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Research Article

Relationships Among Character Strengths, Self-efficacy, Social Support, Depression, and Psychological Well-being of Hospital Nurses

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ABSTRACT

Purpose: From the perspective of positive psychology, our study aimed to explore depressive symptoms and psychological well-being among Chinese nurses, as well as analyze the impacts of character strengths, self-efficacy and social support on the mental health of nurses.
Methods: A cross-sectional and descriptive design using five self-reported questionnaires was used to investigate a cohort of 4238 nurses during 2018. A structural equation modeling analysis was used to verify a hypothetical model linking character strengths, self-efficacy, social support, depressive symptoms, and psychological well-being.
Results: The prevalence of depression among this cohort of Chinese nurses was 58.1%. The mean scores for caring, inquisitiveness, and self-control were 19.93 (SD = 2.82), 15.94 (SD = 3.00), and 16.34 (SD = 2.95), respectively. The hypothesized model was a good fit of the data (χ^2/df = 1.77, p = .183, root mean square error of approximation = 0.04, goodness of fit index = 1.00, comparative fit index = 1.00, Tucker–Lewis index = 1.00). Except for the path from self-control to depression, the other hypothetical paths investigated were statistically significant.
Conclusion: Character strengths were directly and positively associated with psychological well-being. Inquisitiveness was the strongest direct protective factor for depression. In addition, character strengths indirectly alleviated depression and increased psychological well-being through mediating variables of social support and self-efficacy. This study should alert nurse managers that more attention should be paid to the character strengths and mental health of nurses. This study provides evidence for interventions based on character strengths as a management strategy to support the mental health of nurses.
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Introduction

With the development of society, people's demand for health care has been increasing steadily. Nursing is an essential part of the medical and health-care systems, playing an important role in maintaining and promoting human health [1]. Usually, as the main contact point between patients and medical staff, enthusiastic and patient nurses improve the quality of medical services, and promote the harmonious nurse–patient relationship. However, in many cases, factors such as heavy workloads and unstable working environment put an enormous pressure on nurses, making them more prone to negative emotions such as anxiety and depression [2]. Methods to alleviate negative emotions improve psychological well-being among nurses is a focus of nursing managers.

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Depression, the most common type of mental disorder, is characterized by significant and lasting sadness, feelings of inferiority, pessimism, and thoughts of suicide. Sometimes somatic symptoms may also occur. In China, the prevalence of depressive symptoms among nurses is higher than that among other medical staff [2]. Previous studies showed that the prevalence of depression among nurses in China (61.0%) was nearly twice as high as that in Korea (38.0%) and more than two times higher than that in the United States (18.0%) [3–5]. The tendency of Chinese nurses to experience depressive symptoms is possibly due to the following reasons. First, the shortage of nurses in China is severe, and the ratio of nurses to the general population is 1:340, which is lower than that in developed countries, where the ratio ranges from 1:140 to 1:320 [6]. Thus, Chinese nurses are often required to undertake relatively long working hours, heavy workloads, and large number of patients, but their pay is relatively low [5]. Second, in accordance with the Fifth National Health Service Survey in China, the sense of professional honor among the medical staff has declined, and they reported that they felt that they were not respected by patients [7]. Among the medical staff, nurses' social status was relatively low [5]. Finally, in China, the tension between doctors and patients has become one of the prominent social problems, and violent injuries have become a significant source of depression among nurses in China. Depression not only reduces nurses' quality of life and life satisfaction but also increases their job burnout and turnover rate [8]. Furthermore, depression reduces nurses' work efficiency and increases the risk of medical errors and adverse events [9]. As a result, patient safety is affected. Psychological well-being, in reference to an employees' attitudes and feelings toward their work context, is another critical component of workplace health [10]. In contrast to depression, psychological well-being positively affected employment outcomes such as job satisfaction. The higher the psychological well-being of employees, the lower their turnover intention. Nurses play an important role in medical services, and more attention should be paid to their mental health.

Positive psychology assumes that individuals have inherent capacities for growth, fulfillment, and happiness. If an individual lacks these capacities, depression may occur [11]. Character strengths are regarded as an essential component of positive psychology. A previous study showed that character strengths were closely correlated with depression, psychological well-being, and life satisfaction [12]. However, current studies on depression in nurses are mainly focused on work-related factors such as shift work, job satisfaction, and job burnout, ignoring the role of personal factors such as character strengths and related protective factors (i.e., self-efficacy, social support) in the development of depression among nurses. Thus, our study aimed to explore the association among character strengths, self-efficacy, social support, and nurses' mental health, which may provide references for the development of nurses' mental health interventions.

Background

Developed from Seligman's Values-In-Action Classification of Character Strengths and Virtues, the three-factor model is a reliable potential structure of Values-In-Action classification advantages and a visual classification of traditional cultural virtues [13]. It is composed of caring, curiosity, and self-control, which represent interpersonal, intellectual, and temperance strength, respectively [13]. Specifically, interpersonal strength includes kindness, teamwork, love and being loved, forgiveness, and gratitude. Intellectual strength includes creativity, curiosity, and passion, reflecting humor, courage, and faith. Furthermore, temperance strength refers to the self-control and persistence shown in achieving goals, including judgment, prudence, learning ability, and humility. Studies have shown that character strengths are positively correlated with flourishing, hope and happiness but negatively correlated with anxiety and depression [12,14]. Based on previous studies, the first hypothesis of this analysis was that caring, curiosity, and self-control are directly negatively associated with depression and positively associated with psychological well-being.

Self-efficacy is the belief in, judgment of or subjective self-perception of people's ability to perform and fulfill a goal [15]. A previous study showed that intellectual and temperance strength were the most important predictors of self-efficacy [16]. The ability to lead and to get things done (leadership), give and be asked for advice (perspective), seek out challenges (bravery), understand one's motivations (social intelligence), and enjoy improving others' sense of humor are the most important criteria that make individuals believe in their ability to master things and to regard demands as challenges rather than threats [17]. Therefore, we believe that self-control and inquisitiveness may improve self-efficacy. In addition, higher self-efficacy was associated with lower depression [18]. Therefore, the second hypothesis of this study was that self-control and inquisitiveness can improve self-efficacy, thereby alleviating depression and improving well-being among nurses.

Social support refers to information that leads a person to believe that he or she is cared for, loved, respected, and a member of a network of mutual obligations [19]. When faced with challenging job demands, social support is believed to help workers cope with stress. Character strengths are composed of interpersonal, intellectual, and temperance strengths, including kindness, teamwork, humor, passion, and creativity. Populations with high character strengths have better interpersonal relationships, more openness to new possibilities, and greater personal strength, which allows them to play a more prominent role in teams and have better social support. Therefore, we hypothesized that character strengths are positively correlated with social support. In addition, research by Feng et al. [20] showed that social support could directly and effectively affect nurses' depression and work productivity. Therefore, the third study hypothesis was that caring, self-control, and inquisitiveness enhance social support, which in turn alleviates depression and improves psychological well-being.

Based on the theory and studies aforementioned, we proposed the stated hypotheses and established a hypothetical model linking character strengths, self-efficacy, social support, depressive symptoms, and psychological well-being, as shown in Figure 1.

This study had the following two objectives: (1) to investigate the prevalence of depressive symptoms and related factors and (2) to explore the impacts of character strengths, social support, and self-efficacy on the mental health of nurses.

Methods

Study design

A cross-sectional and descriptive study design was used to test the hypothesized model that links character strength, social support, self-efficacy, depression, and psychological well-being.

Settings and sampling

A stratified cluster random sampling method was used to obtain the final sample. China is geographically divided into 7 regions: Northeast, North, Central, East, South, Northwest, and Southwest China. We obtained details regarding the number and proportion of registered nurses and the level of the hospitals in each region of

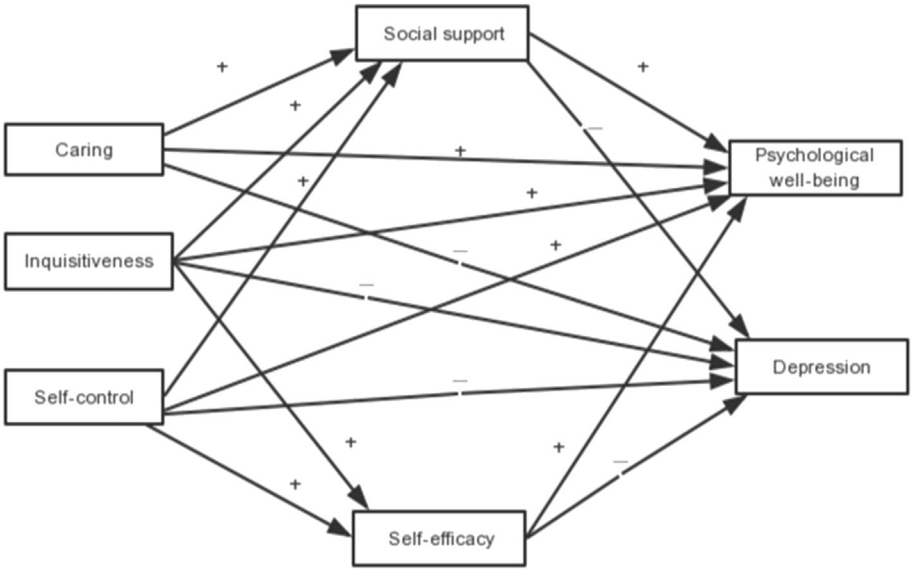


Figure 1. Hypothesized theoretical model.

China from the Chinese health statistics released by the National Health and Family Planning Commission in 2017. Between January and June 2018, 31 hospitals, including 20 tertiary hospitals (>500 beds) and 11 secondary hospitals (101-500 beds), from 15 cities of 13 provinces from 7 geographical areas, were selected to participate in the study. We sent emails to the hospital administrators and nursing managers of each selected hospital, informing them of the purpose and procedure of the investigation, and obtaining their consent and cooperation. After that, we numbered the list of nurses in the selected hospital, and a 25.0% sample was randomly selected, from the total number of registered nurses (RNs) in each of the selected hospitals, using SPSS software. Then, the head nurses and directors from each hospital invited the selected nurses to participate in this study. The sample size was calculated using the formula $n = Z_{\alpha/2}^2 \times P(1\text{-}P)/\delta^2$ [21]. Based on the prevalence of depression among Chinese nurses in previous studies [5], P was set as 0.617, $\alpha = 0.05$, $Z_{\alpha/2} = 1.96$, $\delta = 0.05$, and the minimum sample size required was 364. Nurses eligible for inclusion met the following criteria: (1) registered nurse or licensed practical nurse; (2) provided direct care to residents; and (3) spoke Chinese. In this study, the sample of 4238 participants obviously met the minimum and exceeded sample size of 364.

Ethical considerations

The study was approved by the Ethical Committee of the Third Xingya Hospital of Central South University (Approval no. 2017-S559). Participants provided written informed consent before participating in the study.

Data collection

In this study, we enrolled 31 hospitals from 15 cities. The study team comprised 20 nurse managers and 8 nursing postgraduates. One to two nurse managers were responsible for the data collection of nurses in selected hospitals in each city, with 3 nurses recruited as assistants. Before the survey, all researchers participated in standardized data collection training. Nurses interested in this study contacted the researchers. Then, the researchers collected the standardized questionnaires when the nurses participated in a study meeting or training at the hospital. The researchers explained the research purpose and related content to the nurses and gave them 30 to 45 minutes to complete the questionnaires. After participating in many meetings, the research team completed data collection. Finally, 8 nursing postgraduates summarized and input the data manually.

Measurements

Sociodemographic information

The sociodemographic questionnaire included age, gender, years of employment, position, educational background, marital status, sleep, overall working condition, and treatment at work.

Character strengths

Character strengths were assessed using the 15-item Three-Dimensional Inventory of Character Strengths, developed by Dr Duan [22]. The scale consists of three dimensions, namely, caring, inquisitiveness, and self-control, and each dimension has five items. Each item is scored on a 5-point Likert scale ranging from 1 (very much unlike me) to 5 (very much like me), and subscale scores are obtained by averaging the items on the scale. In a survey of medical staff members, the Cronbach's α values for the caring subscale, the inquisitiveness subscale, and the self-control subscale were .86, .80, and .85, respectively [22].

Self-efficacy

Self-efficacy was assessed using the General Self-Efficacy Scale (GSES), which was originally designed to reflect optimistic self-belief [23]. The Chinese version of the GSES was developed to measure self-efficacy in the general population and contains 10 questions with a score range of 1~4 for each question [24]; higher scores represent higher self-efficacy. The Chinese version of the GSES has a Cronbach's α of .87, retest reliability of .83, and split-half reliability of .82 [24].

Social support

Social support was assessed by the Social Support Self-Rating Scale (SSRS), which is a widely used scale designed by Xiao [25] to measure social support in China. The SSRS is a 10-item scale that assesses three dimensions, namely, subjective support, objective support, and support-seeking behavior. The subjective support

subscale has four items, whereas the other two subscales have three. The total score for social support is obtained by adding up all item scores, and the scoring ranges from 12 to 66. The higher the score, the better the social support. Generally, the level of social support can be classified into three categories: low (≤22), moderate (23–44), and high (≥45). The SSRS had sufficient reliability in a Chinese population with a retest reliability of .92 [25].

Depression

Depressive symptoms among the nurses were assessed by the Self-rating Depression Scale, which consists of 20 items. Participants were scored on the frequency of symptoms during the past week, with response options ranging from 1 to 4 points (none or seldom—most or constant). The total depression score was the sum of the 20-item scores multiplied by 1.25 to obtain the index score [26]. An index score of 50 is the threshold for determining whether a participant is depressed or not. When the total index score is more than 50, it means that the participant may have depressive symptoms. Furthermore, the higher the score, the worse the depressive symptoms. The Chinese version of the Self-rating Depression Scale has a Cronbach's α of .78 [27].

Psychological well-being

Psychological well-being was assessed by the 8-item Flourishing Scale, a scale developed by Dr Tang and Duan [28]. Each item is scored from 1 (strongly disagree) to 7 (strongly agree), and the range for the total item scores is 8–56 points. A high score indicates that the individual has a greater level of psychological well-being. Sufficient reliability was shown for the Flourishing Scale in a Chinese population (Cronbach's α of .93) [28].

Data analysis

Data analysis was performed in SPSS 17.0 (IBM Corp., Armonk, NY, USA). Frequencies, percentages, means and standard deviations, independent-samples t-tests, as well as one-way analysis of variance were used to statistically describe and analyze the demographic factors related to depressive symptoms. The Pearson correlation coefficient was used to explore the interaction among character strengths, self-efficacy, social support, depression, and psychological well-being.

Structural equation model (SEM) with maximum likelihood estimation was used to analyze the hypothesized model using AMOS 22.0 (IBM Corp., Armonk, NY, USA). As suggested by Hooper et al. [29], the chi-square ratio (χ^2/df) was used to evaluate the model fit. Generally, when $\chi^2/df < 3$, the fit was good. In addition, some other indices were also used to assess the fit between our hypothetical model and the observed data. For instance, when the root mean square error of approximation ≤ 0.08, the model fit was reasonable. Moreover, if the goodness of fit index (GFI), the comparative fit index (CFI) and the Tucker-Lewis index (TLI) were >0.90, the model fit was good.

Results

Demographic characteristics of the nurses

Of 5800 eligible nurses, 5000 agreed to participate in the study. In total, 4238 (84.8%) responded effectively; 4152 (98.0%) were women and 2571 (60.7%) were aged 26-35 years. The majority of the nurses had more than five years of work experience ($n = 2807$, 66.2%) and a bachelor's degree ($n = 3103$, 73.2%). Most were unsatisfied with their working conditions ($n = 2219$, 52.4%) and treatment at work ($n = 1956$, 46.1%). Moreover, nearly half of the nurses had sleep problems ($n = 2002$, 47.2%).

The prevalence of depression among these Chinese nurses was 58.1%, and 25.0% had moderate to severe levels of depressive symptoms. There were significant differences in the prevalence of depressive symptoms related to age, education, years of employment, marital status, sleeping status, position, overall working status, and work treatment. Other characteristics are shown in Table 1.

Table 1 *Personal Characteristics and Job Characteristics among Nurse (N = 4238).*

Personal characteristics	*n* (%)	Depressive symptoms Mean ± SD	*p*	Job characteristics	*n* (%)	Depressive symptoms Mean ± SD	*p*
Gender				**Hospital level**			
Men	86 (2.0)	50.22 ± 9.93	.220	Secondary	946 (22.3)	52.89 ± 10.89	.934
Women	4152 (98.0)	51.59 ± 10.84		Tertiary	3292 (77.7)	51.18 ± 10.78	
Age (yrs)				**Years of employment**			
≤25	839 (19.8)	53.89 ± 10.42	<.001	≤5	1431 (33.8)	52.88 ± 10.70	<.001
26–30	1504 (35.5)	52.23 ± 10.71		6–10	1434 (33.8)	52.42 ± 10.62	
31–35	1067 (25.2)	51.77 ± 10.60		11–15	986 (23.3)	50.63 ± 10.78	
36–40	456 (10.8)	48.80 ± 10.83		>15	387 (9.1)	45.91 ± 10.15	
>40	372 (8.7)	46.43 ± 10.54					
The highest education				**Marital status**			
Secondary specialized school	50 (1.2)	54.16 ± 10.74	<.001	Married	2894 (68.3)	50.61 ± 10.88	<.001
				Divorce or Widowhood	73 (1.7)	52.93 ± 8.44	
Junior college	817 (19.3)	52.85 ± 10.73		Unmarried	1271 (30.0)	53.67 ± 10.51	
Undergraduate	3103 (73.2)	51.76 ± 10.70		**Overall working condition**			
Master or above	268 (6.3)	44.88 ± 10.18		Very satisfied	60 (1.4)	44.16 ± 10.99	<.001
Position				Satisfied	548 (12.9)	48.80 ± 9.87	
General nurse	3379 (79.7)	52.40 ± 10.65	<.001	Uncertain	1171 (27.6)	54.52 ± 9.39)	
Teaching group or Quality control team leader	478 (11.3)	50.14 ± 10.87		Dissatisfied	2219 (52.4)	57.99 ± 10.58	
Head nurse or above	381 (9.0)	45.94 ± 10.46		Very dissatisfied	240 (5.7)	67.00 ± 13.02	
Sleep status				**Treatment at work**			
Normal	2236 (52.8)	48.06 ± 9.92	<.001	Very satisfied	127 (3.0)	45.44 ± 11.16	<.001
Difficulty falling asleep	794 (18.7)	56.37 ± 10.49		Satisfied	1012 (23.9)	48.70 ± 10.09	
Easy to wake up	996 (23.5)	54.44 ± 10.05		Uncertain	965 (22.8)	53.54 ± 9.76	
Insomnia	179 (4.2)	55.46 ± 9.70		Dissatisfied	1956 (46.1)	55.34 ± 10.64	
Drug assisted	33 (0.8)	65.58 ± 16.63		Very dissatisfied	178 (4.2)	59.20 ± 12.76	

Note. SD = standard deviation; yrs = years.

Table 2 *Means, Standard Deviations, and Pearson Correlation of Major Study Variables.*

Variable	Mean	SD	1	2	3	4	5	6	7
1. Depression (standard scores)	51.56	10.82	1						
2. Caring	19.93	2.82	−.32**	1					
3. Inquisitiveness	15.94	3.00	−.43**	.45**	1				
4. Self-control	16.34	2.95	−.33**	.48**	.61**	1			
5. Psychological well-being	41.28	7.38	−.53**	.55**	.60**	.54**	1		
6. Self-efficacy	25.33	6.27	−.32**	.30**	.52**	.47**	.58**	1	
7. Social support	40.61	8.06	−.44**	.21**	.30**	.27**	.41**	.26**	1

Note. SD = standard deviation. **$p < .001$.

Descriptive results for the major study variables

Table 2 displays the means, standard deviations, and correlations for the main variables. For character strengths, the mean scores for caring, inquisitiveness, and self-control were 19.93 (SD = 2.82), 15.94 (SD = 3.00), and 16.34 (SD = 2.95), respectively. For the other variables, the mean scores for self-efficacy, social support, and psychological well-being were 25.33 (SD = 6.27), 40.61 (SD = 8.06), 41.28 (SD = 7.38), respectively, generally suggesting that nurses had a moderate level of self-efficacy, social support, and psychological well-being. Depressive symptoms were negatively associated with character strengths, self-efficacy, social support, and psychological well-being. Character strengths were positively correlated with psychological well-being, self-efficacy, and social support. Similarly, psychological well-being was positively correlated with self-efficacy and social support.

Structural model

The primary SEM analysis results indicated that the data did not fit the hypothesized model ($\chi^2 = 348.74$, df = 3.00, $\chi^2/df = 116.25$, $p < .001$, RMSEA = 0.17, GFI = 0.98, CFI = 0.97, TLI = 0.78). Based on the modification indices provided by the Amos output window, the covariant relationship between two pairs of residual terms was added. As a result, the fit was good ($\chi^2 = 1.77$, df = 1.00, $\chi^2/df = 1.77$, $p = .183$, RMSEA = 0.04, GFI = 1.00, CFI = 1.00, TLI = 1.00). As shown in Table 3, inquisitiveness was the strongest direct protective factor for depression ($\beta = -0.80$, $p < .001$), whereas caring was the second factor ($\beta = -0.45$, $p < .001$) and social support was the third ($\beta = -0.44$, $p < .001$). However, although self-control tended to reduce depression, the result was not statistically significant ($\beta = -0.06$, $p = .318$). For psychological well-being, caring was the strongest direct contributor to psychological well-being ($\beta = 0.74$, $p < .001$), whereas inquisitiveness and self-control were the second ($\beta = 0.52$, $p < .001$) and third ($\beta = 0.21$, $p < .001$), respectively. Figure 2 shows that character strengths directly played a strong role in improving psychological well-being among nurses. In addition, caring, inquisitiveness, and self-control indirectly alleviated depressive symptoms and increased psychological well-being through mediating variables of social support and self-efficacy.

Table 3 *Coefficient Estimates for Path Model.*

	Standardized estimates		
	β	CR	*p*
Direct effects			
Caring → depression/PW	−0.45/0.74	−7.83/24.11	<.001
Inquisitiveness → depression/PW	−0.80/0.52	−12.67/15.35	<.001
Self-control → depression/PW	−0.06/0.21	−1.00/6.24	.318/<.001
Social support → depression/PW	−0.44/0.17	−24.10/17.54	<.001
Self-efficacy → depression/PW	−0.13/4.11	−4.90/24.73	<.001
Indirect effects			
Caring → SS → depression/PW	−0.08/0.03	–	<.001
Inquisitiveness → SS → depression/PW	−0.24/0.09	–	<.001
Self-control → SS → depression/PW	−0.14/0.05	–	<.001
Inquisitiveness → self-efficacy → depression/PW	−0.10/3.20	–	<.001
Self-control → self-efficacy → depression/PW	−0.07/2.14	–	<.001

Note. CR = critical ratio; PW = psychological well-being; SS = social support.

Discussion

The purpose of this study was to investigate depression and related factors among Chinese nurses, as well as explore the mechanism underlying the effects of character strengths, self-efficacy, and social support on depressive symptoms and psychological well-being among nurses. The National Health Commission of China reported that most of the nurses were 25 to 34 years old and had worked for 5 to 9 years, and the proportion of male nurses in China was 2.0% in 2018, which was similar to the proportion in our study [30]. In our study, however, the proportion of nurses who had a master's degree was 6.3%, higher than the proportion in the official data (0.2%) [30]. Our study showed that 58.1% of Chinese nurses had depressive symptoms, a proportion higher than those of other countries [3,4]. This result indicated that Chinese nurses were more likely to develop depressive symptoms, which sounded an alarm for nursing managers to attach attention to nurses' mental health. In our study, all sociodemographic factors, except gender and hospital level, were associated with depressive symptoms, which was similar to the findings in the study by Gao et al. [5]. However, for the relationship between education level and depression, our study indicated that compared with nurses with a high educational background, nurses with a low educational level scored higher in terms of depressive symptoms, which was contrary to the study by Gao et al. [5]. Studies have demonstrated that a high level of education positively affects nurses' work attitudes and engagement [31]. Highly educated nurses tend to stay in nursing posts and are confident in coping with adversity at work [32]. Moreover, because of the need for promotion, nurses with a low level of education need to endure the pressure from work while continuing to study, which may make them more likely to be depressed. In addition, our study found that character strengths were directly and negatively correlated with nurses' depressive symptoms and positively correlated with their psychological well-being. At the same time, character strengths may improve psychological well-being through the mediating effect of self-efficacy, whereas curiosity and self-control were positively correlated with self-efficacy, thus affecting the mental health of these nurses. Here, we studied the relationship among personal factors, social support, self-efficacy, depression, and psychological well-being, which provided evidence to develop psychological interventions for nurses.

The first hypothesis confirmed the direct effect of character strengths on depressive symptoms and psychological well-being. Our research shows that caring, inquisitiveness, and self-control can improve well-being, whereas caring and inquisitiveness are negatively related to depression. The results partly supported the

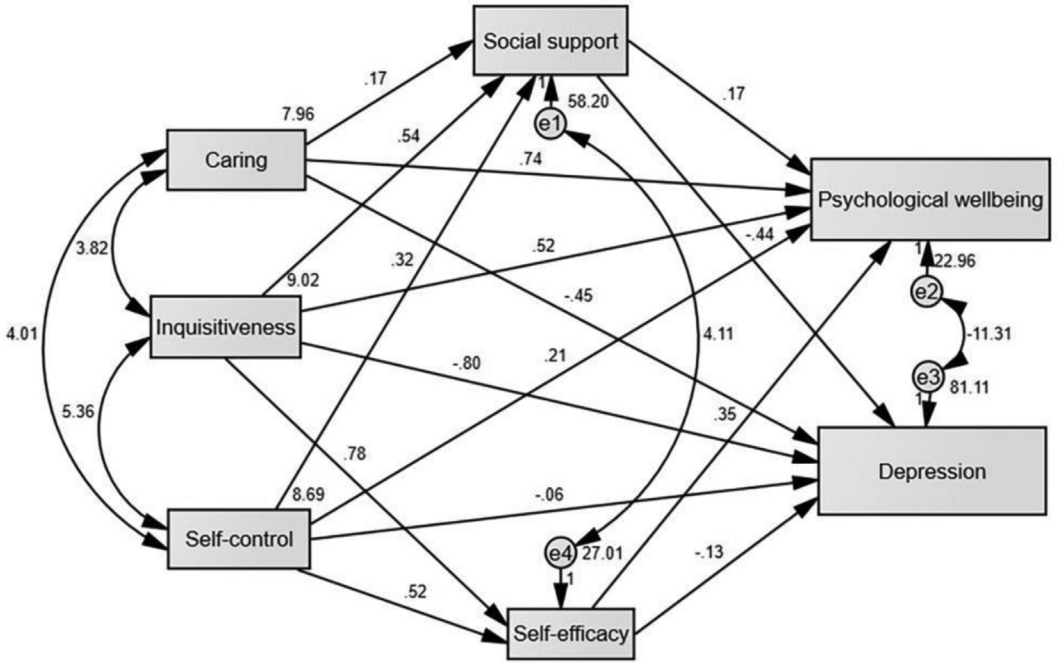


Figure 2. Results of structural equation model linking character strengths, self-efficacy, and social support on nurses' depression and psychological well-being.

hypothesized model and provide evidence for the three-factor model. As shown in Table 3, inquisitiveness explained 80.0% of the variation in depression scores, accounting for the largest proportion of all the aforementioned indicators. Inquisitiveness refers to a person's curiosity and creativity in exploring the unknown outside world. Several studies have shown that high inquisitiveness can positively predict life satisfaction and well-being, whereas low inquisitiveness was associated with depression [12,14]. Nurses with high inquisitiveness are more motivated to explore the unknown and then use theory and knowledge to solve problems in their work, which ultimately optimizes nursing services and promotes innovation in nursing tools and technology. Hence, for a nursing manager, a learning-oriented organizational culture should be established within the nursing team, and support and encouragement should be given to motivate nurses to learn actively. On the other hand, nursing managers should attach importance to nurses' inquisitiveness, provide a platform for their development and provide rewards for their achievements.

Caring, representing interpersonal strength, is another critical factor affecting nurses' mental health. In China, interpersonal support and the harmony of interrelations are issues people are concerned about. People with better interpersonal skills have a stronger sense of belonging and pursuit of a meaningful life. High caring-related interpersonal strength has been associated with well-being [14], which was in line with our study. Proctor et al. [14] reported that self-control attaches importance to the promotion of life satisfaction and psychological well-being. In our study, nurses who scored higher in self-control had greater psychological well-being. However, although self-control tended to alleviate depression, the direct effect was not statistically significant, which differed from the findings in previous studies. The inconsistent results may be caused by the different populations in these studies. Currently, many strength-based positive interventions are developing, such as gratitude visits and three good things based on gratitude, counting kindness developed from kindness. A prior study conducted a strength-based intervention in 622 adults and found that this intervention enhanced happiness and decreased depression in the participants [33]. Humans are born with temperament, but character strengths can be built. Thus, nursing managers should pay attention to the character strengths of the nurses on their teams. If nurses with lack of patience, indifference to interpersonal relationships, and a lack of enthusiasm for life are identified, a positive psychological intervention based on character strengths should be implemented for these individuals.

The second hypothesis was also confirmed: self-control and inquisitiveness can indirectly alleviate depression and enhance psychological well-being via self-efficacy. Self-control and inquisitiveness reflect intellectual and temperance strength, which are the most important predictors of self-efficacy [15]. Nurses with strong self-efficacy have better nursing competence and deal with difficulties more confidently and calmly. Moreover, studies have shown that self-efficacy lowers depression and anxiety [18]. As shown in Figure 2, self-control ($\beta = 0.52$, $p < .01$) and inquisitiveness ($\beta = 0.78$, $p < .01$) contributed significantly to improving self-efficacy in the nurses and had strong indirect effects on psychological well-being via self-efficacy. These results provide further evidence for the role of character strengths in mental health.

The third hypothesis confirmed the relationship between character strengths, social support, depression, and psychological well-being. Character strengths help people establish and maintain social relationships, obtain a sense of social belonging, and improve their social support. Our study showed that Chinese nurses had a moderate level of social support, which was directly and positively affected by their character strengths. Nurses with professional and family responsibilities inevitably face work–family conflict. Social support is important for nurses; it can relieve their pressure and improve their job performance [19,20]. In addition, nurses with higher levels of social support may experience higher personal achievement and less emotional exhaustion [20]. Meanwhile, social support directly and negatively affected depression and positively

affected mental health, was similar to the findings from a research by Feng et al. [20]. Therefore, character strengths alleviate depression and improve mental health via social support.

Strengths and limitations

Many studies have explored the impact of work-related factors on nurses' mental health, but few have explored personal factors such as character strengths or put personal factors and protective factors into a framework to explore their overall impact. This study not only explored the direct effects of character strengths on nurses' mental health but also found that character strengths had a positive effect on nurses' mental health via self-efficacy and social support. In addition, this study used a stratified cluster random sampling method to extract samples from seven regions of China, and the samples are well represented. However, our study still had some limitations. First, this study was a cross-sectional study and lacked the ability to establish a robust causal relationship between the study variables. Therefore, it is necessary to further explore the effects of character strength-based interventions on nurses' social support, self-efficacy and mental health. Second, this study used self-report questionnaires, which may have resulted in reporting bias. Finally, this study only investigated nurses in China; thus, more research in other regions and countries is needed to demonstrate the generalizability of the results.

Conclusion

In our study, the prevalence of depression among nurses was 58.1%. Nurses who had lower educational levels, were aged younger than 25 years old, were unmarried, had less than 5 years of work experience, had poorer sleep quality, and were very unsatisfied with their treatment at work, and working conditions were more likely to experience depression, hence nursing managers should pay more attention to these nurses. Furthermore, our study showed that character strengths not only directly improve psychological well-being but also indirectly improve psychological well-being via social support. Meanwhile, caring and inquisitiveness directly alleviated depression. In addition, inquisitiveness and self-control may enhance psychological well-being and alleviate depression via self-efficacy. Our research demonstrated the relationship between character strengths, social support, self-efficacy, depression, and psychological well-being. It provided evidence for interventions based on character strengths as a management strategy to support the mental health of nurses. Future research based on character strengths should be carried out to improve nurses' mental health.

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Conflict of interest

No conflict of interest has been declared by the authors.

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