scores among nurses with different characteristics

Univariate analysis showed that there was no significant difference in the total score of nurses' work engagement among different genders, marital status, final education, nature of work, nature of hospital, and hospital level ($P > 0.05$). Age, working years, job title, daily disposable learning time, whether there is a psychological counselor/psychotherapist certificate, whether there is a psychological training of the six variables have statistical significance. See Table 3 for details.

Correlation analysis of clinical nurses' character strengths, mental health literacy, and work engagement

Pearson correlation analysis results show that character strengths are significantly positively correlated with mental health literacy ($r = 0.492$, $P < 0.001$) and work engagement ($r = 0.627$, $P < 0.001$). Mental health literacy is significantly positively correlated with work engagement showed a significant positive correlation ($r = 0.428$, $P < 0.001$), see Table 4.

Mediating effects

In this study, Model 4 in Hayes's (2012) SPSS PROCESS macro was applied as a mediation model, examining the role of age, years of work, professional title, daily disposable study time, consultant/psychotherapist certificate, and psychological training of the six variables as control variables. The results are shown in Table 5. The results of regression analysis showed that mental health literacy had a significant positive effect on work engagement ($B = 0.408$, $t = 18.206$, $P < 0.001$), mental health literacy also significantly predicted character strengths ($B = 0.498$, $t = 22.702$, $P < 0.001$), and mental health

literacy still had a positive effect on work engagement ($B = 0.136$, $t = 6.265$, $P = 0.002$), and character strengths also had a positive effect on work engagement ($B = 0.546$, $t = 25.713$, $P < 0.001$).

The Bootstrap test used confidence interval ranges to assess whether the mediation effect was significant. Bootstrap test results (Table 6) show that the mental health literacy of work engagement directly and through the mediation effect of character strengths of bootstrap 95% confidence interval of upper and lower limit does not contain 0, shows that mental health literacy, on the one hand, can directly predict work engagement, on the other hand, can through the mediation effect of character strengths prediction work engagement. The direct effect (0.157, 95% CI: 0.108 ~ 0.206) and the mediation effect (0.313, 95% CI: 0.273 ~ 0.355) accounted for 33.32% and 66.68% of the total effect (0.470, 95% CI: 0.429 ~ 0.509), respectively, indicating that character strengths played a partial intermediary role between mental health literacy and work engagement. A detailed pathway model is shown in Fig. 1.

Discussion

Analysis of the current status of clinical nurses' character strengths, mental health literacy, and work engagement

In this study, clinical nurses were classified as (3.71 ± 0.59), which was slightly higher than the results (3.53 ± 0.58). From the perspective of the current situation, this difference may arise from multiple levels: the first is the difference in the composition of the subjects. This study focused on a female-oriented group of clinical nurses, while the study by Han Shiyu et al. focused more on male nurses. It is well known that male nurses mostly work in emergency department and intensive care. The nature of the work of these departments requires them to be highly vigilant and fully committed to the emergency treatment of patients. In contrast, although female nurses are equally on important nursing tasks, their work environment and responsibility allocation may be more diverse, indicating a slightly different trend in the overall performance of personality strength. Secondly, from the perspective of the social gender role, nursing work has long been regarded as a female-dominated field. The orientation of this social gender role not only shapes the public's general cognition of the nurse profession, but also may affect the personality trait development of the nurse community to a certain extent. Women are often endowed with more delicate and amiable personality traits, which are particularly important in nursing work and help to build a harmonious relationship between nurses and patients and improve the quality of care. Therefore, the main sample of female nurses in this study scored high in the dimension of affinity, matching with

Table 3 Comparison of work engagement scores of nurses with different characteristics ($n = 1660$)

Item		Number	Score ($\bar{x} \pm s$)	F	P
Your gender	male	72	33.83 \pm 5.426	0.006	0.938
	female	1588	33.77 \pm 6.715		
Age Group	≤ 25	112	33.68 \pm 5.36	14.787	< 0.001
	26 ~ 35	908	33.07 \pm 6.64		
	36 ~ 45	528	34.26 \pm 6.80		
	≥ 46	112	37.25 \pm 6.48		
Your marital status	unmarried	328	32.77 \pm 6.68	2.807	0.903
	Be married	1316	34.09 \pm 6.62		
	divorce	16	28 \pm 5.11		
Your final education	Technical secondary school	4	32.77 \pm 6.68	2.16	0.91
	Junior college	40	35 \pm 2.08		
	Undergraduate course	1552	33.71 \pm 6.80		
	Master's degree or above	64	34.19 \pm 4.92		
Years of working experience	≤ 2 years	92	32.91 \pm 4.94	15.849	< 0.001
	2 ~ 5 years	284	34.15 \pm 6.46		
	6 ~ 10 years	496	32.23 \pm 6.83		
	11 ~ 20 years	568	34.11 \pm 6.72		
	≥ 20 years	220	36.25 \pm 6.35		
Your title	Nurse	124	34.16 \pm 5.77	13.75	< 0.001
	Nurse practitioner	512	32.28 \pm 7.44		
	Supervisor nurse	976	34.39 \pm 6.17		
	Deputy chief nurse	48	36.08 \pm 7.80		
the nature of one's job	Contract system	1328	33.41 \pm 6.83	3.233	0.051
	Formal establishment	328	35.32 \pm 5.68		
	other	4	33.77 \pm 6.67		
Rotation of whether in the psychiatric department	Yes	88	33.77 \pm 6.67	1.034	0.918
	No	1572	33.65 \pm 6.7		
Your birthplace	city	112	33.79 \pm 6.77	0.002	0.961
	village	253	33.77 \pm 6.63		
Daily available study time	≤ 1 h	732	32.81 \pm 6.74	16.829	< 0.001
	1 ~ 2 h	772	34.66 \pm 6.69		
	3 ~ 4 h	112	32.39 \pm 4.39		
	≥ 4 h	44	37.73 \pm 6.83		
Do you have a psychologist/psychotherapist certificate?	Yes	80	36.7 \pm 5.38	5.01	< 0.001
	No	1580	33.63 \pm 6.70		
Have you received any psychological training?	Yes	552	35.53 \pm 5.81	8.168	< 0.001
	No	1108	32.9 \pm 6.90		

Table 4 Correlation analysis of mental health literacy, character strengths, and work engagement

variable	Mental health literacy	Character strengths	Work engagement
Mental health literacy	1		
Character strengths	0.492 ^a	1	
Work engagement	0.428 ^a	0.627 ^a	1

^a Correlation is significant at the 0.01 level (two-tailed)

this social gender role orientation. Further analysis of the three-dimensional scores, we found that the affinity score is far ahead, while curiosity and self-control are relatively inferior. This result echoes the previous research results of Han Shiyu [3] and Zhang SE et al [5], which jointly reveals some common characteristics of the personality characteristics of nurses. As a direct embodiment of the nurses' caring ability, the affinity plays a pivotal role in the nursing work. However, in a intensive, fast-paced clinical work environment, nurses often face great time pressure

Table 5 The mediating model of character strengths on the relationship between clinical nurses' mental health literacy and work engagement ($n = 1660$)

outcome variable	predictor variable	R	R ²	F	B	t
work engagement	Mental health literacy	0.469	0.22	66.573 **	0.408	18.206 **
	age				0.116	2.970 *
	Working years				0.007	0.168
	job title				0.022	0.718
	Daily available study time				0.089	4.036 **
	Do you have a psychologist/therapist certificate?				-0.042	-1.892
	Have you received any psychological training?				-0.068	-2.897 *
Character Strengths	Mental health literacy	0.502	0.252	79.564 **	0.498	22.702 **
	age				0.115	2.997 *
	Years of working experience				-0.119	-2.761 *
	job title				0.077	2.587 *
	Daily available study time				0.031	1.434
	Do you have a psychologist/therapist certificate?				0.007	0.326
	Have you received any psychological training?				0.04	1.773
Work Engagement	Mental health literacy	0.666	0.443	164.175 **	0.136	6.265 **
	Character Strengths				0.546	25.713 **
	age				0.054	1.613
	Years of working experience				0.072	1.941
	job title				-0.02	-0.786
	Daily available study time				0.072	3.865 **
	Do you have a psychologist/therapist certificate?				-0.046	-2.445 *
	Have you received any psychological training?				-0.09	-4.545 **

Note: *indicates $P < 0.05$, **indicates $P < 0.001$

Table 6 Effect estimation of the assumption model ($n = 1660$)

	Effect size	Boot standard error	Boot CI lower limit	Boot CI upper limit	Relative effect size
Indirect effect	0.313	0.021	0.273	0.355	66.68%
Direct effect	0.157	0.025	0.108	0.206	33.32%
Total effect	0.470	0.021	0.429	0.509	

The confidence interval of the Bootstrap test does not contain 0 to indicate statistical significance

and workload. They need to find a balance between their family and their career, which undoubtedly poses a higher challenge to their curiosity and self-control. It is noteworthy that while nurses may show relatively low enthusiasm for pursuing new things, this does not mean that they lack room for innovation or progress. On the contrary, this situation reminds us that more attention should be paid to stimulating nurses' curiosity and innovation consciousness in nursing education and vocational training, so as to help them maintain their desire for new knowledge and the spirit of exploration after their busy work. At the same time, medical institutions should also provide more time and space for nurses to develop their self-control ability and improve their overall professional

quality by optimizing the work process and reducing the workload.

In the current medical and health field, clinical nurses, as important providers of medical services, their mental health literacy status directly affects the quality of nursing work and patients' nursing experience. The results of this study showed that the mental health literacy score of clinical nurses (12.01 ± 5.78), which triggered our deep attention to the level of mental health literacy of clinical nurses. It may be closely related to the work characteristics and training experience of clinical nurses. Most of the respondents did not participate in professional training related to psychology, which directly limited their access to mental health knowledge and skills, which led

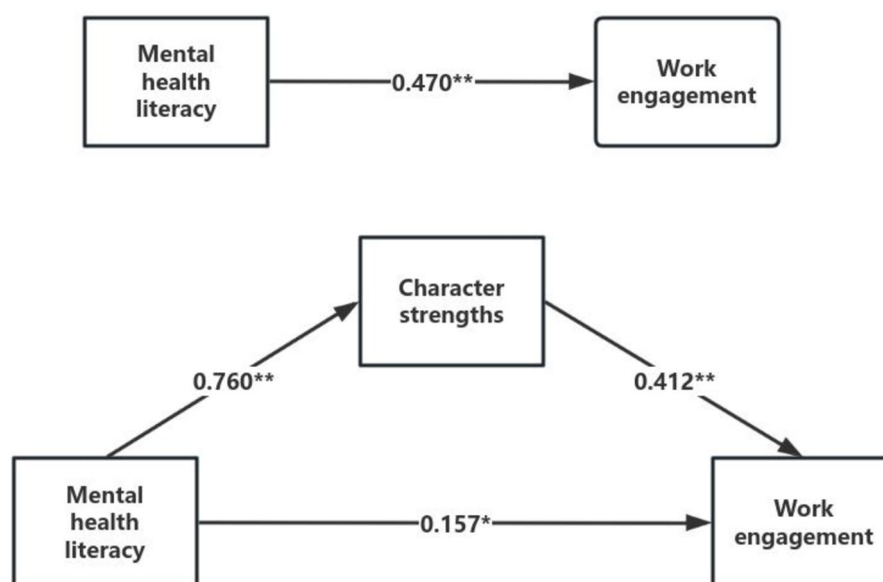


Fig. 1 Mediating effect pathway model. Note: * indicates $P < 0.05$, ** indicates $P < 0.001$

to their relatively low level of mental health literacy. This finding not only reveals the shortcomings of the current nursing education system in the popularization of psychological knowledge, but also reflects the importance of medical institutions to improve the improvement of nurses' mental health literacy. Previous studies have shown that there is a positive correlation between mental health literacy and empathy [22], that is, individuals with higher mental health literacy tend to better understand and feel the emotions and psychological states of others, and thus show stronger empathy. However, in the current group of clinical nurses, the overall low level of mental health literacy may limit the performance of their empathy, which in turn affects the quality of nursing work and patient satisfaction. At the same time, there is a negative correlation between mental health literacy and job burnout [23], which means that with the improvement of mental health literacy, clinical nurses' sense of job burnout may decrease accordingly. This finding emphasizes the importance of improving the mental health literacy of the clinical nurses, which not only helps to relieve the personal psychological pressure of the nurses, but also effectively reduces the occurrence of job burnout and improves their job satisfaction and happiness. Therefore, the current mental health literacy level of clinical nurses still needs to be further improved. Managers should be based on the present situation, take effective measures to strengthen training and education, establish mental health education and counseling mechanism, and create a good working atmosphere and interpersonal environment, etc., to improve the mental health literacy level

of clinical nurses, and improve their work participation, reduce job burnout, provide more high quality nursing services for patients.

In the current medical and health service system, the degree of work input of clinical nurses is an important indicator to measure their professional attitude, work efficiency and nursing quality. The results of this study showed that the project score of clinical nurses was (3.75 ± 0.74) , this result reflects both the active input of clinical nurses in their work and the possibility that there is still room for improvement. The work engagement level of clinical nurses in this study was slightly higher than the study of Juan Jesus Garcia-Iglesias et al. [24]. This difference may be closely related to the national environment and national policies. In recent years, especially during the COVID-19 pandemic, the Chinese government has attached great importance to the health and well-being of medical workers, and introduced a series of policies and measures to protect the rights and interests of medical staff and enhance their social status and professional honor. These initiatives may have partly stimulated the work enthusiasm and commitment of clinical nurses. However, the work engagement level of clinical nurses in this study was slightly lower compared with the findings of Qin Hui et al. [25] (4.06 ± 0.46) . It is worth noting that the respondents of Qin Hui et al. were specialized nurses. Specialized nurses often have higher professional skills and professional qualities because they receive more professional and systematic training, and therefore may show higher levels of work input. This finding reveals the positive impact of the policy orientation that attaches great

importance to the development of specialized nurses on improving the level of nurses' work input. In addition, the National Nursing Development Plan (2021–2025) clearly proposed to strengthen the training of nursing service capacity, which echoes the results of this study, further emphasizing the importance of improving nurses' professional skills and level of work input. The degree of work input is closely related to the work performance of nurses. High level of work input can not only reduce the job burnout of nurses, improve job satisfaction, but also significantly improve the quality of nursing [26, 27]. Therefore, the current work input level of clinical nurses is at a medium level, which has both a positive side and also needs room for improvement. Nursing managers should be based on the status quo, combined with the national policy guidance and actual demand, take effective measures to strengthen the specialized training, optimize the working environment, establish and improve the incentive mechanism and strengthen mental health education, etc., in order to improve the level of clinical nurses, and improve the quality of nursing, reduce burnout, improve job satisfaction.

Character strengths mediate the relationship between mental health literacy and work engagement

This study showed that the mental health literacy of clinical nurses was positively correlated with work engagement and had a positive predictive effect on work engagement ($P < 0.001$), indicating that the higher the level of mental health literacy of clinical nurses, the higher the work engagement. On the one hand, mental health literacy directly predicts work engagement, and on the other hand, it indirectly affects work engagement through character strengths. The mediating effect of character strengths on mental health literacy and work engagement accounted for 66.68% of the total impact, indicating that the more obvious the character strengths of clinical nurses, the higher the level of work engagement, which is consistent with previous studies [6, 7]. Therefore, nursing managers should strengthen psychological training for clinical nurses, improve their mental health awareness and literacy through training, and then promote work engagement. Create a learning-oriented work atmosphere, and provide support and motivation to nurses to promote their learning and work. At present, most studies on character strengths explore their impact on subjective well-being. Nursing managers should apply positive psychology theory, pay attention to the character strengths of nurses in the team, and implement positive psychological intervention measures based on character strengths according to different characteristics.

Implication for nursing management

Nursing managers should attach great importance to the investment level of clinical nurses and take effective measures to improve them. Specifically, we can start from the following aspects: first, to strengthen the specialized training of clinical nurses to improve their professional skills and professional quality, to provide strong support for high quality nursing services; second, to optimize the working environment and conditions, provide nurses with good working atmosphere and necessary facilities and equipment to reduce their work pressure and burden; third, to establish and improve incentive mechanism, give recognition and reward to outstanding nurses, stimulate their enthusiasm and creativity; fourth, to strengthen mental health education and guidance, help nurses effectively cope with the psychological pressure and challenge in work, and maintain a positive attitude.

Limitations

This study also has shortcomings: First, this study is a current study, and the research results can only show a correlation, not a causal relationship. In the future, experimental research can be used to explore the causal relationship between mental health literacy and work engagement. Secondly, the number of samples is limited, and large sample studies can be carried out in the future to prove the universality of the results. Third, the data in this study were collected through self-report by nurses and may introduce bias. To strengthen research, future studies should consider collecting data from various groups, e. g. head nurses, head nurses, patients and physicians.

Conclusions

This study revealed that mental health literacy has a direct and indirect predictive effect on work engagement through the mediating effect, and character strengths have a direct predictive effect on work engagement. It is of great significance to expand the research on the relationship between character strengths, mental health literacy, and work engagement. On the one hand, in the process of nurse recruitment, in addition to considering hard indicators such as academic qualifications, theoretical scores, and operational skills, personality traits should also be assessed, especially those with character strengths; on the other hand, nursing managers should pay attention to the mental health literacy of clinical nurses and can take corresponding measures to improve the mental health literacy of clinical nurses, and further improve the level of work engagement by giving play to their character strengths.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12912-025-02770-1>.

Supplementary Material 1.

Clinical trial number

Not applicable.

Authors' contributions

Li Yuling and Shang Linping designed the study. Data curation: Zhao Yuan. Formal analysis: Zhao Yuan. Writing—original draft: Zhao Yuan. Writing—review and revising: Zheng Ruonan and An Junhong. All authors contributed to the article and approved the submitted version.

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Data availability

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation, to any qualified researcher.

Declarations

Ethics approval and consent to participate

The study was approved by the ethics committee of the First Hospital of Shanxi Medical University (approval number: KYLL-2023–196).

Competing interests

The authors declare no competing interests.

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References

- Schaufeli WB, Bakker AB, Salanova M. The measurement of work engagement with a short questionnaire: a cross-national study. *Educ Psychol Meas.* 2006;66(4):701–16. <https://doi.org/10.1177/0013164405282471>.
- Yin H, Liu C. Correlation between work engagement, role stress, and perceived social support of superiors among clinical nursing teachers. *J Nurs.* 2021;36(7):15–8. <https://doi.org/10.3870/jissn.1001-1660>.
- Han S, Zhang X, Lin W, Wu X. The mediating role of strengths application in the relationship between character strengths and subjective well-being of male nurse. *J Nurs.* 2020;35(18):15–8. <https://doi.org/10.3870/jissn.1001-16602.2020.18015>.
- Xie J, Liu M, Zhong Z, Zhang Q, Zhou J, Wang L, Ma K, Ding S, Zhang X, Sun Q, Cheng ASK. Relationships Among Character Strengths, Self-efficacy, Social Support, Depression, and Psychological Well-being of Hospital Nurses. *Asian Nurs Res (Korean Soc Nurs Sci).* 2020;14(3):150–7. <https://doi.org/10.1016/j.anr.2020.06.002>.
- Zhang SE, Yang LB, Zhao CX, Shi Y, Wang HN, Zhao X, Wang XH, Sun T, Cao DP. Contribution of Character Strengths to Psychology Stress, Sleep Quality, and Subjective Health Status in a Sample of Chinese Nurses. *Front Psychol.* 2021;12:631459. <https://doi.org/10.3389/fpsyg.2021.631459>. Published 2021 Nov 1.
- Huber A, Strecker C, Kachel T, Höge T, Höfer S. Character Strengths Profiles in Medical Professionals and Their Impact on Well-Being. *Front Psychol.* 2020;11:566728. <https://doi.org/10.3389/fpsyg.2020.566728>. Published 2020 Dec 23.
- Ding X, Kan H, Chu X, Sun C, Ruan F. A study of character strengths, work engagement, and subjective well-being in Chinese registered nurses. *Med Pr.* 2022;73(4):295–304. <https://doi.org/10.13075/mp.5893.01203>.
- Liang R, Sun TKM, Zeng L, You W, Li QQ, Xu Y, Lei C, Zhang S, Zhang D. Analysis of the work input level and influencing factors of operating room specialized nurses in Sichuan Province. *J Nurs.* 2023;38(04):40–4.
- Han S. Effect of work stress on subjective wellbeing in male nurses: the mediating role of personality strengths and advantage utilization. Hefei: Anhui Medical University; 2021.
- Wang X, Liu C, Zhao W, Chen X, Li H, Yin M, Zhao H, Wang F. Study on the influence of personality advantage and emotional intelligence on the coping tendencies of clinical caregivers. *J Nurs Manag.* 2023;23(12):931–5+ 977.
- Jorm AF, Korten AE, Jacomb PA, Christensen H, Rodgers B, Pollitt P. "Mental health literacy": a survey of the public's ability to recognize mental disorders and their beliefs about the effectiveness of treatment. *Med J Aust.* 1997;166(4):182–6. <https://doi.org/10.5694/j.1326-5377.1997.tb140071.x>.
- Hao Y, Wu Q, Luo X, Chen S, Qi C, Long J, Xiong Y, Liao Y, Liu T. Mental Health Literacy of Non-mental Health Nurses: A Mental Health Survey in Four General Hospitals in Hunan Province, China. *Front Psychiatry.* 2020;11:507969. <https://doi.org/10.3389/fpsyg.2020.507969>. Published 2020 Oct 27.
- Imamura K, Kawakami N, Tsuno K, Tsuchiya M, Shimada K, Namba K, Shimazu A. Effects of web-based stress and depression literacy intervention on improving work engagement among workers with low work engagement: An analysis of the secondary outcome of a randomized controlled trial. *J Occup Health.* 2017;59(1):46–54. <https://doi.org/10.1539/joh.16-0187-OA>.
- Seligman ME, Csikszentmihalyi M. Positive psychology: An introduction. *Am Psychol.* 2000;55(1):5–14.
- Meiling L, Xizhou T, Xiaodong G. Character advantage and its impact results. *Adv Psychol Sci.* 2018;26(12):2180–91.
- Kim EJ, Yu JH, Kim EY. Pathways linking mental health literacy to professional help-seeking intentions in Korean college students. *J Psychiatr Ment Health Nurs.* 2020;27(4):393–405.
- Wang Y, Ning L, Xu J, Cai L, Zhang Q, Chen M, Wu T. The impact of positive psychological group counseling on perceived stress and work engagement among nursing interns. *High Med Educ China.* 2021;11:12–4.
- Faul F, Erdfelder E, Buchner A, Lang A-G. Statistical power analyses using G* power 3.1: tests for correlation and regression analyses. *Behav Res Methods.* 2009;41(4):1149–60.
- Duan W, Bu H. Development and initial validation of a short three-dimensional inventory of character strengths. *Qual Life Res.* 2017;26(9):2519–31. <https://doi.org/10.1007/s11136-017-1579-4>.
- Jung H, von Sternberg K, Davis K. Expanding a measure of mental health literacy: Development and validation of a multicomponent mental health literacy measure. *Psychiatry Res.* 2016;243:278–86. <https://doi.org/10.1016/j.psychres.2016.06.034>.
- Ming Z, Chen Z, Wang Y, Jiang L, Guo F. Reliability and validity evaluation of the Chinese version of the Multivariate Mental Health Literacy Scale in male soldiers. *Chin J Public Health.* 2021;37(1):86–91. <https://doi.org/10.11847/zgggws1123418>.
- Sun H. The moderating role of mental health literacy in the relationship between occupational stress and burnout in nurses. *Occup Health.* 2020;36(19):2593–5+2599. <https://doi.org/10.13329/j.cnki.zyyjk.2020.0686>.
- Qi W, Shi Z. Research on the influence of nurses' mental health literacy level on empathy ability. Shanghai Nursing Association. Collection of abstracts of the 5th Shanghai International Nursing Conference (Part 2). 2022;2. <https://doi.org/10.26914/c.cnkihy.2022.029283>.
- García-Iglesias JJ, Gómez-Salgado J, Ortega-Moreno M, Navarro-Abal Y. Relationship Between Work Engagement, Psychosocial Risks, and Mental Health Among Spanish Nurses: A Cross-Sectional Study. *Front Public Health.* 2021;8:627472. <https://doi.org/10.3389/fpubh.2020.627472>. Published 2021 Jan 26.
- Qin H, Wu J, Wang T, Wu J, Zhou J. Investigation and analysis of the current status and influencing factors of work engagement of specialist nurses in Jiangsu Province. *J Nurs.* 2022;37(11):53–6. <https://doi.org/10.3870/j.1001-16602.2022.11.053>.
- Wan Q, Zhou W, Li Z, Shang S. Associations of Organizational Justice and Job Characteristics with Work Engagement Among Nurses in Hospitals in China. *Res Nurs Health.* 2018;41(6):555–62. <https://doi.org/10.1002/nur.21908>.
- Mukaihata T, Fujimoto H, Greiner C. Factors influencing work engagement among psychiatric nurses in Japan. *J Nurs Manag.* 2020;28(2):306–16. <https://doi.org/10.1111/jonm.12923>.

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