



Investigation and analysis of psychological stress and professional identity of nursing students during COVID-19 pandemic

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Certain diseases or infections affect large number of people in short span of time. A local endemic disease can outbreak into an epidemic affecting the whole population or region which at times extend to other countries and continents and become pandemic. Pandemics results in loss of life as well as economy. Pooled efforts and resources, effective sharing of data, parallel multiple approaches as well as physical and mental state of front line staff influence management of pandemics. The coronavirus disease COVID-19 caused by SARS-CoV-2 started in December 2019 from Wuhan in China, is now a worldwide public health emergency affecting millions of people. It affects many frontline healthcare workers too. Here, we studied psychological stress and professional identity of nursing students for possible correlations, if any, and analyze influencing factors. We used purposive sampling technique with 415 nursing students in Nanjing, China through a general information questionnaire, perceived stress scale and nursing professional identity questionnaire. Students' origin, monthly living expenses and their knowledge on epidemic prevention and treatment have shown a significant impact on their psychological stress ($P < 0.01$). Similarly, students' gender, origin, clinical practices and knowledge of prevention and treatment, and whether they actively learn such knowledge impact significantly on their professional identity ($P < 0.01$). The overall score of psychological stress was 24.47 ± 7.35 and professional identity had 72.47 ± 8.07 . The stress condition exhibited negative correlation with the degree of professional identity ($P < 0.01$, $r = -0.457$). Increased psychological stress, had lower sense of professional identity. Overall, analysis of data on perceived stress and professional identity pandemic suggests that stress levels are inversely proportional to knowledge in effective ways of handling the pandemic. Students with clinical practice fared better in terms of professional identity. The study suggests nursing students to stay focused on studies, clinical practice and counselling, if required.

Keywords: 2019-nCoV, Convenience sampling, Nursing students, Professional identity, Respiratory droplets, SARS-CoV-2, Stress

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Coronavirus is a viral infection notified as cold as early as 1960. The novel 2019-nCoV, as renamed by the coronavirus study group of the International Committee on Taxonomy of Viruses as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is the third coronavirus to cross species to infect human populations as coronavirus disease 2019 (COVID-19) in the past two decades after the severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome MERS¹⁻³. Started as a series of pneumonia like cases caused by SARS-CoV-2 from Wuhan of Hubei province, China in December 2019, it has spread rapidly across the globe^{1,4}. The World health Organization (WHO) has defined COVID-19 as a global pandemic, and considerable researches have been focused on identification and prevention of SARS-CoV-2^{1,5}. Though COVID-19 has been included in the category B of infectious diseases as specified in the "Law of the People's Republic of China on the Prevention and Treatment of Infectious Diseases", it is being prevented and treated as category A infectious diseases in China⁶.

The SARS-CoV-2 is a β -coronavirus belonging to the sarbecovirus subgenus of Coronaviridae family of order Nidovirales^{1,7}. The recently identified SARS-CoV-2 has distinct features from the previous findings on severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) including viral structures, epidemiology and clinic pathophysiology. All such differences have caused substantial challenges in public prevention, control, clinical treatments, and invention of novel efficacious drugs to treat COVID-19^{2,5}. The SARS-CoV-2 is transmitted by contact and respiratory droplets, and almost all age groups are susceptible to this disease though the elderly are affected seriously than the young^{1,8-10}. The genome sequence of 2019-nCoV is about 89% identical to bat SARS-like-CoVZXC21 and 82% identical to human SARS-CoV¹¹. The infected patients are predominantly presented with fever, cough, and radiological ground glass lung opacities, which resemble SARS-CoV and MERS-CoV infections, however, growing number of asymptomatic cases are reported across the world¹². The SARS-CoV-2 uses the same cell entry receptor,

ACE2, to infect humans, as SARS-CoV, thus the clinical similarity between the two viruses could be a reason for severity of COVID-19 patients¹¹. With the spread of COVID-19 in the whole world, the social distancing, also known as ‘physical distancing’, quarantine and self isolation has been identified as the most suitable way to prevent the disease^{1,13}.

The published data suggests that covid-19 has a disproportionate impact on all healthcare workers. On mental symptoms, the severity has been reported to be influenced by gender, age, occupation, specialization, and proximity to COVID-19 patients^{2,14,15}. Studies suggest implementation of infection prevention measures to reduce hospital transmission. The operating room preparations involve multiple stakeholders and can present a significant challenge to health care workers¹⁶. Transmission of infection occurs from healthcare facilities to healthcare workers. About 3.8% of COVID-19 cases have occurred in healthcare workers, causing five deaths in China¹⁷.

As the COVID-19 is new and spreads rapidly due to lack of specific medication, the psychological stress on the front line healthworkers, both physicians and nurses including pediatric wards, is apparent. Considerable studies have reported interesting findings^{3,14,15,18-20}. A study conducted to find the experiences of these health-care providers in the early stages of this pandemic showed that intensive work drained them physically and emotionally. Though they have shown resilience and professional dedication to overcome such occupational challenges, they need inclusive support to safeguard their wellbeing including regular and intensive training to promote preparedness and efficacy in crisis management¹⁸.

Bohlken *et al.*¹⁵ who studied the psychological stress of healthcare workers from departments of internal medicine, infectiology, surgery and fever wards including ICU associated with COVID-19 patients @ 7.5-10% in Germany in the ongoing pandemic, have reported that they undergo extensive mental strain due to stress, depression and anxiety. Some of the reports have high prevalence of disease, while as others have paid attention to the severity of psychological problems among medical personnel and

showed urgency of providing psychological care to nursing staff^{21,22}.

In this context, we investigated whether the pandemic would influence the professional identity and psychological stress of nursing students, and whether it would affect the career options of nursing students.

Materials and Methods

Research subjects

In this study, the method of convenience sampling was used to investigate some undergraduate nursing students in, Nanjing, China in February 2020 to obtain detailed descriptions of their psychological stress and insights in their professional identity during the COVID-19 pandemic. Purposive sampling technique is a selective or subjective sampling, a type of non-probability sampling method that relies on the objective of the study as well as the characteristics of the subject selected. All subjects informed consent was obtained [review no. (2020) 55] and they participated voluntarily in the investigation.

Survey instruments

General information questionnaire

The questionnaire was designed by the researchers themselves and it included 10 items such as gender, age, origin, monthly living expenses, and knowledge of prevention and treatment of COVID-19.

The Perceived Stress Scale of Chinese Version, PSS-C

The scale²³ consists of 14 questions that can reflect the feelings of tension and losing control. It is mainly used to measure the widespread and overall stress in an individual's life and can reflect the individual's self-awareness of the stress. Likert 5-point scale was used in this investigation. Among the 14 items in the scale, seven positive items (4, 5, 6, 7, 9, 10, and 13) are reversely coded and the remaining seven items are forwardly coded. The score can reflect the psychological stress perceived by the individual. The higher the score, the greater the stress perceived by the research subjects. The total score of the 14 items is 56 and the lowest score is 0. Details are shown in Table 1.

Nursing professional identity questionnaire

This evaluation tool was developed by Porter & Wilton²⁴. The scale was made according to the

Table 1 — Details of the total score of subject corresponding to the level stress perceived by the subject

Total Score	Implication of the stress
0-28	Normal
29-42	Have great stress, and need self-adjustment and reduction of stress.
43-56	Have too much stress, and need to seek assistance from others to reduce stress

characteristics of nursing, and was based on a considerable domestic and foreign experience. There are 25 items in this scale. The validity of its content and consistency of its items are higher than 0.80, and the test-retest reliability is above 0.70. The questionnaire was appropriately adjusted in this investigation according to the characteristics of the research subjects, and the final questionnaire has 21 items.

With the help of a third-party online questionnaire platform, the questionnaire was compiled into an electronic format and sent to the research subjects meeting the inclusion criteria. Before the investigation, the research subjects were informed of the investigation objective, significance and necessary consent was obtained. The investigation was conducted anonymously. A total of 420 questionnaires were collected in this survey. After excluding those with obvious errors, the researchers collected 415 effective questionnaires, with an effective collection rate of 98.8%.

Inclusion criteria was regular nursing students registered in Bachelors and Masters programme at the University, and whether or not they have clinical. All students who participated in this study were Han Chinese. The Exclusion criteria was Prior experience of pandemics or major outbreaks or any such experience.

Statistical method

The collected data was entered and analysed using SPSS version 22. Descriptive statistics including the age, gender, area, educational background, urban/rural origin, expenses, clinical practice and learnt knowledge of epidemic of the participant were collected. All testing was applied at 95% confidence level. P-value is <0.05 was considered as significant.

Results and Discussion

General information of the research subjects

This study investigated 415 nursing students and all of them are of Han nationality. The general information included subjects' gender, age (18-23, ≥ 24), whether or not from Hubei Province of China, education background (college, bachelor or master or above), origin (Urban/Rural), expenses (Yuan), clinical practice, knowledge of epidemic prevention and familiarity of treatment and the suspected or diagnosed patients in the community. The results are shown in Table 2.

Status of psychological stress and professional identity of nursing students

In this study, psychological stress and professional identity of 415 nursing students was evaluated. Overall score of psychological stress is (24.47 \pm 7.35) and the overall score of professional identity is (72.47 \pm 8.07), as shown in Table 3.

Correlation analysis of stress level and professional identity of nursing students

The results of this investigation showed that the stress status [total score of stress level (r)] is negatively (-0.457) correlated with the degree of professional identity ($P < 0.0$).

Current status and influencing factors of perceived stress of nursing students during the pandemic

Results showed that nursing students have good psychological condition and strong ability to work under pressure, and they could adjust themselves well in a pandemic. Different origins, monthly living expenses and knowledge of epidemic prevention and treatment have influence on their psychological stress. For students with greater psychological stress, individual or group psychological counseling should be provided by their school psychological counselling centres or their school counsellors. Good mental health is particularly important for medical workers²⁵, and it is suggested that the administrative staff in school (school counsellors) should not only pay close attention to the overall changing trend of mental health of medical students, but also regularly or irregularly carry out some mental health education activities to reduce the stress of students as much as possible and avoid the negative results caused by mental health problems. Another study also showed that psychological and life adjustment, altruistic acts, team support, and rational cognition played vital role in psychological experience of nurses caring for COVID-19 patients.

Further, it was observed that working under such circumstances increases affection and gratefulness, development of professional responsibility, and self-reflection²⁰. Impact of gender, having children, confidence in fighting outbreak, professional attitudes, having attended infection prevention training among other factors are predictors of mental health of nurses working at emergency and fever outpatient. It was found that strengthening their protection training, increasing number of nurses for emergency services, timely updates on epidemic situation and special attention to nurses with children may help in averting

Item	Number of cases [n (%)]	Total score of PS	Total score of PI
Gender			
Male	43 (10.4)	25.60±6.84	67.51±7.43
Female	372 (89.6)	24.34±7.40	73.04±7.96*
Age			
18-23	364 (87.7)	24.73±7.32	72.41±8.12
≥24	51 (12.3)	22.65±7.37	72.90±7.83
Whether from Hubei Province			
Yes	11 (2.7)	25.27±6.15	70.91±6.55
No	404 (97.3)	24.45±7.38	72.51±8.11
Education background			
College Degree	33 (8.0)	25.73±8.86	74.48±8.26
Bachelor Degree	310 (74.7)	24.60±7.22	72.12±8.13
Master or above	72 (17.3)	23.33±7.09	73.07±7.69
Origin			
Urban	155 (37.3)	22.85±8.83	74.37±9.24
Rural	260 (62.7)	25.436±6.12*	71.34±7.07*
Monthly living expenses (yuan)			
<1000	50 (12.1)	22.56±6.42	71.34±7.78
1000-1500	241 (58.1)	25.78±7.04	72.49±7.57
1501-2000	84 (20.2)	23.49±7.26	72.24±9.65
≥2000	40 (9.6)	21.00±8.61*	74.23±7.75
Whether have clinical practice			
Yes	401 (96.6)	24.40±7.34	72.74±7.96
No	14 (3.4)	26.43±7.72	64.71±7.65*
Whether actively learn the knowledge of epidemic prevention and treatment			
Yes	388 (93.5)	24.29±7.39	72.74±7.96
No	27 (6.5)	27.07±6.28	64.71±7.65*
Mastery of knowledge			
Good	150 (36.7)	22.35±8.42	74.95±8.26
General	259 (62.4)	25.47±6.29	71.17±7.66
Just familiar with	6 (1.4)	34.50±2.95*	66.16±4.12*
Whether have suspected or diagnosed patients in the community			
Yes	53 (12.8)	26.15±5.65	73.66±8.99
No	362 (87.2)	24.22±7.54	72.30±7.93

[PS, Perceived Stress; PI, Professional Identity * $P < 0.01$]

Table 3 — level of psychological stress and professional identity of nursing students (n = 415)

Item	Min.	Max.	Score
Total Score of Perceived Stress Scale	3	49	24.47±7.35
Total score of professional identity scale	48	97	72.47±8.07

the stress among them²⁶. A study showed that gender and origin has a role in coping strategies of nurses and nursing college students during COVID-19 outbreak. It was found that women showed more severe anxiety and fear than men, and the participants from cities showed more anxiety and fear than participants from rural, however, rural participants showed more sadness than urban participants. Study also showed the closer interaction with COVID-19 patients, the stronger the anxiety and anger among the participants²⁷. It is also necessary for school to continuously improve the

construction of humanities curriculums for students. Relevant humanities courses should be developed for senior students, so that students can have both professional skills and humanistic qualities. Their unique humanistic spirits can thus be formed, which will further promote students' physical and mental health²⁸.

Current status and influencing factors of professional identity of nursing students during the pandemic

During the pandemic, nursing students have shown a general sense of professional identity. Genders, origins, clinical practice, knowledge of epidemic prevention and treatment, and whether they actively learn the related knowledge of epidemic prevention and treatment can affect their professional identity. The environment of clinical practice can affect students'

professional identity. It also suggested that clinical educators should strengthen the education of professional identity during students' internship²⁹. In the course of clinical practice, especially in the middle and late stages of practice, clinical teachers should give more encouragement to students, and help students to better plan their careers and improve their professional identity in some ways like telling them the experiences of some successful nursing professionals³⁰. Student's self-learning ability should also be trained in school. Another study showed that the use of self learning modules could help nursing students enhance their quality of nursing clinical competency³¹. During pandemic, at early stage, negative emotions were dominant and positive emotions appeared gradually, while as self-coping styles and psychological growth played an important role in maintaining mental health of nurses²⁰. With this impulsive COVID 19 pandemic, nursing students need to keep learning related knowledge about COVID-19. Therefore, nursing schools need to set up a self-learning section in their teaching practices.

Correlation analysis of perceived stress and professional identity of nursing students during the pandemic

The perceived stress of nursing students has a negative correlation with their professional identity, which means the less the stress, the higher the professional identity level. Another study demonstrated that the experiences of clinical practices including interactions with nurses, patients, patients' family members, and healthcare professionals, would affect students' experience and self-identity and would help in developing their perceptions toward the nursing profession³². Based on total score of the role stress scale, the total score of the professional identity questionnaire for nursing students ($r=-0.295$, $P < 0.01$), age ($r=0.145$, $P < 0.01$), having an only child or not ($r=-0.114$, $P < 0.05$), their education level ($r=0.295$, $P < 0.01$) and experience in community organizations ($r=0.151$, $P < 0.01$), all helps in determining their professional identity. It was also found that nursing students with higher professional identity values had lower role stress levels²⁰. A positive correlation of the anxiety with stress score ($r=0.443$, $P < 0.001$) was established, while the coping tendency score was found negatively correlated with anxiety ($r=-0.268$, $P < 0.001$) and stress ($r=-0.503$, $P < 0.001$)²². Furthermore, nursing educators should pay attention to the psychological changes of the students and carry out targeted psychological counselling so as to reduce the

mental pressure of the students, enable them to actively participate in their study and indirectly enhance their professional identity³³.

Over all, analysis of the data collected from nursing students through filled in questionnaires on perceived stress and professional identity during the current COVID-19 pandemic suggests that their stress levels are inversely proportional to their knowledge in effective ways of handling this pandemic. Understandably, those with clinical practice fared better in terms of professional identity. Observations from this study suggest that during the pandemic, students should study independently, focus on their studies, and reduce their mental stress. School counselors play an important role by providing regular psychological care and support to students staying at home. In this way, the professional identity can be enhanced and students can better plan their future.

Conclusion

Results of this study suggest that factors such as place of origin, monthly living expenses and knowledge of epidemic prevention and treatment during the pandemic have an impact on students' psychological stress. Different genders, origins, clinical practice and knowledge of epidemic prevention and treatment, as well as whether they actively learn such knowledge have an influence on their professional identity. It was found that the psychological status of nursing students is positively correlated with their professional identity, and *vice versa*. During the pandemic, schools and teachers are required to timely urge students to learn relevant knowledge, set up relevant courses of prevention and treatment of COVID-19, and establish online learning platforms to allow them to learn and test their knowledge, and prepare them for better prevention and treatment. In the later courses, it is necessary to constantly tap the students' self-learning potentials, improve their self-learning abilities, so that they can constantly make progress in this challenging medical field. Schools and teachers should also care for students from different origins, concern about their psychological state, and provide psychological counselling in a timely manner. The outcome of this study may provide scope for timely adjustment of students' psychological status and planning for subsequent education by figuring out the psychological stress and professional identity of nursing students during this period.

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Conflicts of interest

Authors declare no conflict of interests.

References

- Sun P, Lu X, Xu C, Sun W & Pan B, Understanding of COVID-19 Based on Current Evidence. *J Med Virol*, 25 (2020) 10.1002/jmv.25722. doi: 10.1002/jmv.25722.
- Chen J, Pathogenicity and transmissibility of 2019-nCoV— A quick overview and comparison with other emerging viruses. *Microb Infect*, 22 (2020) 69.
- Huang Y & Zhao N, Generalized Anxiety Disorder, Depressive Symptoms and Sleep Quality During COVID-19 Outbreak in China: A Web-Based Cross-Sectional Survey. *Psychiatry Res*, 288 (2020) 112954. doi: 10.1016/j.psychres.2020.112954.
- Xu X, Yu C, Qu J, Zhang L, Jiang S, Huang D, Chen B, Zhang Z, Guan W, Ling Z & Jiang R, Imaging and clinical features of patients with 2019 novel coronavirus SARS-CoV-2. *Eur J Nucl Med Mol Imaging*, 47 (2020) 1275.
- Li C & Xu BH, The viral, epidemiologic, clinical characteristics and potential therapy options for COVID-19: A review. *Eur Rev Med Pharmacol Sci*, 24 (2020) 4576.
- Lin L & Li TS, Interpretation of "Guidelines for the diagnosis and treatment of novel coronavirus (2019-nCoV) infection by the national health commission (Trial version 5)". *Zhonghua Yi Xue Za Zhi*, 100 (2020) E001.
- Richman DD, Whitley RJ & Hayden FG, *Clinical Virology*, (John Wiley & Sons, NJ, USA), 2016.
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X & Cheng Z, Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*, 395 (2020) 497.
- Wang C, Horby PW, Hayden FG & Gao GF, A novel coronavirus outbreak of global health concern. *Lancet*, 395 (2020) 470.
- Chan JFW, Yuan S, Kok KH, To KKW, Chu H, Yang J, Xing F, Liu J, Yip CCY, Poon RWS & Tsoi HW, A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*, 395 (2020) 514.
- Chan JFW, Kok KH, Zhu Z, Chu H, To KKW, Yuan S & Yuen KY, Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia after visiting Wuhan. *Emerg Microbes Infect*, 9 (2020) 221.
- Xu X, Yu C, Qu J, Zhang L, Jiang S, Huang D, Chen B, Zhang Z, Guan W, Ling Z & Jiang, R. Imaging and clinical features of patients with 2019 novel coronavirus SARS-CoV-2. *Eur J Nucl Med Mol Imaging*, 47 (2020) 1.
- Suppawittaya P, Yiemphat P & Yasri P, Effects of social distancing, self-quarantine and self-isolation during the COVID-19 pandemic on people's well-being, and how to cope with it. *Int J Sci Health Res*, 5 (2020) 12.
- Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, Tan H, Kang L, Yao L, Huang M, Wang H, Wang G, Liu Z, Hu S, Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*, 3 (2020) e203976. doi: 10.1001/jamanetworkopen.2020.3976.
- Bohlken J, Schömig F, Lemke MR, Pumberger M & Riedel-Heller SG, COVID-19 Pandemic: Stress Experience of Healthcare Workers - A Short Current Review. *Psychiatr Prax*, 47 (2020) 190. doi: 10.1055/a-1159-5551.
- Wong J, Goh QY, Tan Z, Lie SA, Tay YC, Ng SY & Soh CR, Preparing for a COVID-19 pandemic: A review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anesth*, 67 (2020) 1.
- Wu Z & Mc Googan JM, Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *J Am Med Assoc*, 323 (2020), 1239.
- Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S, Xia L, Liu Z, Yang J & Yang BX, The experiences of health-care providers during the COVID-19 crisis in China: A qualitative study. *Lancet Glob Health*, 6 (2020) e790.
- Wang S, Xie L, Xu Y, Yu S, Yao B & Xiang D, Sleep Disturbances Among Medical Workers During the Outbreak of COVID-2019. *Occup Med (Lond)*, (2020). doi: 10.1093/occmed/kqaa074.
- Sun N, Shi S, Jiao D, Song R, Ma L, Wang H, Wang C, Wang Z, You Y, Liu S & Wang H, A qualitative study on the psychological experience of caregivers of COVID-19 patients. *Am J Infect Control*. 948 (2020) 592.
- Hui DS, I Azhar E & Madani TA. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health-The latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis*, 91 (2020) 264.
- Kang L, Li Y & Hu S, The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiat*, 7 (2020) e14.
- Meng R, Li J, Wang Z, Zhang D, Liu B, Luo Y, Hu Y & Yu C, The Chinese version of the Perceived Stress Questionnaire: development and validation amongst medical students and workers. *Health Qual Life Out*, 18 (2020) 1.
- Porter J & Wilton, A professional identity of allied health staff. *J Allied Health*, 48 (2019) 11.
- Mao Y, Zhang N, Liu J, Zhu B, He R & Wang X, A systematic review of depression and anxiety in medical students in China. *BMC Med Educ*, 19 (2019) 327.
- Chu J, Cui S, Jiang Y, Shi Q, Zhang L, Kong D & Qian M, Impact of COVID-19 on psychology of nurses working in the emergency and fever outpatient: A cross-sectional survey. (2020) PPR139269, doi: 10.21203/rs.3.rs-20777/v1.
- Huang L & rong Liu H, Emotional responses and coping strategies of nurses and nursing college students during COVID-19 outbreak. *medRxiv*, (2020) doi: 10.1101/2020.03.05.20031898.
- Kromydas T, Rethinking higher education and its relationship with social inequalities: past knowledge, present state and future potential. *Palgrave Commun*, 3 (2017) 1.

- 29 Zhang X, Zhang H, & Zhang H, The impact of clinical learning environment on undergraduate nursing students' professional identity and professional self-efficacy. *Chin J Nurs Edu*, 15 (2015) 167.
- 30 Goldie J, Dowie A, Goldie A, Cotton P & Morrison J, What makes a good clinical student and teacher? An exploratory study. *BMC Med Educ*, 15 (2015) 40.
- 31 Tohidi, S, KarimiMoonaghi H, Shayan A & Ahmadiania H, The effect of self-learning module on nursing students' clinical competency: A pilot study. *Iran J Nurs Midwifery Res*, 24 (2019) 91.
- 32 Tseng HC, Wang HH & Weng WC, Nursing students' perceptions toward the nursing profession from clinical practicum in a baccalaureate nursing program—A qualitative study. *Kaohsiung J Med Sci*, 29 (2013) 161.
- 33 Mukumbang FC & Alindekane LM, Student nurse-educators' construction of teacher identity from a self-evaluation perspective: A quantitative case study. *Nurs Open*, 4 (2019) 108.