

# Relationship between work-family conflict on work engagement in Chinese nurses: multiple mediating effects of anxiety and emotional intelligence

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## Research Article

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# Abstract

**Background:** In recent years, the work service quality of nurses has largely depended on their work engagement, which is extremely important and cannot be underestimated. Therefore, it is utmost importance to investigate the factors that can improve the work engagement of nurses, and the improvement in the level of work engagement of nurses is of great practical significance to the nursing service industry. A balance between work and family can promote the work engagement of nurses. This study aims to develop a structural model to assess the impact of work-family conflict on work engagement among Chinese clinical nurses using multiple mediators to clarify the underlying mechanisms of this relationship.

**Methods:** This is a cross-sectional study involving 1,177 registered nurses from a hospital in China, which provided the work-family conflict, work engagement, anxiety, and emotional intelligence scales. AMOS 23.0 was used for the path analysis of multiple mediation models.

**Results:** The total score of the work engagement of nurses was  $58.49 \pm 8.52$ , and the average score was  $3.66 \pm 0.53$ . Work-family conflict had a significant positive correlation with anxiety ( $r = 0.382, P < 0.001$ ) and a significant negative correlation with work engagement ( $r = -0.381, P < 0.001$ ) and emotional intelligence ( $r = -0.200, P < 0.001$ ); anxiety had a significant negative correlation with work engagement ( $r = -0.326, P < 0.001$ ) and emotional intelligence ( $r = -0.188, P < 0.001$ ); and work engagement had a significant positive correlation with emotional intelligence ( $r = 0.326, P < 0.001$ ). Emotional intelligence and anxiety partially mediated the relationship between work-family conflict and work engagement, with effect values of  $-0.092$  and  $-0.075$ , respectively. The chain-mediating effect of anxiety and emotional intelligence exhibited a value of  $-0.05$ . The total indirect effect had a value of  $-0.172$ .

**Conclusions:** Thus, it is suggested that hospital managers should take measures to alleviate work-family conflict, relieve anxiety, and improve the work engagement and emotional intelligence of nurses.

## Background

With the reform of the nursing mode and the rapid development of medical technology, significant medical problems are being faced in today's society with the new era of nursing staff having higher requirements. As the core force and key factor affecting the reform of the nursing mode, the work engagement of nurses has become the focus of society's attention. However, while the work life of nurses has received considerable attention, their family life and mental health have been neglected. Owing to the particularity of their work, nurses are more likely to face work-family conflicts than other professionals because of the heavy work pressure that leads to their constricted psychological space. Thus, balancing the relationship between work and family is a key factor in improving the work engagement of nurses.

With the advancement of positive psychology, psychological researchers have begun to focus on people's positive psychological abilities in contrast to the traditional focus on negative emotions and negative behaviors<sup>[1]</sup>. Based on the research and development of job burnout, work engagement is proposed

under the influence of positive psychology and positive organizational behavior. As a positive individual state, work engagement has gradually entered the perspective of research and has become a hot spot of researchers' attention in recent years. The concept of work engagement was first proposed by Kahn, an American scholar, in 1990, who defined the term as "the perfect combination of employees and their work roles through effective self-control" [2]. At present, research on work engagement has been conducted in nursing, psychology, human resource management, and many other fields, and an increasing number of researchers have begun to pay attention to research on nurse job involvement [3-7]. Nurses are the providers of patient care services and play a vital role in medical services: when their work input is at a high level, they tend to be more willing to devote more time and energy to work, realize the perfect combination of self and work, and perform better in terms of physiology, cognition, and emotion, and present themselves well; in contrast, when their work engagement level is low, they tend to pull themselves out of their work role, which affects their occupational health status, resulting in a reduction in work performance and nursing quality, and a high dismissal rate [8-10]. In Europe, 43% of nurses consider leaving within three years [11]. In China, 20.2–56.1% of nurses have a high turnover tendency [12]. The problem of nurse shortage and loss has become one of the major concerns of medical institutions at all levels worldwide, thus affecting the development of global health. This is also one of the challenges faced by the nursing industry in China. Since the outbreak of the novel coronavirus disease 2019 (COVID-19), medical staff, particularly nursing staff, have been subjected to significant psychological and physical pressure in the face of the sudden epidemic, with heavy workloads, in addition to the responsibility of caring for their loved ones. Consequently, their work vitality, dedication, and concentration have been directly affected, thereby influencing the quality of nursing work. Nurses are the backbone of the healthcare system, and their work runs throughout the field of healthcare. The efficiency and high-quality work of nurses determines the service quality and nursing quality of hospitals and health units to a large extent, and affects the development of nursing careers. Therefore, improving the work engagement of nursing staff is an important task for managers of health organizations.

Based on the continuous research on work engagement, factors affecting work engagement can be classified into three categories, namely individual, organizational, and family factors. Individual factors include anxiety [13], emotional intelligence [14], and self-efficacy [15]; organizational factors include organizational support [16], organizational behavior [17], organizational commitment [18]; and family factors include family support [19], work-family conflict [20], and family mastery [21]. However, at present, most studies on work engagement at home and abroad involve bivariate studies, while the potential relationship between these factors has rarely been reported. Therefore, this study used clinical nurses as the research object to explore the interaction mechanism among the four variables of work-family conflict, anxiety, emotional intelligence and work engagement, so as to provide some references for intervention research to improve the level of work engagement of nurses.

## **The influence of work-family conflict on work engagement**

The concept of work-family conflict was first proposed by Kahn and Wolfe et al. (1964). Work-family conflict refers to the role interaction conflict when the work and family pressures are irreconcilable in certain respects [22]. Work-family conflict is bidirectional, including work-family conflict and family-work conflict [23]. The study of the relationship between work and family has become a hot topic in the field of contemporary Western organizational behavior, as well as the focus of psychology, sociology, and human resource management in recent years. Work-family conflict among nurses has been attracting increasing attention from researchers at home and abroad. It is challenging for nurses to balance their work and family life, because they not only have to assume the role of staff, undertake heavy workloads, high pressure, and high-risk nursing work, but also face the requirements of family life. Therefore, work-family conflict is an inevitable problem for nurses, and research has shown that work-family conflict is an important predictor of their work engagement [24]. Work-family conflicts for nurses tend to affect their physical and mental health; cause job burnout; reduce work enthusiasm, job satisfaction, and level of work engagement; increase turnover tendency; and affect the stability of the entire nursing team. Therefore, we hypothesize the following:

**Hypothesis 1:** Work-family conflict will significantly predict work engagement (emotional intelligence →work engagement).

## The mediating effect of anxiety between work-family conflict and work engagement

Anxiety is a psychological and physical state combined with cognitive, somatic, emotional, and behavioral aspects, often associated with annoyance, tension, fear, or worry, and a negative emotional experience that is often felt by individuals [25]. Numerous studies have shown that nurses are more susceptible to anxiety [26-30]. In China, the incidence of nurse anxiety is 18–43% [31-35]. As a negative emotion, anxiety has a certain influence on the thoughts, cognition, behavior, and physical health of nurses. Against the background of current social development, nurses, as medical workers working in the frontline of medical care for a long time, are prone to work-family conflicts owing to the particularity of their work. When nurses are in a predicament that they cannot cope with or when they cannot cope with pressure effectively, they experience further anxiety. If their anxiety is not addressed in time, it can lead to burnout, low work efficiency, dull or unstable mood, and other adverse reactions, thus imposing a long-term serious impact on the physical and mental health of clinical nurses, which in turn affects nursing quality. Only nurses with good psychological quality and a stable mood can exhibit their best skills and the best nursing level, and fully engage in their nursing work. Therefore, we hypothesize the following:

**Hypothesis 2:** Work-family conflict will influence work engagement through the mediating effect of anxiety (work-family conflict → anxiety →work engagement).

# The mediating effect of emotional intelligence between work-family conflict and work engagement

The concept of emotional intelligence was first proposed by Mayer and Salovey (1990). Emotional intelligence refers to the ability of individuals to control their own and others' emotions and recognize and use this information to guide their own thoughts and actions<sup>[36]</sup>. The professional particularity of nurses shows that they are highly emotional workers, and their emotional intelligence not only affects their own mental health and work engagement, but also has a certain impact on work-family conflict. Emotional intelligence is closely related to work-family conflict and work engagement<sup>[37-39]</sup>. When faced with work-family conflicts, nurses with high emotional intelligence can regulate their emotions effectively, implement self-motivation effectively, generate more neutral feelings toward work, and in the face of setbacks exhibit a stronger psychology to bear other responsibilities, and encourage themselves to do better work, thus improving the adaptability and enthusiasm toward work, and becoming fully involved in their nursing work. Therefore, we hypothesize the following:

**Hypothesis 3:** Work-family conflict will influence work engagement through the mediating effect of emotional intelligence (Work-family conflict→emotional intelligence →work engagement).

# The chain mediating effect of emotional intelligence and anxiety on work-family conflict and work engagement

Emotional intelligence can alleviate work-family conflicts, negative emotions, and negative impacts on work engagement. Nurses with a high emotional intelligence, when faced with a low work-family conflict, can devote sufficient psychological resources to work. In contrast, when faced with a high work-family conflict, they can effectively regulate their emotions and behavior, significantly alleviate work-family conflicts caused by stress, reduce the production of negative emotions, and maintain a high level of work engagement. Therefore, we hypothesize the following:

**Hypothesis 4:** Anxiety and emotional intelligence will jointly play an intermediary role in the relationship between work-family conflict and, work engagement (work-family conflict→ anxiety →emotional intelligence→work engagement).

## Methods

## Aims

This study explored the current level of nurses' work engagement, and whether anxiety and emotional intelligence mediate the relationship between work-family conflict and work engagement.

# Design

The study adopted a descriptive cross-sectional design and adhered to the STROBE guideline for cross-sectional studies.

## Participants

In September 2021, cluster sampling method was adopted to select nurses from a third-class a hospital in Xinxiang City, Henan Province, China to participate in this survey. A total of 1177 nurses participated in the study. Inclusion criteria: on-duty clinical nursing staff with registered nurse qualification certificate; Voluntarily participate in this study and sign informed consent. Exclusion criteria: non-in-service nurses, including out-of-hospital trainees and practice nurses; Nurses who did not work in hospitals during the survey period included those on sick leave, maternity leave, personal leave away and retired persons.

## Measurements

### Demographic characteristics

A self-compiled general demographic questionnaire was adopted, including the nurse's age, sex, marital status, department, title, education, nursing years, average monthly income, labor and personnel relations and other items.

### Outcome variable: Work Engagement

The work engagement scale adopts Utrecht Work Engagement Scale (UWES) prepared by Schaufeli <sup>[36]</sup>et al., which is suitable for different nationalities and cultural backgrounds and mainly evaluates the work engagement of nurses in the work environment. The scale consists of three factors: vitality, focus and dedication. All items were rated on a Likert scale, with "1" representing "strongly disagree" and "5" representing "strongly agree". The higher the score, the higher the individual's job involvement. The scale was valid and reliable with a Cronbach's  $\alpha$  coefficient of 0.928 in this study.

### Independent variables: work-family conflict

The work-family conflict scale, compiled by Carlson <sup>[37]</sup>et al in 2000, measures the Conflict between Work pressure and Family pressure. The scale reflects two directions of work-family conflict, namely work-family conflict (WIF) and family-work conflict (FIW), including a total of 18 items, and 3 dimensions: "time-based conflict", "pressure-based conflict", and "behavior-based Conflict". The Likert scale uses a 5-point scale, with 1 meaning "very discordant" and 5 meaning "very satisfactory". All items are rated positively.

The total score is 18-90 points, and the higher the score, the higher the work-- family conflict. The Chinese version of work-family conflict scale has been proven to have satisfactory reliability and validity. The Cronbach's  $\alpha$  coefficient of the scale in this study was 0.895.

## Mediator variable: Anxiety

The Generalized Anxiety Scale (GAD-7) was developed by Spitzer<sup>[38]</sup> et al. in Developed in 2006 for the screening and symptom severity of generalized anxiety degree of evaluation. As a simple and reliable screening tool for anxiety symptoms, the scale consists of 7 items, and the scores of each item are as follows: 0 score meaning never, 1 point meaning occasionally several days, 2 points meaning often, more than one week in the past two weeks, 3 points meaning almost every day, the total score is the sum of the scores of each item, the total scores range from 0 to 21, the higher the score, indicating the severity of anxiety symptoms. The scale has good reliability and validity in the application of general outpatients in domestic general hospitals. The Cronbach's  $\alpha$  coefficient of this scale in this study was 0.931.

## Mediator variable: Wong and Law Emotional Intelligence Scale (WLEIS)

Wong and Law Emotional Intelligence Scale (WLEIS) is a self-reported emotional intelligence scale developed by Wong and Law<sup>[39]</sup> in 2002 . The scale was compiled under the Chinese background, and there are no cultural differences and other problems when measuring Chinese people, so it is a good localized emotional intelligence scale. This scale is often regarded as a comprehensive and scientific measure of individual emotional intelligence. This scale are 16 items in this scale, including four dimensions of "self-emotional perception", "emotion regulation", "recognize others' emotions" and "emotional use". The Likert scale uses a 5-point scale, 1-5 points were scored from "strongly disagree" to "strongly agree", and all items were scored positively. the total score was 16-80 points, The higher the total score of the scale, the higher the emotional intelligence level of nurses with lower experience. The Cronbach's  $\alpha$  coefficient of this scale in this study was 0.925.

## Data collection

Before the formal investigation, 20 clinical nurses who met the criteria of this study were selected by purpose sampling method for preliminary investigation. With the assistance of the nursing department of the surveyed hospital, an electronic questionnaire was issued through the network platform, indicating the purpose of the survey and the way of filling in the questionnaire, promising the principle of confidentiality, and setting the limit for each user to fill in the address once. A total of 1210 questionnaires were sent out in this study, and 1177 were effectively collected, with an effective rate of 97.27%.

# Ethical consideration

This study was approved by the local ethics committee (number XYLL-2,018,096). Informed consent and anonymity should be strictly implemented during investigation.

## Data analysis

The data in this study were analyzed using SPSS (version 23.0) statistical software. Spearman correlation analysis was used to analyze the relationship between work-family conflict, emotional intelligence, anxiety and work engagement of nurses. Then, AMOS 23.0 was used to build a structural equation model to fit the relationship models of work-family conflict, emotional intelligence, anxiety and work engagement. The deviation correction Bootstrap test model was used to fit the relationship models, and the mediating effects were calculated. First, a model with work-family conflict as the independent variable and work engagement as the dependent variable was constructed to test Hypothesis 1. Second, two intermediary variables of anxiety and emotional intelligence were added between work-family conflict and work engagement, and hypotheses 2 and 3 were tested. Finally, under the premise that the two factors mediation model was established, the chain mediation effect of Hypothesis 4 was tested to form the final model. A bootstrap method was used to construct 5000 samples for mediation analysis, and the significance of each path coefficient was tested at  $\alpha = 0.05$ . In the tested model, all coefficients reached the level of significance.

## Results

### Participants

1177 clinical nurses, aged 21 ~56 years old; 97.71 % of them are women; Medical nurses accounted for 35.09%, surgical nurses accounted for 28.38%; 65.51% of nurses felt that work intensity was high; Labor and personnel relations were personnel agency, accounting for 45.71%; Bachelor degree accounted for 75.53%; The professional title of nurses accounted for 50.21%; Most of the time the family relationship is harmonious 57.77%; The average monthly income is mainly 4000-6000 yuan, accounting for 41.46%; Monthly night shift frequency of 5-8 times/month accounted for 41.38%; Only 11.64% of nurses were trained in emotional management.

### Nurse's Work Engagement score

The total score of nurses' Work Engagement was  $(58.49 \pm 8.52)$ , and the average score was  $(3.66 \pm 0.53)$ . The average score of each dimension is from high to low: Energy, dedication, focus as shown in Table 1

**Table 1**

### Participants' Work Engagement score

Variables	The total score	The average score
	Mean (SD)	Mean (SD)
Work Engagement	58.49(8.52)	3.66(0.53)
Energy	20.30(3.71)	3.38(0.62)
dedication	19.11(3.16)	3.82(0.63)
focus	19.08(2.75)	3.82(0.55)

## Correlation analysis

Table 2 shows the correlation between work-family conflict, emotional intelligence, anxiety, and work engagement variables. The results show that work-family conflict has a significant positive correlation with anxiety ( $r = 0.382, P < 0.001$ ); a significant negative correlation with work engagement ( $r = -0.381, P < 0.001$ ) and emotional intelligence ( $r = -0.200, P < 0.001$ ); anxiety has a significant negative correlation with work engagement ( $r = -0.326, P < 0.001$ ) and emotional intelligence ( $r = -0.188, P < 0.001$ ); work engagement has a significant positive correlation with emotional intelligence ( $r = 0.326, P < 0.001$ ), which was in line with our hypothesis.

**Table 2**

The correlation of work-family conflict, emotional intelligence, anxiety, and work engagement (n = 1177)

Variables	1	2	3	4	5	6	7
1. Work Engagement	1						
2. vitality	0.901**	1					
3. dedication	0.886**	0.679**	1				
4. focus	0.864**	0.664**	0.680**	1			
5. work-family conflict	-0.381**	-0.402**	-0.315**	-0.275**	1		
6. emotional intelligence	0.326**	0.297**	0.274**	0.294**	-0.200**	1	
7. anxiety	-0.326**	-0.355**	-0.292**	-0.196**	0.382**	-0.188**	1

Notes: All P values < 0.001, \*\* at 0.01 level (two-tailed), the correlation was significant

## Mediation model construction

This study used structural equation model to explore the relationship between variables, and to investigate the mediating role of emotional intelligence and anxiety. The structural equation consists of four latent variables: work-family conflict, emotional intelligence, anxiety, and work engagement. The observed variables of latent variables are composed of different dimensions of these scales. The final structural equation model is shown in Fig. 1. The Bollen-Stine method was adopted to correct the match (Bollen & Stine, 1992), the modified fitting index results show that:

$\chi^2/DF = 1.083$ ,  $RMSEA = 0.008$ ,  $CFI = 0.999$ ,  $GFI = 0.992$ ,  $NFI = 0.999$ . After modification, all the fitting indexes are within the reference range, and the model is reasonable and good.

*Insert Figure 1 here*

## Mediation model validation and effect analysis

The mediation model between work-family conflict, emotional intelligence, anxiety, and work engagement is shown in Fig. 1. After increasing the two mediating variables of emotional intelligence and anxiety, the direct effect of emotional intelligence on job wellbeing decreased from  $-0.616 (P < 0.001)$  to  $-0.343 (P < 0.001)$ . Work-family conflict had a significant negative predictive effect on emotional intelligence ( $\beta = -0.240, P < 0.001$ ) and had a significant positive predictive effect on anxiety ( $\beta = 0.395, P < 0.001$ ). Emotional intelligence had a significant positive predictive effect on work engagement ( $\beta = 0.292, P < 0.001$ ) and had a significant negative predictive effect on anxiety ( $\beta = -0.118, P < 0.001$ ). Anxiety had a significant negative predictive effect on work engagement ( $\beta = -0.143, P < 0.001$ ).

The non-parametric percentile Bootstrap method of deviation correction was used to test the mediation effect, repeat the sampling 5000 times and calculate the 95 % confidence interval. The mediating effect analysis in Table 3 shows that the impact of work-family conflict on work engagement is affected by three indirect effects respectively, and all of them reach a significant level. Firstly, the mediating effect value of the path consisting of work-family conflict  $\rightarrow$  emotional intelligence  $\rightarrow$  anxiety  $\rightarrow$  job engagement was  $-0.05$ , and the confidence interval did not include 0. Second, the mediating effect value of the path consisting of work-family conflict  $\rightarrow$  emotional intelligence  $\rightarrow$  work involvement is  $-0.092$ , excluding 0 confidence interval. Third, the mediating effect value of the path consisting of work-family conflict  $\rightarrow$  anxiety  $\rightarrow$  work involvement is  $-0.075$ , excluding 0 confidence interval. The results showed that the total indirect effect was  $-0.172$ . Therefore, anxiety and emotional intelligence play a chain mediating role in the effect of work-family conflict on nurses' job involvement. All assumptions are true.

**Table 3**

The mediating effect of emotional intelligence and anxiety between work-family conflict and work engagement.

Paths	Point estimate	SE	Bias-corrected 95% CI		Percentile 95% CI		Two-tailed significance
			Lower	Upper	Lower	Upper	
work-family conflict → emotional intelligence → anxiety → work engagement	-0.05	0.002	-0.11	-0.002	-0.010	-0.002	< 0.05
work-family conflict → emotional intelligence → work engagement	-0.092	0.018	-0.131	-0.062	-0.130	-0.061	< 0.001
work-family conflict → anxiety → work engagement	-0.075	0.020	-0.118	-0.038	-0.117	-0.036	< 0.05
Total indirect effects	-0.172	0.028	-0.230	-0.121	-0.229	-0.120	< 0.001

Notes: Standardized estimating of 5000 bootstrap sample

## Discussion

In this study, the total score of work engagement was  $58.49 \pm 8.52$ , which can be improved. In the analysis of all dimensions, the score of the focus dimension was the lowest. This may be attributed to the fact that nurses are required to not only complete their routine nursing work, management work, and all types of command work, but also devote energy toward bearing family responsibilities. As their physical and psychological endurance is limited to a certain extent, they cannot undertake continuous and long-term focused work. With the increased awareness of positive psychology, work engagement has become a factor of organizational behavior with great research value. The efficiency and high-quality work of nurses largely determines the service quality and nursing quality of hospitals and health units, and affects the development of nursing careers. Studies have shown that the work engagement of nurses can predict job performance to a certain extent and directly affects the quality of nursing services<sup>[44]</sup>. Therefore, it is necessary for nursing managers and educators to implement relevant interventions to improve the work engagement of nurses.

In this study, work-family conflict demonstrated a significant negative effect on work engagement, indicating that the lesser the work-family conflict, the lesser the interference caused by work to family, and the higher the work engagement of nurses. This is consistent with previous research<sup>[45-47]</sup>. Maintaining a balance between work and family and reducing conflicts can help nurses obtain beneficial resources in fulfilling their work or family roles, and generate work-family gains. Additionally, anxiety had a significant negative effect on work engagement, which is consistent with Innstrand's<sup>[13]</sup> research results, which indicated that when nurses experience excessive anxiety, they exhibit negative emotions

and behaviors at work, thereby reducing their efficiency in managing their work, leading to a lack of focus, and reducing the amount of work input. Moreover, emotional intelligence demonstrated a positive effect on work engagement. Individuals with high emotional intelligence experience more positive emotions, likely promoting an improvement in work engagement. This is consistent with previous research [37, 43, 48-51]. Nurses with high emotional intelligence demonstrate the abilities to work in a complex environment, accurately assesses their emotions and perceive others' emotions, effectively self-regulate their mood and behavior, control their negative emotions and adopt a positive outlook to deal with the problems at work, enhance their positive experience, demonstrate a positive attitude while facing reality, and devote more positive psychological resources toward work to improve job satisfaction and work engagement. Work-family conflict demonstrated a positive effect on anxiety. The greater the work-family conflict, the greater the anxiety. This is consistent with previous research [52, 53]. There is a shortage of nurses in China, and women dominate the nursing staff. Female nurses are required to not only face an increasingly complex working environment, undertake more responsibilities and workloads, but also take on a variety of family roles such as wives, mothers, and daughters. With the implementation of the "two-child" policy, nurses are required to devote more energy and physical strength toward their families, which can lead to an imbalance between family and work, resulting in conflicts. This also tends to make nurses anxious, affect their mental health, and reduce their quality of life. Work-family conflict is negatively correlated with emotional intelligence, that is, high emotional intelligence corresponds to a low work-family conflict, which is consistent with previous research results [38, 39, 54, 55]. Emotional intelligence is an important psychological resource that can reduce work-family conflict and play a positive role in reducing job burnout and improving work engagement. Emotional intelligence also had a significant negative effect on anxiety. The higher the emotional intelligence of nurses, the lower their anxiety and depression. This is consistent with previous research [56, 57]. Nurse with high emotional intelligence can perform work rapidly and accurately, and have a comprehensive sense of the emotional states of themselves as well as others, even under extreme conditions. They can also control their emotions, skillfully handle problems, and effectively understand perspectives when dealing with patients and their family members. They are patient while communicating with patients, and can promptly change their negative cognition and regulate their negative emotions, such as anxiety, to stay positive.

In summary, all our assumptions are valid. Therefore, combined with the results of this study, the work engagement of nurses can be addressed from the following aspects. First, it reduces the negative impact of work-family conflict. Managers should consider the reasonable needs of the personal lives of nurses when delegating work. Considering the different characteristics of personal life and family life, flexible scheduling and reasonable arrangement of shifts must be taken into account. Additionally, nurse managers must consider organizing certain activities, such as sending birthday wishes, conducting award ceremonies with awards such as "the most beautiful nurse," and appropriately improving welfare benefits so as to reduce their sense of work-family conflict and create a higher sense of satisfaction and belonging to the organization. Furthermore, nurses should be encouraged to establish positive professional values and attitudes to stimulate internal work motivation. Second, attention should be paid to cultivating the emotional intelligence abilities of nurses. This study demonstrates that emotional

intelligence plays a vital mediating role, thus enhancing the emotional management abilities of nurses, including their emotional cognition, emotional expression, and rational catharsis, and can effectively reduce the negative impact of work-family conflict on their work engagement. Thus, clinical nurses should regularly assess their emotional intelligence through accurate and reliable methods. Moreover, training sessions must be conducted for nurses with low emotional intelligence levels to help them improve their emotional intelligence abilities. Third, focus must be placed on reducing anxiety. Organizations should actively create a harmonious work atmosphere and regularly conduct mindfulness-based trainings<sup>[58]</sup>, cognitive behavioral therapies<sup>[59]</sup>, music therapies<sup>[60]</sup>, and other trainings to help nurses relieve their anxiety and negative emotions, and improve their enthusiasm toward work and life, so as to improve the quality of their work.

## **Limitations and future work**

Although a chain mediating effect of anxiety and emotional intelligence on the relationship between work-family conflict and work engagement, the present study has some limitations. First, the survey objects of this study are limited to certain tertiary hospitals in Henan Province, China, indicating geographical limitations. Therefore, we intend to expand the study area to conduct research on large samples and hospitals of different grades in the future. Second, owing to the nature of cross-sectional studies, we cannot infer a causal relationship between work-family conflict, emotional intelligence, anxiety, and work engagement. Thus, in the future, longitudinal dynamic research should be conducted. Third, all the data were collected through questionnaires, indicating the possibility of participants overreporting or underreporting the impacts of the research factors. Finally, this study did not consider the impact of organizational factors such as job stress on work engagement. Therefore, future work should incorporate occupational stress into the study and explore the impact of work-family conflict on work engagement under the influence of occupational stress. Despite these limitations, the conclusions of this study provide useful references for nursing managers to help them develop effective strategies for promoting work engagement.

## **Conclusions**

In summary, the emotional intelligence, anxiety, and work-family conflict of clinical nurses cannot be ignored in the quest for work engagement. The study findings suggest that nursing managers should take effective measures to alleviate work-family conflict and balance the relationship between work and family. Additionally, they should regularly conduct emotional intelligence trainings to improve the emotional intelligence level of nurses, as well as relevant trainings to help reduce anxiety and negative emotions; they should also undertake other measures to improve the level of work engagement of nurses.

## **Declarations**

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## **Authors' contributions**

RL designed the content of this study and wrote the main manuscript text, XL prepared Figure 1 and drew the tables. HC and XF participated in data collection and made adjustments to the format of the manuscript. The manuscript was examined by all the authors, and all authors are responsible for the content and have approved this final version of the manuscript.

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## **Availability of data and materials**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## **Ethics approval and consent to participate**

The study protocol was approved by the ethics committee of Xinxiang Medical College (China). Ethics review number: XYLL-2018096. All participants gave their voluntary written informed consent prior to study participation. All methods of the study were carried out in accordance with relevant guidelines and regulations.

## **Consent for publication**

Not applicable

## **Competing interests**

The authors declare that they have no competing interests.

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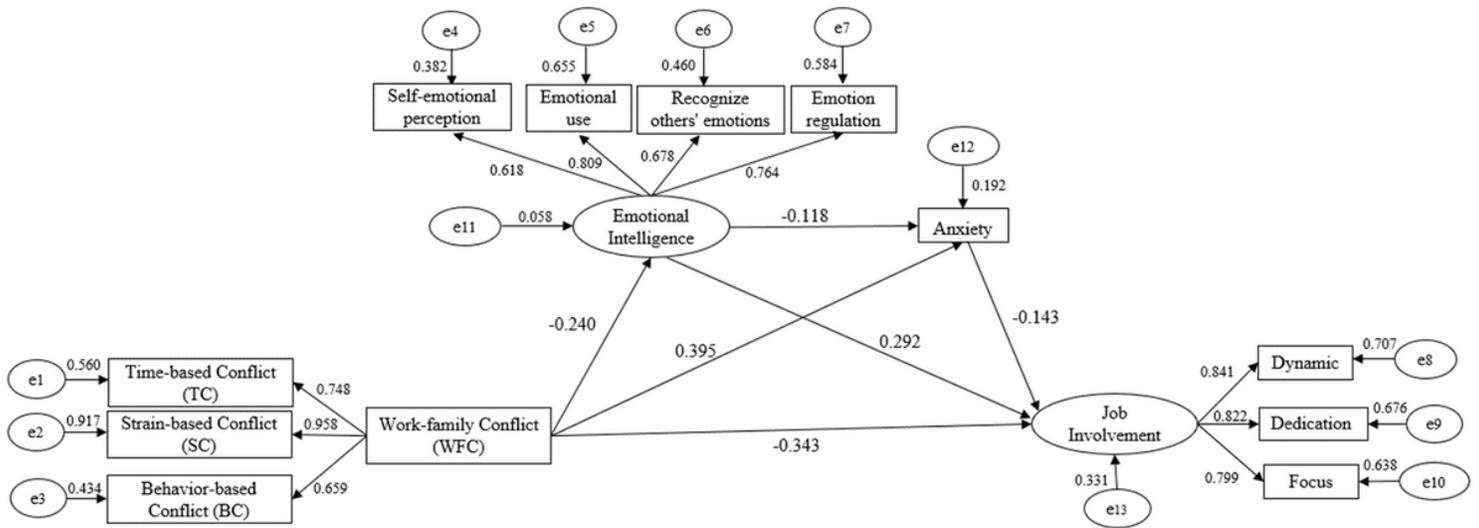
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## Figures



**Figure 1**

Multiple mediating models of emotional intelligence and anxiety between work-family conflict and work engagement.

Note: All P values < 0.001. The figure is a normalized coefficient graph.