

The Impact of the COVID-19 Pandemic on Future Nursing Career Turnover Intention Among Nursing Students

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Introduction: A shortage of nurses has been a major global concern, particularly during pandemics. Nursing students turning away from the nursing profession upon graduation may exacerbate nursing workforce shortfalls. The main objective of this study was to assess perceived occupational turnover intention among nursing students and associated factors (fear of COVID-19 and life satisfaction). Students were also asked to provide suggestions that could enhance their intention to join the nursing profession.

Methods: An online survey was sent to all registered undergraduate nursing students at Fujian Medical University, China. The partial least squares structural equation model (PLS-SEM) was used to investigate key factors influencing turnover intention.

Results: A total of 1020 complete responses were received (response rate: 86.2%). Nearly half (49.1%) reported that they would choose not to be on a nursing course if given a choice, 45.4% often think of not going into the nursing profession in the future, and 23.7% would consider entering a healthcare industry that has zero contact with patients. The total turnover intention score range was 3 to 15, and the mean \pm standard deviation (SD) was 9.2 (SD \pm 2.5). PLS-SEM path analysis revealed that fear of COVID-19 ($\beta = 0.226$, $p < 0.001$) had a positive effect on turnover intention. Satisfaction with life ($\beta = -0.212$, $p < 0.001$) had a negative effect on turnover intention. Analysis of open-ended survey data on students' perspectives on how to encourage nursing students to enter the nursing workforce revealed five central themes: 1) professional role, respect, and recognition; 2) higher wages; 3) reduce workload; 4) enhance occupational health and safety; and 5) career advancement opportunities.

Conclusion: Factors influencing turnover intention and suggestions to reduce students' apprehension towards joining the nursing profession found in this study should be seriously taken into consideration in initiatives to address the nurse shortages.

Keywords: Chinese nursing students, fear of COVID-19, psychological reactions, life satisfaction, turnover intention

Introduction

The issues of nursing staff shortages and turnover are human resource problems affecting many European and Asian countries having a huge impact on the performance of the national healthcare systems of those countries.^{1,2} Continued nurse shortages hinder the delivery of high-quality patient care and have a detrimental impact on patient outcomes and mortality.^{3,4} The nursing shortage situation in China constitutes a considerable concern.⁵ In China, the shortage of nurses has increased the workload, stress, and burnout of the remaining nurses.⁶ Nurse

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turnover is a serious problem that has been the subject of intensive research in China.⁷ High annual turnover rates range from 20% to 45% of hospital nursing care workers in China has been reported.⁸

More recently, a systematic review reported a high prevalence of depressive symptoms among Chinese nurses, with an increasing trend associated with a shortage of nursing resources resulting in heavy workloads.⁹ Apart from a heavy workload, well-being and life satisfaction are also important influencing factors affecting nurses' decision to stay in the nursing profession.¹⁰ Life satisfaction is a general assessment of emotions and attitudes about an individual's life at a certain point.¹¹ Greater life satisfaction is associated with greater career satisfaction, motivation, and commitment.¹² Well-being in healthcare workers and undergraduate students has been found to have a positive relationship with optimism, resilience in facing challenges, and a stronger belief in one's ability to handle stress.¹³

The novel coronavirus (COVID-19) epidemic first broke out in Wuhan, China, in December 2019. It is now a major public health emergency worldwide, because it has spread quickly and caused extensive infections. As of 28 March 2021, over 126 million SARS-CoV-2 cases and 2.7 million deaths have been reported by the World Health Organization (WHO).¹⁴ According to the WHO, as of July 2020, over 1.4 million infections of COVID-19 have been reported among healthcare workers, which accounts for 10% of global infections.¹⁵ During an infectious disease pandemic, healthcare workers are every country's most valued resource. As nurses constitute the majority of healthcare workers, they have a tremendously important function in healthcare systems during outbreaks of acute infectious diseases. The impact of COVID-19 on the nursing workforce has been pronounced across the world and the pandemic has exacerbated the already critical shortage of nursing staff.¹⁶ Most importantly, the COVID-19 pandemic has resulted in an enhanced nursing workload,¹⁷ resulting in nurses suffering burnout or psychological distress.¹⁸ Furthermore, nurses face a substantial risk of SARS-CoV-2 infection because they are on the frontline in the fight against COVID-19.

A high prevalence of SARS-CoV-2 infection has been reported among healthcare workers from the UK and the Netherlands.¹⁹ In China, as of 26 March 2020, out of 50,006 COVID-19 cases in Wuhan, 2457 (nearly 5%) were healthcare workers, of whom 17 died.²⁰ Of note, half of the infected healthcare workers were nurses.²⁰

A recent study reported that the COVID-19 pandemic has instilled tremendous fear among frontline nurses in China, and nursing students who will soon become nurses have similarly expressed heightened anxiety.²¹

As the need for nurses continues to increase with the world facing the COVID-19 pandemic, nursing students are an important future nursing workforce. An increasing loss of Chinese nurses after graduation was reported in China prior to the pandemic.²² Hence, it is important that nursing students enter the workforce to fill the serious nursing workforce shortage. Much research has been conducted into the turnover intention of nurses in the workforce, but little is known about the turnover intentions and career orientations of nursing students after the COVID-19 pandemic in China. Therefore, this study aimed to determine perceived occupational turnover intention among nursing students. The existing literature indicates that fear of COVID-19 and life satisfaction are important influences of career turnover intention. Hence, factors influencing turnover intention, namely fear of COVID-19 and life satisfaction, were also studied. In this study we hypothesized that higher levels of fear of the COVID-19 pandemic and lower levels of life satisfaction may result in higher turnover intention among nursing students.

It is also important to gather opinions from nursing students about other external factors that influence turnover intention. Therefore, the second objective of this study was to capture students' opinions on these factors to obtain a greater understanding of the barriers or facilitators influencing their intention to join the nursing profession. The findings of this study may contribute to the understanding of nursing students' career intentions in the era of the COVID-19 pandemic and provide useful insights for nursing programmes or government authorities to prevent depletion of the nursing workforce.

Method

Study Participants

The participants were all undergraduate nursing students enrolled in Fujian Medical University, Fuzhou, China. The survey was administered online. A convenience sampling method was used for the data collection. The link to the online self-report questionnaire was sent to all registered nursing students. Data collection was conducted between 24 September 2020 and 10 October 2020. In the current study, the estimated sample size was derived from the online Raosoft sample size calculator.²³ The sample size

was calculated based on a response rate of 50%, a confidence interval of 99%, a margin of error of 5%, and a total of the university nursing student population of 1183. Accordingly, the total sample size required for the study was calculated to be 426. The sample size was multiplied by the predicted design effect of two to account for the use of convenience sampling and an online survey.²⁴ Hence, the minimum survey sample size was set to 852 (426×2) participants.

Measures

Fear of COVID-19 Scale

The fear of COVID-19 scale assessed the students' psychological reactions to the COVID-19 pandemic. They were asked about their level of fear in relation to being in a nursing career during the COVID-19 pandemic. To date, there is no established measurement for assessing fear of COVID-19 in nurses or other healthcare workers, hence the questionnaire used was self-developed. A five-item unidimensional scale was answered by nursing students using a 4-point Likert scale which ranged from 0 (not at all afraid) to 3 (very afraid). The composite score ranged from 0 to 15, with a higher score indicating a greater fear of COVID-19.

Satisfaction with Life Scale

Students' satisfaction with their current life was measured using the five-item Satisfaction with Life Scale (SWLS).²⁵ Students answered each item on the scale using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The summation of complete item responses yielded a total raw score ranging from 5 to 35. The scores were classified as extremely satisfied (31–35), satisfied (26–30), slightly satisfied (21–25), neutral (20), slightly dissatisfied (15–19), dissatisfied (10–14), and extremely dissatisfied (5–9).²⁵ The mean Cronbach's alpha of the SWLS across various samples was 0.78 with 95% confidence intervals (95% CI) ranging from 0.766 to 0.807.²⁶

Turnover Intention Scale

Perceived turnover intention was measured using a modified version of the turnover intention assessment scale by Camman, Fichman, Jenkins and Klesh (1979),²⁷ using a three-item scale with a five-point Likert format ranging from 1 (strongly disagree) to 5 (strongly agree). The total score ranged from 3 to 15, with a higher score indicating greater turnover intention. Turnover intention

was assessed by the item "I often think of not going into the nursing profession in the future", "It is very possible that I will look for a career in the healthcare industry that has zero contact with patients in the future", and "If I could choose again, I would choose not to be in the nursing course".

The last question in this survey was an open-ended question, to which the students responded in their own words with suggestions to alleviate students' apprehension about joining the nursing profession.

Data Analysis

Univariable and multivariable logistic regression analyses were performed to investigate the demographic factors influencing fear of COVID-19 and satisfaction with life. In the multivariable logistic regression analyses, all variables found to have a statistically significant association (two-tailed, $p < 0.05$) in the univariate analyses were entered into the model via the forced-entry method.²⁸ Odds ratios (ORs), 95% confidence intervals (95% CIs) and p -values were calculated for each independent variable. The Hosmer-Lemeshow goodness-of-fit test was used to measure the model fit.²⁹

Partial least squares structural equation modelling (PLS-SEM) was used to quantify the contributing factors (socio-demographics, fear of COVID-19, and satisfaction with life) of turnover intention. As the students' age and grade are equivalent assessments, only the students' age was included in the model. A bootstrapping approach was used to evaluate the significance of the associations in the proposed model. This technique assesses not only the reliability of the dataset but also the statistical significance of the coefficients and the error of the estimated path coefficients.³⁰ The bootstrapped significance calculation was conducted using SmartPLS version 3.2.8 (SmartPLS GmbH).³¹ In the model, turnover intention, fear of COVID-19, and satisfaction with life were considered as reflective constructs and all other independent variables were a single-item construct. Prior to running the path model, the convergent and discriminant validity of all the measurements were assessed. To assess reliability, we utilized internal consistency using Cronbach's alpha coefficient (α) with composite reliability (CR). Discriminant validity was evaluated using the heterotrait-monotrait (HTMT) ratio. The qualitative data generated by open-ended questions were analysed using deductive qualitative content analysis.^{32,33}

Table 1 Characteristics of the Study Population and Factors Associated with Fear of COVID-19 and Satisfaction with Life (N=1020)

		Fear of COVID-19			Satisfaction with Life Scale (SWLS)		
		Univariable Analysis		Multivariable Analysis	Univariable Analysis		Multivariable Analysis
	N (%)	Score 7–15 (n=510)	p-value	OR (95% CI) ^a Score 7–15 vs 0–6	Satisfied [†] (n=466)	p-value	OR (95% CI) ^b Satisfied [†] vs Dissatisfied [‡]
Demographic characteristics							
Age							
16–19	405 (39.7)	172 (42.5)	p<0.001	Reference	219 (54.1)	p<0.001	1.55 (1.03–2.32)*
20–21	478 (46.9)	265 (55.4)		1.13 (0.76–1.68)	193 (40.4)		0.95 (0.64–1.41)
22–23	137 (13.4)	73 (53.3)		1.01 (0.58–1.74)	54 (39.4)		Reference
Gender							
Male	148 (14.5)	57 (38.5)	0.003	Reference	74 (50.0)	0.284	
Female	872 (85.5)	453 (51.9)		1.59 (1.10–2.28)*	392 (45.0)		
Ethnicity							
Han	908 (89.0)	453 (49.9)	0.920		420 (46.3)	0.316	
Others	112 (11.0)	57 (50.9)			46 (41.1)		
Location							
Urban	315 (30.9)	140 (44.4)	0.021	Reference	166 (52.7)	0.003	1.33 (1.00–1.76)*
Rural	705 (69.1)	370 (52.5)		1.40 (1.06–1.84)*	300 (42.6)		Reference
Study grade							
Grade 1	192 (18.8)	73 (38.0)	p<0.001	Reference	97 (50.5)	0.064	
Grade 2	274 (26.9)	123 (44.9)		1.28 (0.87–1.89)	137 (50.0)		
Grade 3	262 (25.7)	156 (59.5)		2.13 (1.30–3.49)**	112 (42.7)		
Grade 4	292 (28.6)	158 (54.1)		1.74 (1.02–2.95)*	120 (41.1)		
Average monthly family income (CNY)							
<4000	415 (39.3)	220 (53.0)	0.381		147 (35.4)	p<0.001	Reference
4000–9999	450 (44.1)	216 (48.0)			229 (50.9)		1.74 (1.32–2.30)***
10,000 and above	155 (15.2)	74 (47.7)			90 (58.1)		2.13 (1.44–3.16)***

Notes: *p<0.05, **p<0.01, ***p<0.001. ^aHosmer–Lemeshow test, chi-square: 2.666, p-value: 0.954; Nagelkerke R²: 0.049. ^bHosmer–Lemeshow test, chi-square: 6.819, p-value: 0.338; Nagelkerke R²: 0.063. [†]Responses for extremely satisfied/satisfied/slightly satisfied/neutral. [‡]Responses for slightly dissatisfied/dissatisfied/extremely dissatisfied.

Results

A total of 1020 out of a total sample of 1183 nursing registered nursing students completed the survey between 24 September 2020 and 10 October 2020, producing a response rate of 86.2%. The mean (\pm SD) age of the participants was 19.9 (\pm 1.5) years. The majority of the participants were female (85.5%), originated from rural areas (69.1%) and had an average monthly family income of CNY4000–9999. The complete details of students' characteristics are presented in Table 1.

Figure 1 shows the responses for fear of being in nursing career during the COVID-19 pandemic. Nearly 70% reported being very afraid/moderately afraid of

infecting family members, followed by fear of losing life. The mean (\pm SD) for the total physical prevention barriers score was 6.3 (\pm 3.1). The median was 6.0 (interquartile range [IQR], 5.0 to 9.0). The mean fear scores were categorised as a score of 7–15 or 0–6, based on the median split; as such, a total of 510 (50.0%; 95% CI: 46.9 to 53.1) were categorised as having a score of 7–10. As shown in Table 1, those of an older age, females, those originating from rural areas, and those with higher grades reported a higher fear of COVID-19. Finding from the multivariate analysis revealed that students from grade 3 (OR=2.13, 95% CI: 1.30–3.49) and grade 4 (OR=1.72, 95% CI: 1.02–2.95) reported a higher fear than did those

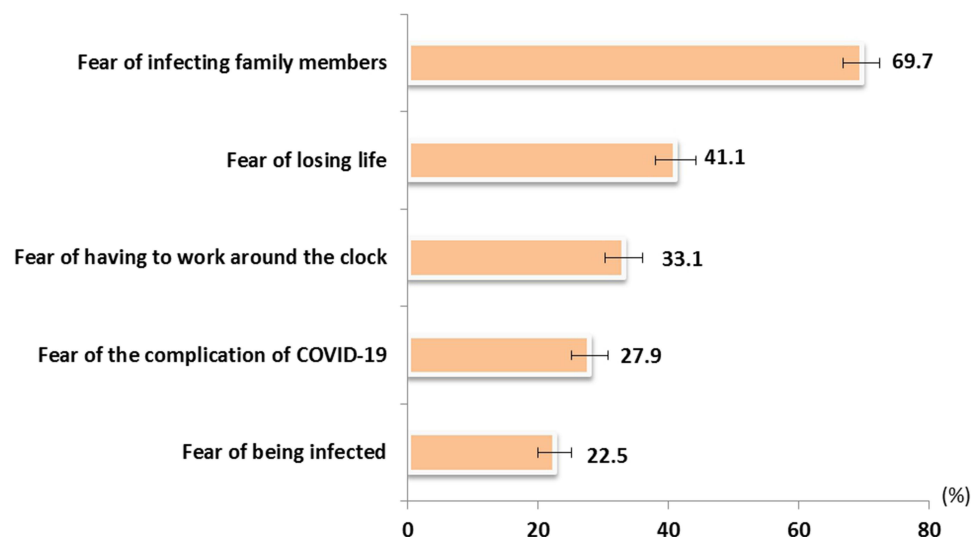


Figure 1 Proportion of “very afraid/moderately afraid” responses for fear of COVID-19 items (N=1020).

from grade 1. Female students reported higher fear scores than males (OR=1.59, 95% CI: 1.10–2.28), and participants originating from rural areas reported higher fear scores than those from urban areas (OR=1.40, 95% CI: 1.06–1.84).

As shown in Figure 2, nearly two-thirds (62.4%) responded “strongly agree/agree/slightly agree/neutral”

concerning their level of satisfaction with their lives at the current moment and slightly over half (55.3%) said that their life was close to their ideal. Overall, the proportion of “strongly agree/agree/slightly agree/neutral” responses was very low for all the five SWLS items. The highest proportion (29.7%) was for the slightly dissatisfied group (score 15–19), followed by 26.4% for slightly

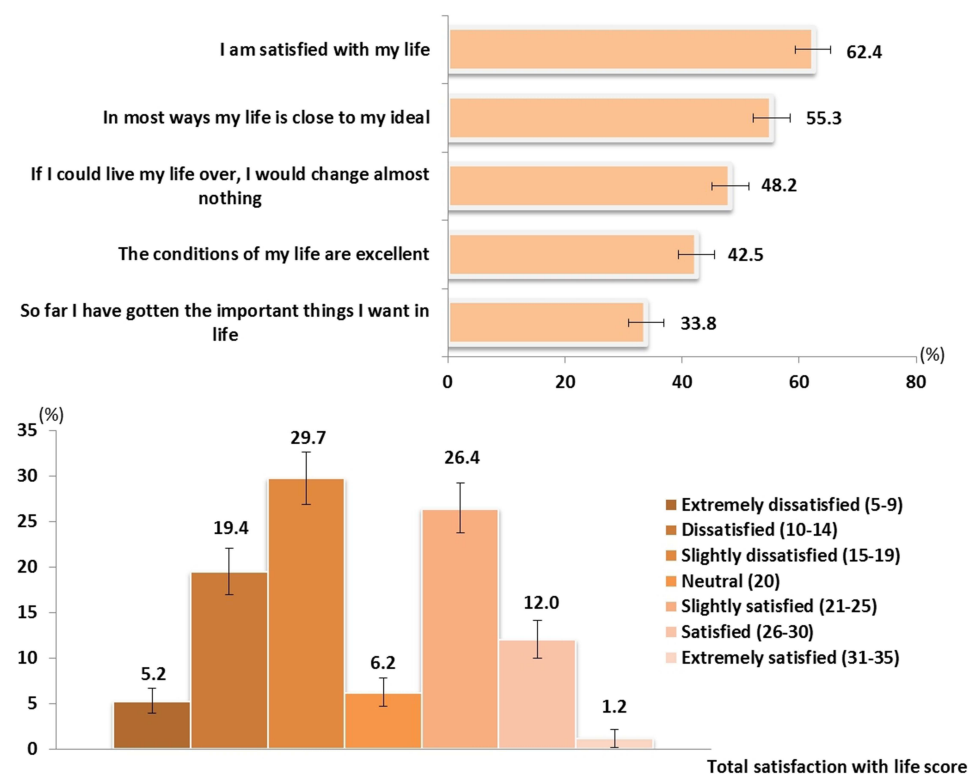


Figure 2 Proportion of “strongly agree/agree/slightly agree/neutral” responses for satisfaction items and total satisfaction with life score (N=1020).

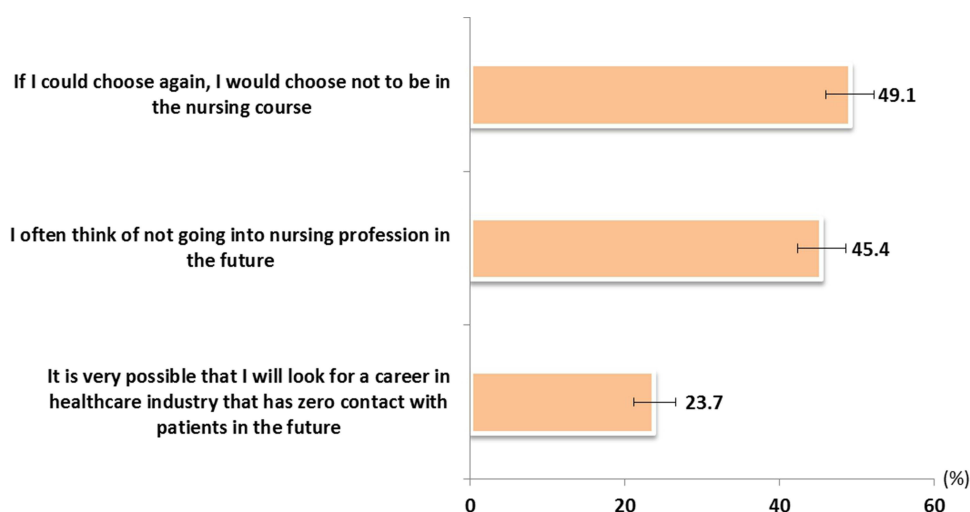


Figure 3 Proportion of responses of “extremely agree/slightly agree” responses for turnover items (N=1020).

satisfied (score 21–25). The mean (\pm SD) for the SWLS was 18.7 (\pm 5.9). The median was 19 (IQR: 15.0 to 23.0). As shown in [Table 1](#), significantly higher satisfaction with life scores were reported among younger age participants and those living in urban areas. In the multivariable analysis, average family income was the strongest predictor of higher SWLS. Participants with an average family monthly income of CNY 10,000 and above had a 2.13 higher odds (95% CI: 1.44–3.16) of higher SWLS than those with an income below CNY4000. Participants aged 16–19 years old reported 1.55 higher odds (95% CI: 1.03–2.32) of higher SWLS than those aged 22–23 years. Participants residing in urban areas also reported 1.33

higher odds (95% CI: 1.00–1.76) of SWLS than those in rural areas.

The proportion of responses to turnover intention is shown in [Figure 3](#). The vast majority responded “extremely agree/slightly agree” that they would choose not to be on the nursing course if given a choice (49.1%), often think of not going into the nursing profession in the future (45.4%), and are considering the possibility of venturing into a healthcare industry that has zero contact with patients (23.7%). The mean (\pm SD) for the turnover score was 9.2 (\pm 2.5). The median was 9 (IQR: 8.0 to 11.0).

[Table 2](#) shows the convergent validity and reliability of the constructs. The results of the measurement model

Table 2 Convergent Validity and Reliability of Constructs

Construct	Item	Loading	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Fear of COVID-19	Fear 1	0.857	0.828	0.873	0.587
	Fear 2	0.873			
	Fear 3	0.743			
	Fear 4	0.502			
	Fear 5	0.797			
Satisfaction with life	Satis1	0.810	0.862	0.896	0.632
	Satis2	0.716			
	Satis3	0.839			
	Satis3	0.793			
	Satis5	0.813			
Turnover intention	Turnover1	0.847	0.697	0.833	0.625
	Turnover2	0.708			
	Turnover3	0.810			

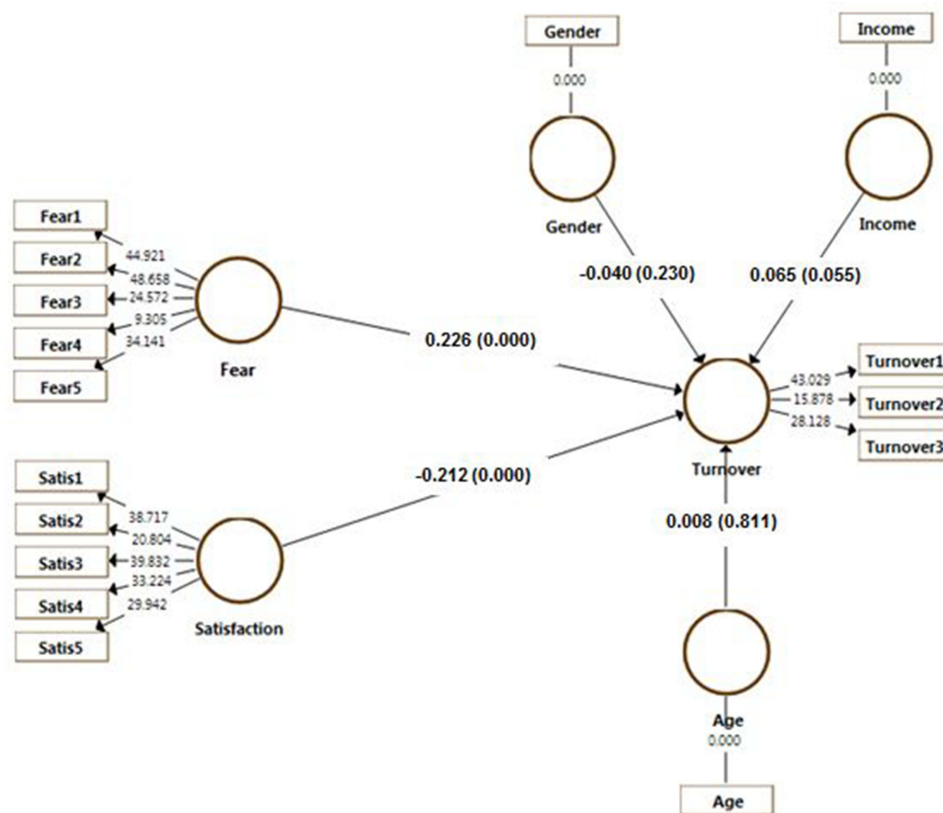


Figure 4 Partial least squares structural equation model (PLS-SEM) of factors influencing turnover intention.

indicated that all indicators had an acceptable outer loading (above 0.5), with a CR value over 0.7 and average variance extracted (AVE) above 0.5. The variance inflation factors (VIFs) for all indicators were below 2.5, implying that all indicators belonging to these three constructs were adequately independent. The results of the discriminant validity analysis using the HTMT ratio of correlations method also showed that all HTMT values were lower than the most restrictive threshold (0.85) proposed by Kline (2011),³⁴ implying adequate discriminant validity. The hypothesised associations between demographics, fear of COVID-19, satisfaction with life, and turnover intention are shown in Figure 4. The model showed that fear of COVID-19 ($\beta=0.226$, $p<0.001$) had a positive effect on turnover intention. Satisfaction with life ($\beta=-0.212$, $p<0.001$) had a negative effect on turnover intention. The results for adjusted R^2 indicated that this model explained 10.1% of the total variance in turnover intention.

In the last section of the survey, 71 responses to the open-ended questions were received. Analysis of the open-ended survey data revealed five central themes in the responses: 1) professional role, respect, and recognition; 2)

higher wages; 3) reduced workload; 4) enhanced occupational health, and safety; and 5) career advancement opportunities. Selected quotes from the participants are shown in Table 3.

Discussion

The COVID-19 pandemic has signified the importance of an adequate nursing workforce in the healthcare system during an infectious disease crisis. This study investigated perceived turnover intention among nursing students to identify potential shortages of the nursing workforce and to enable planning strategies to alleviate the nurse turnover rate. This study investigated psychological reactions to the COVID-19 pandemic and life satisfaction, which are two important components that can affect career retention and turnover intention.

In this study, the median score for fear of COVID-19 near the midpoint implies that the nursing students who participated in the study had a moderate level of fear about being in a nursing career during the COVID-19 pandemic. Nursing students in this study expressed heightened fear of the risk of infecting family members

Table 3 Five Central Themes and Respective Illustrative Quotes

Themes	Quotes
Professional role, respect, and recognition	Social status of nurses is low, we do not get the respect we deserve, low salary, and bad treatment at work. Should improve social status and social identity of nurses. Improve social status and patients' respect for nurses. Improve the public's respect for the nurse. Improve and providing fair treatment to nurses.
Higher wages	Policy or strategies to protect nurses' basic rights, such as increase income and rest time Increase the salary
Reduce workload	Reduce night-shift time, reduce workload. Career satisfaction and nurses' welfare.
Enhance occupational health and safety	Enhance strategies to protect nurses' basic rights, such as safety. Pay more attention to nurses' personal protection and safety issues. The hospital needs to prepare enough personnel and protective equipment
Career advancement opportunities	I hope the government could pay attention to nursing career development, to secure nurses' career happiness. Improve nurses' career development, provide more opportunities

and fear of death, which was similarly reported in a recent survey of frontline nurses in China. The high susceptibility, severity, and fatality of COVID-19 intensified anxiety and fear in most frontline nurses in Wuhan, China; many reported facing enormous mental turmoil.¹⁸ In our study, nursing students of an older age and with higher grades exhibited a higher level of fear of COVID-19. Like prior studies,^{35,36} this study found that females demonstrated lower psychological resilience than males. It is important to note that male participants were under-represented in this study; therefore further studies are needed to confirm the gender disparities in psychological resilience.

With regard to life satisfaction, the current study showed that the overall level of nursing students' satisfaction with life was moderate. Nursing students from urban residences have higher life satisfaction than those from rural areas. A decline in satisfaction along with an increase in age was observed, and life satisfaction increased with an increase in family income. Our findings of the association between demographic, socio-economic, and life satisfaction using the SWLS of this study were similar to findings reported in college students and adults populations.^{37–41}

In this study, nearly half reported that they would not choose to be on the nursing course and thought of not going into the nursing profession in the future. Furthermore, based on a score range of 3–15, and

a median score of 9, the findings imply that the nursing students who participated in this study scored an average turnover intention. As such, the findings may imply a potential loss of approximately half of nursing students entering the workforce. Additionally, this study indicate the possibility of nursing students leaving the nursing programme before their residency to pursue other options. Considering the current shortage of nursing staff in China, our findings indicate that the country may be on the verge of a critical nursing shortage in the coming years. Recruitment and retention strategies are urgently required to prevent this shortage from reaching a crisis point for healthcare services.

The results of the PLS-SEM analysis shed light on the importance of psychological reactions to the COVID-19 pandemic and life satisfaction in turnover intention. Our study found that a higher level of fear of COVID-19 was strongly associated with nursing students' perceived occupational turnover intention. Likewise, a recent study performed in another Asian country reported that fear of COVID-19 had a significant positive influence on professional turnover intention in nurses.³⁵ Therefore, addressing the fear of COVID-19 may enhance the intention of students to join the nursing workforce in the future. Improvements in institutional mental health support for nursing students to address their fear of COVID-19, such as provision of counselling and accurate information about

COVID-19, are essential to reduce fear. It is expected that poor life satisfaction will result in high turnover intention, as shown in previous findings on nurses.^{42,43}

The use of an open-ended question encouraging nursing students to enter the nursing profession was conducive to uncovering useful insights from our study participants. Firstly, the responses indicated the need to improve recognition and respect from society and within the organisation, as reported in other studies.^{44,45} In China, a lack of respect and recognition for nurses' work from patients and their families, as well as the organisation, has been reported to influence nurses' intentions to leave their profession.⁴⁶ These findings imply that it is essential to enhance inter-professional respect between nurses and other health professionals in medical practice settings. Occupational violence against nurses from patients and their relatives should be prevented. There is also a need to improve the understanding of society about the prestige of the nursing profession to increase the respect for and visibility of nurses in society. Responses from our study participants should also encourage the government authorities to look into the heavy workload of nurses, long working hours, and low salaries of nurses, which are also common challenges surrounding the nursing profession worldwide.⁴⁷ Our study participants also called for the safeguarding of nurses from workplace-induced injuries and illnesses. Particularly in the age of COVID-19, high COVID-19 infection rates and lives lost among nurses in China warrant effective measures from the authorities to protect healthcare workers. During the early phase of the pandemic, a high risk of infection was reported for healthcare workers in China due to a shortage of personal protective equipment.⁴⁸ Lastly, the current lack of career advancement opportunities among nurses in China warrants serious attention. Opportunities for career development have been found to be a factor in nurse retention in the workforce in many countries around the world,⁴⁹ as well as in a study conducted in China.⁵⁰ Therefore, the provision of a good career orientation with many opportunities for professional growth is needed.

Limitations

The findings of this study should be interpreted cautiously owing to some limitations. First, the use of a cross-sectional study design precluded the evaluation of the causality among the relationships investigated in this study. Second, self-reported data were subject to socially desirable responses. Third, the occupational turnover intention does not necessarily result in actual intention. The last limitation in the sampling method, which involved recruiting participants from only one

medical school in the Fujian province. The findings of this study may not be generalisable to the nursing student population in China as a whole. Despite these limitations, the sample was large, with diverse demographic backgrounds, and the study had the advantage of a high response rate. Furthermore, our results are much in accordance with many similar studies on turnover intention in nursing careers conducted in China, as well as across the globe.

Conclusions

The COVID-19 pandemic is anticipated to exacerbate the decline in nursing students entering the nursing profession. A considerable proportion may turn away from the nursing profession upon graduation, and institutions may also be at risk of students quitting the nursing programme. The nursing workforce may continue to face shortages due to the low number of nursing graduates to replenish the workforce. Existing nurses may be likely to continue experiencing burnout and dissatisfaction, potentially leading to reduced patient care resulting in higher patient mortality. An important highlight of this study is the significant influence of fear of COVID-19 and life satisfaction on nursing students' turnover intention. As nursing students are an important source of the future nursing workforce, addressing their fears and well-being before they graduate should be a priority. Life satisfaction and psychological reactions to the COVID-19 pandemic influenced nursing students' perceived turnover intention in this study and can guide higher education institutions to carefully attend to groups of students vulnerable to turnover intention. Tackling turnover intention in the academic institutions would encourage nursing students to join the nursing profession in the future. Psychological approaches to mental illness, interventions relating to COVID-19 and career motivational talks at the institutional level are highly recommended to rejuvenate and sustain the nursing workforce.

Data Sharing Statement

The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethics Approval and Informed Consent

This study was approved by the Biomedical Research Ethics Committee of the Fujian Medical University, Fuzhou, China (Approval: FJMU 2020 NO.1). This study was conducted in accordance with the principles of the Declaration of Helsinki.

The study participants were informed as to the purpose of the study, and that informed consent included consent to have anonymized responses published. It was also noted in the survey form that consent was implied upon completion of the questionnaire. All responses were collected and analysed without identifiers.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

- Simon M. Nine per cent of nurses across Europe report intent to leave their profession, with burnout among the associated personal and professional factors. *Evid Based Nurs.* 2014;17(2):54–55. doi:10.1136/eb-2013-101321
- Dewanto A, Wardhani V. Nurse turnover and perceived causes and consequences: a preliminary study at private hospitals in Indonesia. *BMC Nurs.* 2018;17(S2):52. doi:10.1186/s12912-018-0317-8
- Bae SH, Mark B, Fried B. Impact of nursing unit turnover on patient outcomes in hospitals. *J Nurs Scholarsh.* 2010;42(1):40–49. doi:10.1111/j.1547-5069.2009.01319.x
- Ismail M, Angham AM, Abed A, et al. Impact of nursing staff perception of work environment on turnover rate in hemodialysis unit. *Med J Cairo Univ.* 2020;88:85–90. doi:10.21608/mjcu.2020.93964
- Yun H, Jie S, Anli J. Nursing shortage in China: state, causes, and strategy. *Nurs Outlook.* 2010;58(3):122–128. doi:10.1016/j.outlook.2009.12.002
- Yang HY, Lv JW, Zhou X, et al. Validation of work pressure and associated factors influencing hospital nurse turnover: a cross-sectional investigation in Shaanxi Province, China. *BMC Health Serv Res.* 2017;17(1):112. doi:10.1186/s12913-017-2056-z
- Lyu L, Li G, Li J, et al. Nurse turnover research in China: a bibliometric analysis from 2000 to 2015. *Int J Nurs Sci.* 2016;3(2):208–212. doi:10.1016/j.ijnss.2016.04.008
- Wang Y, Yuan H. What is behind high turnover: a questionnaire survey of hospital nursing care workers in Shanghai, China. *BMC Health Serv Res.* 2018;18(1):485. doi:10.1186/s12913-018-3281-9
- Xie N, Qin Y, Wang T, et al. Prevalence of depressive symptoms among nurses in China: a systematic review and meta-analysis. *PLoS One.* 2020;15(7):e0235448. doi:10.1371/journal.pone.0235448
- Holland P, Tham TL, Sheehan C, et al. The impact of perceived workload on nurse satisfaction with work-life balance and intention to leave the occupation. *Appl Nurs Res.* 2019;49:70–76. doi:10.1016/j.apnr.2019.06.001
- Buetell N. Life satisfaction, a Sloan work and family encyclopedia entry; 2006. Available from: <https://wfrn.org/wp-content/uploads/2018/09/Life-Satisfaction-encyclopedia.pdf>
- Chughtai AA. A closer look at the relationship between life satisfaction and job performance. *Appl Res Qual Life.* 2019;16:1–21. doi:10.1007/s11482-019-09793-2
- Mayordomo T, Viguer P, Sales A, et al. Resilience and coping as predictors of well-being in adults. *J Psychol.* 2016;150(7):809–821. doi:10.1080/00223980.2016.1203276
- WHO. Weekly epidemiological update on COVID-19-30 March 2021. Available from: <https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19-31-march-2021>. Accessed August 18, 2021.
- DW. Coronavirus latest: WHO says health workers account for 10% of global infections; 2020. Available from: <https://www.dw.com/en/coronavirus-latest-who-says-health-workers-account-for-10-of-global-infections/a-54208221>. Accessed August 18, 2021.
- Al Thobaity A, Alshammari F. Nurses on the frontline against the COVID-19 pandemic: an integrative review. *Dubai Med J.* 2020;3:1–6. doi:10.1159/000509361
- Lucchini A, Iozzo P, Bambi S. Nursing workload in the COVID-19 era. *Intensive Crit Care Nurs.* 2020;61:102929. doi:10.1016/j.iccn.2020.102929
- Hu D, Kong Y, Li W, et al. Frontline nurses' burnout, anxiety, depression, and fear statuses and their associated factors during the COVID-19 outbreak in Wuhan, China: a large-scale cross-sectional study. *EClinicalMedicine.* 2020;24(10044):100424. doi:10.1016/j.eclinm.2020.100424
- Reusken CB, Buiting A, Bleeker-Rovers C, et al. Rapid assessment of regional SARS-CoV-2 community transmission through a convenience sample of healthcare workers, the Netherlands, March 2020. *Eurosurveillance.* 2020;25(12):2000334. doi:10.2807/1560-7917.ES.2020.25.12.2000334
- Zheng L, Wang X, Zhou C, et al. Analysis of the infection status of the health care workers in Wuhan during the COVID-19 outbreak: a cross-sectional study. *Clin Infect Dis.* 2020;71(16):2109–2113. doi:10.1093/cid/ciaa588
- Huang L, Lei W, Xu F, et al. Emotional responses and coping strategies in nurses and nursing students during Covid-19 outbreak: a comparative study. *PLoS One.* 2020;15(8):e0237303. doi:10.1371/journal.pone.0237303
- Fang ZZ. Potential of China in global nurse migration. *Health Serv Res.* 2007;42(3p2):1419–1428. doi:10.1111/j.1475-6773.2007.00717.x
- Raosoft. Sample size calculator by Raosoft; 2017. Available from: http://www.raosoft.com/sample_size.html. Accessed August 18, 2021.
- Wejnert C, Pham H, Krishna N, Le B, DiNenno E. Estimating design effect and calculating sample size for respondent-driven sampling studies of injection drug users in the United States. *AIDS Behav.* 2012;16(4):797–806. doi:10.1007/s10461-012-0147-8
- Diener E, Emmons RA, Larsen RJ, et al. The satisfaction with life scale. *J Pers Assess.* 1985;49:71–75. doi:10.1207/s15327752jpa4901_13

26. Vassar M. A note on the score reliability for the satisfaction with life scale: an RG study. *Soc Indic Res.* 2008;86(1):47–57. doi:10.1007/s11205-007-9113-7
27. Cammann C, Fichman M, Jenkins D, et al. *The Michigan Organisational Assessment Questionnaire. Unpublished Manuscript.* Ann Arbor, Michigan: University of Michigan; 1979.
28. Katz MH. *Multivariable Analysis: A Practical Guide for Clinicians and Public Health Researchers.* Cambridge university press; 2011.
29. Hosmer DW, Lemeshow S, Sturdivant RX. *Applied Logistic Regression.* Vol. 398. John Wiley & Sons; 2013.
30. Chin WW. The partial least squares approach to structural equation modelling. In G. A. Marcoulides (Ed.): *Modern Methods for Business Research.* Mahwah, NJ: Lawrence Erlbaum Associates; 1998:295–336.
31. Ringle CM, Wende S, Becker JM. *SmartPLS 3.2. 7.* Bönningstedt, Germany: SmartPLS GmbH; 2015.
32. Mayring P. Qualitative content analysis. *Qual Soc Res.* 2000;1(2). Available from: <http://www.qualitative-research.net/index.php/fqs/article/view/1089>.
33. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs.* 2008;62(1):107–115. doi:10.1111/j.1365-2648.2007.04569.x
34. Kline RB. *Principles and Practice of Structural Equation Modeling.* 3rd ed. New York, NY: The Guilford Press; 2011.
35. Labrague LJ, De Los Santos JAA. COVID-19 anxiety among front-line nurses: predictive role of organisational support, personal resilience and social support. *J Nurs Manag.* 2020;28(7):1653–1661. doi:10.1111/jonm.13121
36. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open.* 2020;3(3):e203976. doi:10.1001/jamanetworkopen.2020.3976
37. Diener E, Sandvik E, Seidlitz L, et al. The relationship between income and subjective well-being: relative or absolute? *Soc Indic Res.* 1993;28(3):195–223. doi:10.1007/BF01079018
38. Sachs J. Validation of the satisfaction with life scale in a sample of Hong Kong university students. *Psychologia.* 2003;46(4):225–234. doi:10.2117/psysoc.2003.225
39. Bai X, Wu C, Zheng R, et al. The psychometric evaluation of the satisfaction with life scale using a nationally representative sample of China. *J Happiness Stud.* 2011;12(2):183–197. doi:10.1007/s10902-010-9186-x.
40. Zhang J, Zhao S, Lester D, et al. Life satisfaction and its correlates among college students in China: a test of social reference theory. *Asian J Psychiatr.* 2014;10:17–20. doi:10.1016/j.ajp.2013.06.014.
41. Yun YH, Rhee YE, Kang E, et al. The satisfaction with life scale and the subjective well-being inventory in the general Korean population: psychometric properties and normative data. *Int J Environ Res Public Health.* 2019;16(9):1538. doi:10.3390/ijerph16091538.
42. Kim Y, Lee E, Lee H, Heslop L. Association between workplace bullying and burnout, professional quality of life, and turnover intention among clinical nurses. *PLoS One.* 2019;14(12):e0226506. doi:10.1371/journal.pone.0226506.
43. Qi L, Wei X, Li Y, et al. The influence of mistreatment by patients on job satisfaction and turnover intention among Chinese nurses: a three-wave survey. *Int J Environ Res Public Health.* 2020;17(4):1256. doi:10.3390/ijerph17041256.
44. Stievano A, Bellas S, Rocco G, et al. Nursing's professional respect as experienced by hospital and community nurses. *Nurs Ethics.* 2018;25(5):665–683. doi:10.1177/0969733016664972
45. Chiou-Fen LIN, Huang CI, Yang C-M, et al. The relationship between work environment satisfaction and retention intention among nursing administrators in Taiwan. *J Nurs Res.* 2019;27(5):e43. doi:10.1097/jnr.0000000000000312.
46. Tao H, Ellenbecker CH, Wang Y, et al. Examining perception of job satisfaction and intention to leave among ICU nurses in China. *Int J Nurs Sci.* 2015;2(2):140–148. doi:10.1016/j.ijnss.2015.04.007.
47. Goodare P. Literature review: why do we continue to lose our nurses? *Austr J Adv Nurs.* 2017;34(4):50.
48. Wang J, Zhou M, Liu F. Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. *J Hosp Infect.* 2020;105(1):100–101. doi:10.1016/j.jhin.2020.03.002.
49. Gebregziabher D, Berhanie E, Berihi H, et al. The relationship between job satisfaction and turnover intention among nurses in Axum comprehensive and specialized hospital Tigray, Ethiopia. *BMC Nurs.* 2020;19(1):1–8. doi:10.1186/s12912-020-00468-0.
50. Chen H, Li G, Li M, et al. A cross-sectional study on nurse turnover intention and influencing factors in Jiangsu Province, China. *Int J Nurs Sci.* 2018;5(4):396–402. doi:10.1016/j.ijnss.2018.09.012.

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