



OPEN Anxiety and inhibitory control play a chain mediating role between compassion fatigue and Internet addiction disorder among nursing staff

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Mental health problems among nurses are prevalent and harmful. Nurses worldwide have encountered serious mental health issues. Although fatigue has been proven to lead to substance abuse or addictive behaviors (such as internet addiction), there is a lack of sufficient data on whether there is a connection with compassion fatigue. Compassion fatigue is a common mental health problem in helping professions. Anxiety and inhibitory control have been demonstrated to be associated with internet addiction, but the mediating role between them in the state of compassion fatigue remains to be further explored. Therefore, this study aims to investigate the chain—mediating effect of anxiety and inhibitory control between compassion fatigue and internet addiction in the nurse population. From July to August 2024, a questionnaire survey was conducted using a convenience sampling method in 7 hospitals in Hunan Province, China. A total of 516 front—line clinical nurses were included, among whom 17 were male and 499 were female. Subjective data on compassion fatigue, internet addiction, anxiety, and inhibitory control were collected and analyzed. SPSS 26.0 and its PROCESS macro—plugin were used for data analysis. After controlling for age and gender, compassion fatigue was found to be a significant predictor of internet addiction ($\beta = 0.40$, $P < 0.001$). However, when anxiety and inhibitory control were added, the prediction of compassion fatigue on internet addiction in the nurse population remained significant ($\beta = 0.18$, $P < 0.001$). Eventually, the research results show that compassion fatigue can predict internet addiction through anxiety and inhibitory control. It is recommended that nursing managers provide appropriate emotional interventions for nurses with compassion fatigue or adjust the shift—scheduling and leave system to prevent the occurrence of internet addiction.

Keywords Compassion fatigue, Anxiety, Inhibitory control, Internet addiction

The mental health issues among nurses are widespread and harmful. Research indicates that nurses globally have encountered serious mental health challenges, including depression, cognitive impairments, anxiety, trauma/post-traumatic stress disorder (PTSD), burnout, sleep disorders, and other negative mental health conditions¹. According to the “Report on the Development of National Mental Health in China (2021–2022)”², frontline clinical medical staff experience more severe mental health issues compared to other medical personnel. Nurses, as primary providers of medical services, often face high levels of occupational stress, complex and variable patient conditions, substantial workloads, and diverse interpersonal relationships, all posing significant threats to their

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physical and mental well-being³. Compassion, a core value in healthcare settings and fundamental to delivering high-quality psychological medical services⁴, is also associated with compassion fatigue, a common mental health issue among caregiving professions⁵. Compassion fatigue refers to the secondary traumatic stress or vicarious traumatization experienced by caregivers who are repeatedly exposed to empathetic or traumatic situations, leading to compassion stress and exhaustion^{6,7}. Nurses, recognized as one of the most “caring” professions, often experience varying degrees of anxiety, depression, self-reproach, insomnia, lack of concentration, and low job satisfaction when suffering from compassion fatigue^{8,9}, which can lead to medical errors, tense nurse-patient relationships, decreased nursing quality, and even hinder the professional development of nurses and result in the loss of nursing team human resources, increasing the burden on the hospital system¹⁰. Therefore, researching compassion fatigue among nursing staff is of great practical significance.

The internet has brought immense convenience to the information age, offering opportunities for entertainment and social interaction. Despite its utility for work and socializing, inappropriate internet use is a recurring issue. This behavior is commonly referred to as “Internet addiction,” also known as “pathological internet use,”¹¹ which describes a loss of control over internet use and a psychological state that arises without the influence of addictive substances. This can lead to decreased efficiency in learning and work, emotional distancing, and a decline in interpersonal skills¹². It is therefore necessary to explore the mechanisms underlying Internet addiction. Although Internet addiction has been confirmed to be widespread among adolescents^{13–15}, it can also occur in adults and may be associated with a greater burden of psychiatric symptoms and fatigue¹⁶. According to previous studies, internet addiction has a significant impact on the physical and mental health development of college students, and there is a correlation between negative emotions, fatigue, and internet addiction among college students^{16–21}.

For frontline clinical nurses, the psychological and mental burden is substantial, encompassing self-perceived anxiety, depression, stress, and job burnout^{22,23}. The “Internet Compensation Theory” posits that when individuals experience a lack of psychological needs fulfillment in real-life environments—such as social isolation, difficulty in stress relief, or insufficient sense of achievement—they may turn to internet activities (e.g., social media interaction, gaming, short videos) to compensate for these deficiencies, leading to dependent behaviors²⁴. In other words, internet activities can compensate for psychological and social issues, fulfilling needs that cannot be met in real life, thereby increasing the likelihood of Internet addiction^{25–29}. Furthermore, due to the informatization of modern healthcare systems, nursing staff’s daily tasks—from patient contact, medication acquisition, treatment and precautionary advice, to patient health education and nursing student training—are all closely related to the internet³⁰. This particularity makes nursing staff susceptible to Internet addiction³¹. Moreover, due to the caring nature of their profession, nursing staff inevitably invest more emotionally in their patients, generally possessing higher levels of compassion, which can lead to compassion fatigue^{32,33}. However, the negative emotions brought about by compassion fatigue, such as anxiety, depression, and irritability, are not uncommon^{34,35}. The self-control model suggests that an individual’s psychological resources are finite, and self-control relies on limited cognitive resources³⁶. Self-control behavior can be described as the process by which an individual attempts to control or overcome dominant behavioral or response tendencies to achieve specific goals. When resources are depleted due to fatigue, stress, or excessive consumption, focus and efficiency decrease, making individuals more susceptible to the allure of the internet^{37,38}. A meta-analysis has proposed that internal variables statistically have a greater impact on Internet addiction than interpersonal variables³⁹. Therefore, exploring the influencing factors and potential mechanisms of Internet addiction among frontline clinical nurses is of significant importance. Based on the above analysis, this study hypothesizes that nurses with high levels of compassion fatigue may tend to alleviate their stress through risky behaviors, and there is a significant correlation between compassion fatigue and Internet addiction (H1).

Previous studies have indicated that various psychological factors mediate between negative emotions and Internet addiction^{40,41}, particularly anxiety. Anxiety is a common emotional state among nursing staff⁴², typically associated with events that have not occurred or have uncertain outcomes^{43,44}. A substantial amount of research has shown a correlation between anxiety and Internet addiction^{45–51}, with characteristic anxiety even serving as one of the predictive factors for Internet addiction⁵². A longitudinal study conducted on 648 adolescents at different ages demonstrated that higher levels of anxiety were significantly associated with greater IA behaviors⁵³; additionally, a study in Macau, China, surveyed 11 secondary schools and found that social anxiety mediated between adolescent victimization experiences and Internet addiction⁵⁴. Concurrently, numerous studies have shown a certain correlation between anxiety and compassion fatigue^{55,56}, and the neurobiological mechanisms of compassion and anxiety may interact, with increased communication between the left amygdala and insula associated with higher levels of compassion, worry, and rumination⁵⁷. Similarly, when individuals face emotions such as fear and anxiety, the anterior insula cortex also exhibits abnormal activity⁵⁸. Coping theory suggests that when individuals are under stress and threat, they adopt a series of measures to cope with stress assessment, with escape coping being one of them⁵⁹. The nature of escape coping is avoidance rather than problem-solving, and Internet use may merely serve as an individual’s window to cope with reality, reducing anxiety and stress, while Internet addiction is, in turn, correlated with emotions such as depression, anxiety, perceived stress, and perceived burnout^{60,61}. Given the link between anxiety and compassion fatigue and Internet addiction, it is believed that compassion fatigue may directly lead to Internet addiction, and anxiety may act as a mediator between compassion fatigue and Internet addiction (H2).

Another variable often associated with Internet addiction is inhibitory control. Inhibitory control refers to the ability to suppress irrelevant stimuli and behavioral responses, which is an essential component of executive functions⁶². Compared to the general population, individuals with Internet addiction often exhibit poorer inhibitory control⁶³. A study conducted in 2012 using functional magnetic resonance imaging (fMRI) and the Stroop task to examine the neural correlates of response inhibition in individuals with Internet addiction found that these individuals had significantly increased activity in the anterior cingulate cortex and posterior

cingulate cortex, indicating reduced efficiency in the response inhibition process⁶⁴. Moreover, an individual's inhibitory control is not static; research indicates that negative emotions can significantly affect an individual's level of inhibitory control^{65,66,67}. A meta-analysis showed a close relationship between affective compassion and inhibitory control⁶⁸. At the same time, medical students and healthcare workers, especially frontline clinical nursing staff who have the most contact with patients on a daily basis, may experience a decrease in neural responses to pain information in the anterior insula due to excessive direct or indirect exposure to patient suffering. The anterior insula is an area of the brain associated with processing pain and negative emotions, and this can lead to reduced levels of brain inhibitory control⁶⁶. Therefore, we hypothesize that compassion fatigue is associated with weakened inhibitory control, and inhibitory control may play a mediating role between compassion fatigue and Internet addiction (H3).

Anxiety also weakens an individual's inhibitory control abilities, with higher levels of anxiety corresponding to lower levels of inhibitory control^{69–71}. Research has found that the key to the generation of anxiety lies in the amygdala of the brain's basal lateral area, which heavily relies on inhibitory control⁷², indicating an interactive relationship between the two. As previously mentioned, individuals with compassion fatigue are more susceptible to anxiety, and seeking “rewards” or short-term pleasure can easily lead to Internet addiction and weakened behavioral control¹¹. Based on the above analysis, we propose a hypothesis that anxiety and inhibitory control may mediate the relationship between compassion fatigue and Internet addiction (H4).

In light of the above discussion, it is essential to investigate compassion fatigue, anxiety, and inhibitory control among frontline clinical nursing staff. This research is aimed at curbing the risk of Internet addiction among nurses, managing their psychological health, and fostering the sustainable development of nursing teams. However, there is still a dearth of empirical and objective data regarding the actual experiences of the nursing community. Thus, the purpose of this study is to explore the relationship between compassion fatigue and Internet addiction among frontline clinical nurses, as well as the mediating roles of anxiety and inhibitory control. Based on this, we have formulated a hypothesis that compassion fatigue is positively correlated with Internet addiction among frontline clinical nurses. Furthermore, the relationship between compassion fatigue and Internet addiction is hypothesized to be mediated by anxiety and inhibitory control (See Fig. 1). The hypotheses are as follows:

H1 Compassion fatigue positively significantly predicts Internet addiction.

H2 Compassion fatigue significantly positively predicts anxiety, which in turn significantly positively predicts Internet among addiction nursing staff.

H3 Compassion fatigue significantly negatively predicts inhibitory control, which in turn significantly positively predicts Internet addiction among nursing staff.

H4 Anxiety and inhibitory control have a serial mediating effect between compassion fatigue and Internet addiction among nursing staff.

Methods

Participants

From July to August 2024, a convenience sampling method was employed to recruit 533 frontline clinical nurses from seven tertiary hospitals in Hunan Province, China. The inclusion criteria were: (1) possession of a nursing practice qualification certificate; (2) providing informed consent for this study. The exclusion criteria were: (1) interns, standardized training, or further education nurses; (2) non-frontline clinical positions, such as those dedicated to research, management, teaching, logistics, etc.; (3) nurses who had undergone psychotherapy or psychopharmacological treatment within the past three months. All participants voluntarily and freely joined the study, and the testing staff explained the survey content, data anonymity, confidentiality, and usage to the participants before distributing the questionnaires, informing them of their right to withdraw at any time. It

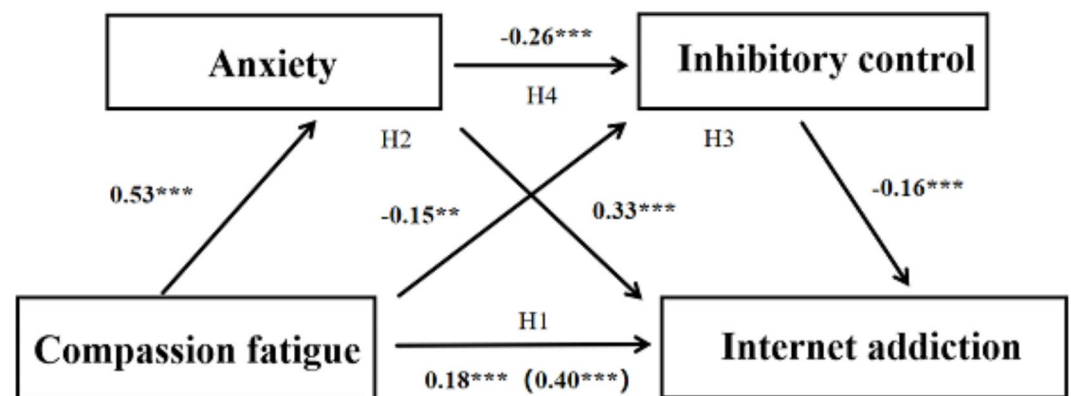


Fig. 1. Hypothesis mediation model.

took participants no more than 20 min to complete the questionnaire. Informed consent was obtained online from all participants. After screening the collected data and excluding responses that were incomplete or showed obvious patterned answering, the final analysis sample for this study included 516 participants (17 males and 499 females). This study has been approved by the Biomedical Ethics Committee of Jishou University (approval number: JSDX-2024-0125). Basic information is presented in Table 1.

Measurement tools

Compassion fatigue

The Chinese version, translated and revised by Chen et al.⁷³, consists of 30 items across three dimensions. These include 10 items on compassion satisfaction (items 2, 5, 7, 9, 11, 13, 14, 23, 25, 28), 10 items on job burnout (items 1, 4, 8, 10, 15, 17, 19, 21, 26, 29), and 10 items on secondary traumatic stress (items 3, 6, 12, 16, 18, 20, 22, 24, 27, 30). The Likert 5-point scoring method is utilized, where 1 indicates “never,” 2 indicates “rarely,” 3 indicates “occasionally,” 4 indicates “often,” and 5 indicates “always.” compassion satisfaction represents a positive dimension reflecting a positive trend, while job burnout and secondary traumatic stress represent negative dimensions reflecting a negative trend. The critical values for each dimension are as follows: compassion satisfaction < 37 points, job burnout > 27 points, and secondary traumatic stress > 17 points. In this study, the Cronbach’s α coefficient was 0.91.

Internet addiction

Validated and revised by Wei⁷⁴, the scale comprises eight items, ranging from 8 to 40 points, with each item assessed using a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate a higher level of Internet addiction. In this study, Cronbach’s α was 0.95.

Anxiety

The depression anxiety stress scale-21 (DASS-21), revised into Simplified Chinese by Gong et al.⁷⁵, consists of 21 items, with seven items pertaining to anxiety, ranging from 7 to 28 points. Each item uses a 4-point Likert scoring system, from 1 (very disagree) to 4 (very agree). Higher scores indicate a higher level of anxiety. In this study, the Cronbach’s α was 0.90.

Inhibitory control

Developed by Huang et al.⁷⁶, the Executive Function Scale measures inhibitory control ability using the cognitive flexibility sub-scale. The sub-scale consists of six items, each rated on a scale from 1 (“often”) to 3 (“never”). The total score of these items represents the level of inhibitory control, ranging from 6 to 18. A higher score indicates a higher level of inhibitory control. In this study, the Cronbach’s α coefficient for this sub-scale was 0.90.

Statistical analysis

Before analyzing the data, the present study conducted a common method bias (CMB) test. Following the recommendations of Podsakoff et al., a threshold of 40%⁷⁷ was set to determine whether significant bias existed in the data. Secondly, the four main variables in this study were presented in terms of means and standard deviations (SD) and were subjected to descriptive and correlational analysis using SPSS 26.0. Prior to conducting the analysis, a normality test was performed on the data. Following the guidelines of Kim⁷⁸, the data were considered approximately normally distributed if the absolute values of skewness were less than 2 and the absolute values of kurtosis were less than 7. The results of the normality tests confirmed that the main variables in this study followed a normal distribution, allowing for the use of parametric tests. Specifically, independent sample t-tests and one-way ANOVA were employed to examine differences between gender and grade, while Pearson correlation analysis was used to assess the relationships between variables. Additionally, the mediation model was tested using the PROCESS 4.0 macro in SPSS. Prior to conducting the mediation analysis, the variables were standardized. Compassion fatigue was set as the independent variable, internet addiction as

Demographic variables	Number (N)
Gender	
Male	17
Female	499
Only child	
Yes	92
No	424
Age	
18–23	44
24–30	145
31–35	135
36–40	75
41–45	63
≥ 46	54

Table 1. Demographic characteristics.

the dependent variable, and Anxiety and inhibition control dependence as the mediators, with demographic variables included as covariates in the chain mediation model (Model 6)⁷⁹. To assess model fit and estimate 95% confidence intervals (95% CI), 5000 bootstrap resampling iterations were performed, ensuring the robustness of the analysis⁸⁰. The significance level was set at 0.05.

Results

Common method bias test

In order to evaluate the influence of common method bias, Harman’s single-factor test was utilized. The results of this analysis indicated that, in the absence of Principal component factor rotation, two factors exhibited eigenvalues surpassing the value of 1. The first factor was found to explain 36.38% of the variance, falling short of the 40% cutoff. Therefore, it is concluded that significant common method bias is not present in this study. This finding is crucial for the validity of the results, as it suggests that the observed relationships among the variables are not artifactually inflated by the method of data collection.

Correlation analysis

The results depicted in Table 2 reveal significant correlations among the variables of interest. Compassion fatigue exhibited a positive correlation with both internet addiction ($r=0.39, P<0.001$) and anxiety ($r=0.52, P<0.001$) within the nursing cohort, while a negative correlation was observed with inhibitory control ($r=-0.29, P<0.001$). Anxiety was found to be negatively correlated with inhibitory control ($r=-0.31, P<0.001$) and positively correlated with internet addiction ($r=0.49, P<0.001$). Furthermore, inhibitory control displayed a negative correlation with internet addiction ($r=-0.31, P<0.001$) among nursing staff. These correlations underscore the interrelated nature of these Psychological constructs and their potential negative impacts impact on the mental health and behavioral tendencies of frontline clinical nurses.

Mediation analysis

Following the control for gender and age, compassion fatigue was identified as a direct and significant predictor of internet addiction within the nursing population ($\beta=0.40, SE=0.04, P<0.001$). Moreover, in the examination of indirect effects, the predictive influence of compassion fatigue on internet addiction among nurses was still found to be significant ($\beta=0.18, SE=0.04, P<0.001$). Compassion fatigue was a significant positive predictor of anxiety among nursing staff ($\beta=0.53, SE=0.04, P<0.001$), and anxiety was a significant positive predictor of internet addiction ($\beta=0.33, SE=0.05, P<0.001$). Furthermore, compassion fatigue was a significant negative predictor of inhibitory control ($\beta=-0.15, SE=0.05, P<0.05$), and inhibitory control was a significant negative predictor of internet addiction ($\beta=-0.16, SE=0.04, P<0.001$). Lastly, anxiety was a significant negative predictor of inhibitory control ($\beta=-0.26, SE=0.05, P<0.001$). The mediation analysis of empathy fatigue’s effect on internet addiction among nursing staff is detailed in Tables 3 and 4 and visualized in Fig. 2. These findings underscore the complex interplay between empathy fatigue, anxiety, inhibitory control, and internet addiction, highlighting the importance of considering these factors in the context of nursing Practice and mental health.

Discussion

To the best of our knowledge, few studies have investigated the relationships among compassion fatigue, internet addiction, anxiety, and inhibitory control in the nurse population. As for the results, a significant positive correlation was found between compassion fatigue and internet addiction. Through mediation analysis, we discovered that anxiety and inhibitory control played a significant chain—mediating role in the relationship between compassion fatigue and internet addiction among nursing staff.

Specifically, compassion fatigue among nursing staff can influence internet addiction through four pathways. Firstly, compassion fatigue directly affects internet addiction. Secondly, compassion fatigue exacerbates anxiety, which in turn induces internet addiction. Thirdly, compassion fatigue weakens inhibitory control, thereby accelerating the development of internet addiction. Fourthly, compassion fatigue exacerbates anxiety, which then weakens inhibitory control, thus promoting internet addiction. These factors, either individually, through mutual influence, or by compounding their negative impacts, increase the risk of internet addiction.

In the sample of the current study, the demographic data such as age, gender, educational background, and whether they are only children exhibit certain characteristics. The age group with a relatively large proportion is mainly the young population, which is related to the nature of the nursing profession. Nursing is a profession that

	1	2	3	4	5	6
1 Gender	–					
2 Age	0.13**	–				
3 Compassion fatigue	–0.01	0.06	–			
4 Internet addiction	–0.03	–0.15***	0.39***	–		
5 Inhibitory control	–0.06	–0.09*	–0.29***	–0.31***	–	
6 Anxiety	–0.04	–0.14**	0.52***	0.49***	–0.31***	–
M	–	–	74.58	18.76	13.29	13.25
SD	–	–	12.02	9.82	2.62	4.64

Table 2. Correlations among the variables. **: $P < 0.01$; ***: $P < 0.001$.

Outcome variables	Predictive variables	β	SE	t	R ²	F
Internet addiction	Compassion fatigue	0.40	0.04	10.10***	0.19	38.99***
	Age	-0.18	0.04	-4.38***		
	Gender	-0.01	0.04	-0.04		
Anxiety	Compassion fatigue	0.53	0.04	14.40***	0.30	74.34***
	Age	-0.17	0.04	-4.60***		
	Gender	-0.02	0.04	-0.46		
Inhibitory control	Compassion fatigue	-0.15	0.05	-3.02**	0.14	20.18***
	Anxiety	-0.26	0.05	-5.18***		
	Age	-0.11	0.04	-2.69**		
	Gender	-0.06	0.04	-1.46		
Internet addiction	Compassion fatigue	0.18	0.04	4.12***	0.31	44.68***
	Anxiety	0.33	0.05	7.24***		
	Inhibitory control	-0.16	0.04	-4.12***		
	Age	-0.13	0.04	-3.44**		
	Gender	-0.01	0.04	-0.14		

Table 3. Chain mediation model test. *: $P < 0.05$; **: $P < 0.01$; ***: $P < 0.001$.

Mediation model paths	Effect	SE	Bootstrap 95% CI	Proportion of mediating effect (%)
Total effect	0.40	0.04	0.32, 0.48	
Direct effect	0.18	0.04	0.09, 0.27	
Total indirect effect	0.22	0.03	0.16, 0.29	54.70
Compassion fatigue → Anxiety → Internet addiction	0.18	0.03	0.12, 0.24	43.32
Compassion fatigue → Inhibitory control → Internet addiction	0.02	0.01	0.01, 0.05	5.94
Compassion fatigue → Anxiety → Inhibitory control → Internet addiction	0.02	0.01	0.01, 0.04	5.45

Table 4. Mediation model paths.

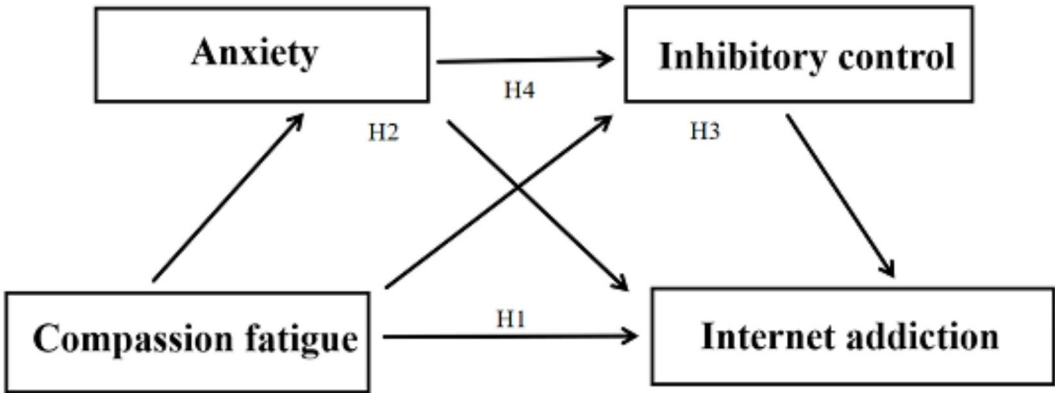


Fig. 2. Chain mediation model test.

requires both physical strength and emotional management⁸¹. Moreover, newly recruited nurses and those with less seniority may face a higher risk of compassion fatigue⁸². In addition, the majority of the research subjects are female, which is consistent with the national conditions in China. According to the report of the National Health Commission of China in 2023, as of 2022, men accounted for only 3.4% of registered nurses in China⁸³. In this study, the nurse group was in a state of a certain degree of compassion fatigue. For front-line clinical nurses, in addition to their daily specific nursing work, they need to be constantly exposed to the emotional pain and trauma of others⁸⁴, long-term continuous emotional output and emotional investment not only have an adverse impact on the physical and mental health of nurses but also affect work efficiency and weaken patient care⁸⁵. The conservation of resources theory posits that individuals are motivated to build, protect, and cultivate their resource pool⁸⁶. When nurses' psychological capital is exhausted, they will seek ways to manage resources⁸⁷, and the Internet is one of them. A previous study in Italy also showed that the internet addiction scores of the nurse group were higher than those of normal subjects⁸⁸, which is consistent with our research, indicating that

although nurses are professional healthcare workers, they still have digital health problems. Unreasonable use of the Internet can bring a series of negative effects, such as increased anxiety and reduced inhibitory control ability, which may further exacerbate internet addiction.

Therefore, to prevent internet addiction among nursing staff, nursing managers should pay attention to nurses' mental health and strengthen psychological counseling. For example, various emotional catharsis approaches can be adopted, such as group psychological counseling⁸⁹, mindfulness—based stress reduction, and the Feldenkrais awareness through movement intervention⁹⁰, to alleviate emotional disorders such as compassion fatigue among the nurse group (H1).

In addition, according to the results of the mediating effect, compassion fatigue not only directly affects internet addiction but also indirectly influences it through the exacerbation of anxiety and the weakening of inhibitory control ability. Research indicates that individuals with a high level of compassion are prone to a series of negative emotions such as anxiety and depression⁹¹. The underlying mechanism may be related to brain regions associated with compassion and emotion processing, such as the amygdala and the anterior cingulate cortex. During compassion fatigue, these regions are over—activated. The amygdala enhances the response to negative emotions, and the anterior cingulate cortex, which is involved in emotion regulation and cognitive control, when over—activated, disrupts the balance, making individuals more likely to experience anxiety⁹². Anxiety not only reduces the connectivity between the amygdala and the prefrontal cortex⁹³ but also weakens cognitive executive function⁹⁴, thereby increasing the risk of internet addiction⁹⁵. An overly anxious individual may be restless, flustered, and unable to concentrate, with reduced stress—resistance and coping abilities. As a result, they are easily attracted by information such as online pop—ups, increasing the risk of internet addiction^{51,96}. (H2).

Emotions can enhance or magnify cognitive processes and behavioral responses⁹⁷. Individuals who are exposed to negative emotions for an extended period often experience emotional exhaustion due to long—term over—compassion with others' negative emotions. The negative effect causes attentional biases in them, making them more inclined to focus on information that allows them to temporarily escape the fatigued state in reality. For example, when browsing the web, they may be more easily attracted to light—hearted and entertaining content⁹⁸. Compassion fatigue is more of a psychological state of exhaustion. Football players in a state of psychological fatigue experience a decline in their decision—making cognitive abilities⁹⁹. Similarly, nurses in a state of compassion fatigue often experience emotional depletion¹⁰⁰. When an individual experiences compassion fatigue, they may have difficulty concentrating, be easily startled, and struggle to maintain an objective attitude. These symptoms can affect inhibitory control ability because inhibitory control requires cognitive resources and focused attention, and compassion fatigue may deplete these resources¹⁰¹. A study has found that individuals with a tendency towards internet addiction are more impulsive and share common neuropsychological and event—related potential (ERP) characteristics with addicted patients¹⁰². Therefore, compassion fatigue may indirectly increase the risk of internet addiction by weakening inhibitory control ability (H3).

Research indicates that anxiety is one of the characteristic manifestations of individuals with internet addiction¹⁰³. Individuals with anxiety often experience impairments in cognitive control processes, including inhibitory ability¹⁰⁴. Inhibitory control ability is typically negatively correlated with internet addiction¹⁰⁵. A decrease in inhibitory control ability increases the likelihood of internet addiction, and internet—addicted individuals often have impaired prefrontal—related inhibitory control, which plays a crucial role in inhibitory control¹⁰⁶. Our research findings suggest that nurses experiencing compassion fatigue may increase their risk of internet addiction through a pathway where increased anxiety leads to weakened inhibitory control ability, which is consistent with previous research¹⁰⁷. Therefore, given the negative impact of compassion fatigue ultimately leading to internet addiction, it is necessary to take measures to mitigate its effects. Specifically, health management departments could incorporate compassion fatigue into occupational health management and include the results in occupational health records. Nursing managers could improve the shift—rotation and leave systems. When scheduling shifts for hospital nurses, they should be empathetic, avoid consecutive night shifts, or implement “mental health leave” and the like. Nurses could alleviate stress and regulate emotions through mindfulness meditation, cognitive—behavioral therapy, or regular physical exercise. These methods not only help in managing negative emotions but also enhance overall mental well—being. However, the intervention measures proposed in our study differ from previous research on promoting nurses' compassion regarding compassion fatigue¹⁰⁸. Thus, specific measures need to be carried out according to different conditions (H4).

Strengths and limitations

Previous research on internet addiction often focused on adolescents or medical students, with relatively few studies paying attention to internet addiction among nurses. This study attempts to analyze the proportion of internet addiction in the nurse population and, by incorporating compassion fatigue, a common state among nurses, provides some theoretical reference for future psychological interventions for clinical nurses, which is of certain significance. However, like most studies, this research also has some limitations. Firstly, this study is a cross—sectional research, lacking objective measurement data and neurophysiological indicators. This type of research restricts the ability to explain causal relationships among variables. Secondly, the data source is the nurse population in the central and western regions of Hunan Province. All participants are Chinese, and due to the internal gender imbalance within the nurse group, the differences between genders were not taken into account. Therefore, caution should be exercised when interpreting and generalizing the results. Finally, the data are sourced from the self—reports of the nurse group, which may carry certain self—reporting risks. The results may be subjective, thus undermining the relative objectivity of the findings. Based on these limitations, we acknowledge the need for follow—up research on anxiety, inhibitory control, and internet addiction caused by compassion fatigue. Adding objective neurophysiological indicators, such as functional magnetic resonance imaging, can enhance the objectivity and interpretability of the results. Alternatively, conducting a larger-scale

study with a more balanced gender distribution, covering different genders and regions, can be carried out to verify and compare the research results among different genders and ages.

Conclusion

This study further clarifies the potential mechanisms underlying the relationship between front—line clinical nurses in Hunan province, China, and internet addiction. Compassion fatigue can directly and negatively predict internet addiction among nurses. It can also indirectly predict internet addiction among nurses through anxiety and inhibitory control, and simultaneously negatively predict nurses' internet addiction via these two pathways.

Data availability

The datasets generated and/or analysed during the current study are not publicly available due [our experimental team's policy] but are available from the corresponding author on reasonable request.

Received: 24 October 2024; Accepted: 24 March 2025

Published online: 10 April 2025

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Acknowledgements

Thanks to Xinxin Tan, a gentle and careful girl, for her great contribution to this research.

Author contributions

Xinxin Tan contributed to the Manuscript by undertaking the Primary writing and data collection efforts. Zhongzheng Li Played a Pivotal role in the Peer review Process and also Participated in data collection activities. The data collection team was comprised of Hong Peng, Min Tian, Jiong Zhou, Ping Tian, Jingrui Wen, and

Shenglin Luo. Yan Li offered her expertise in statistics, Providing guidance throughout the research Process, and also contributed to the review of the manuscript. Ping Li's efforts were focused on data collection. Lastly, Liu Yang was instrumental in Performing the statistical analysis and Played a significant Part in the editorial review of the manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Ethical approval and consent to participate

The research Protocol was reviewed and approved by the Biomedical Ethics Committee at Jishou University, with the approval number JSDX–2024–0125. Prior to the start of the study, informed consent was secured from all individuals who participated in the research, ensuring their understanding and voluntary agreement to Partake in the study Procedures. This adherence to ethical standards guarantees the Protection of the rights and welfare of the study participants, which is a fundamental requirement in scientific research.

Additional information

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