

Original Research Paper

Resilience, Stress and Well-Being in Undergraduate Nursing Students in China and the UK

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Article history

Received: 03-08-2020

Revised: 01-03-2021

Accepted: 05-03-2021

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Abstract: To test the differences of resilience, stress and well-being and explore the correlations between nursing students in China and United Kingdom. Globally nursing is considered a demanding profession and increasing attention has been placed on the psychological well-being and resilience of undergraduate nursing students. Limited international comparative research of the interaction between resilience, stress and well-being has been reported. A cross-sectional correlational design was adopted with a purposive sample of 444-second year nursing students, recruited from two universities, located in the United Kingdom and China. Resilience, stress and psychological well-being were assessed via self-reported questionnaires (Connor Davidson Resilience Scale; WHO 5 well-being Index; The Perceived Stress Scale) and a demographic inventory. Findings show the average scores of resilience revealed for UK and Chinese nursing students (26.70 ± 5.11 and 25.18 ± 5.61), stress (20.94 ± 3.87 and 21.54 ± 3.64) and well-being (15.43 ± 4.38 and 14.93 ± 4.00) respectively. Differing levels of resilience between the two countries affected by age and intention to leave was reported. The interaction between resilience and stress influences the psychological well-being of the undergraduate nursing students in both countries. Nursing students are experiencing stress, which is affecting their psychological well-being, but resilience is a protective factor. Intervention studies are required to ensure student nurses, especially younger students, are equipped with strategies to cope with stress during their education. The high prevalence of stress among nursing student is of concern. In response, educational, government and employing hospitals should develop measures and policies to support student nurses to help reduce stress and enhance resilience.

Keywords: Nursing Student, Psychological Well-Being, Resilience, Stress, Cross Sectional

Introduction

Globally nursing is considered a demanding profession (Vandali, 2017) with reports suggesting nursing students experience higher levels of academic stress than other disciplines (Reeve *et al.*, 2013; Stephens, 2013). This has been attributed to stressful training experienced (Woo and Newman, 2019), feeling ill-prepared for the realities of practice (Woo and Newman, 2019), which impacts upon the psychological and physical health (Jimenez *et al.*, 2010). Psychological well-being is a multidimensional concept, including hedonic and eudaimonic which

were used to refer to the subjective feelings of happiness and purposeful aspect of psychological well-being separately (Trudel-Fitzgerald *et al.*, 2019). Psychological distress is an emotional state of experiencing anxiety and depression (Arvidsdotter *et al.*, 2016). Among undergraduate nursing students, it attributed to burnout, attrition, poor academic performance and poor psychological well-being (Ayaz-Alkaya *et al.*, 2018).

A protection factor, advocated in the academic literature (Thomas and Revell, 2016) and educational/workforce policy (McFadden *et al.*, 2019) is resilience, which many

authors agree can be developed or taught (Grant and Kinman, 2014). Whilst resilience has varying definitions it is considered to be “the ability to overcome adversity and learn to be stronger from the experience” (Chow *et al.*, 2018). Prevalence rates of resilience among nursing students has shown variabilities internationally with moderate levels in Nigeria (Aloba *et al.*, 2016) and high in Australia and Spain (Chamberlain *et al.*, 2016; Ríos-Risquez *et al.*, 2016).

There are several benefits of resilience, such as it has a bearing on academic performance, psychological well-being and course completion (Thomas and Revell, 2016). In China, some authors (Wang *et al.*, 2014; Luo and Wang, 2009), suggest that it has an important influence in the development of professional identity among undergraduate nursing students. In the United Kingdom (UK), evidence suggests it can help to avoid student burnout and help to adjust to adversity, such as working within the Covid-19 pandemic, enabling the development of a future workforce able to make a difference and build organisational empathy (Taylor *et al.*, 2020). Following qualification, it has also been shown to have ramifications for patient care, staff health and work environments (Sull *et al.*, 2015; West *et al.*, 2017).

However, despite the importance of resilience and its relationship with well-being it remains a relatively unexplored area (Chow *et al.*, 2018). Moreover, there is a dearth of international comparative research which has assessed the prevalence, commonalities and differences resilience plays in relation to stress and psychological well-being of the student nurses.

There is a growing body of evidence exploring the prevalence and source of stress, psychological well-being and resilience among student nurses (Galvin *et al.*, 2015; Smith and Yang, 2017; García-Izquierdo *et al.*, 2018; He *et al.*, 2018; Lanz, 2020).

Internationally, stress, as a health problem, is reported to be widespread among student nurses with levels ranging from moderate to severe (Smith and Yang, 2017; He *et al.*, 2018). It has been associated with academic, clinical and personal reasons (Gibbons *et al.*, 2011; Chernomas and Shapiro, 2013; Labrague *et al.*, 2017). Academically, reasons for stress include fear of failure and worries about the ability to cope with intense clinical workloads (Reeve *et al.*, 2013). Clinically, the fear of making mistakes, experiencing interpersonal conflict and being exposed to death and dying are reported to be triggers (Chernomas and Shapiro, 2013; Smith and Yang, 2017). Personal reasons relate to the impact of studying on family and social life (Lo, 2002). Research by Smith and Yang (2017) claims that Chinese undergraduate nursing students experience higher levels of stress compared with western nursing students. They

attributed this to Chinese nursing students being traditionally younger females who enter directly from high school, which (Hua *et al.*, 2006) believes Hua makes them susceptible to the negative effects of stress. In contrast, nursing students in the UK tend to be mature females with dependents who have life and work experience (Thomas, 2002; Maguire, 2018).

Evidence suggests student nurses are vulnerable to experiencing psychological distress, however prevalence varies internationally from medium to poor (Zhao *et al.*, 2015; Ríos-Risquez *et al.*, 2016; Smith and Yang, 2017; Yildirim *et al.*, 2017). For example, low levels have been reported in China (Zhao *et al.*, 2015; Smith and Yang, 2017) and Spain (Ríos-Risquez *et al.*, 2016) and medium levels in Hong Kong (Chow *et al.*, 2018). Specific psychological stressors for nursing students relate to meeting the dual demands of clinical and educational training, shift work and exposure to sick and vulnerable individuals (Gibbons *et al.*, 2011; Chernomas and Shapiro, 2013). These could have a negative impact on nursing students’ psychological well-being. However, a range of positive factors including resilience, self-efficacy, social support, friendly relationships, self-worth, self-esteem and positive emotions also could influence levels of psychological well-being (Gibbons *et al.*, 2011; Brajsa-Zganec *et al.*, 2017).

Being resilient is advocated as one approach for student nurses to cope with stressful situations and enhance psychological well-being (Smith and Yang, 2017; He *et al.*, 2018). Consequently, calls to foster resilience to aid and prepare student nurses for education and clinical experience have been made (Stephens, 2013). An integrative review exploring resilience in nursing students suggest that resilience is a dynamic evolving process that can change over time (Thomas and Revell, 2016). Levels among nursing students suggested it to be moderate to high (Aloba *et al.*, 2016; Ríos-Risquez *et al.*, 2016; Smith and Yang, 2017; He *et al.*, 2018). However, a range of factors including supportive relationships, environments and feelings of empowerment influence levels of resilience (Thomas and Revell, 2016).

The Lazarus and Folkman (1984) Transactional Model of Stress and Coping implies that the interaction between stress and resilience is intrinsic to psychological well-being. Several papers have reported this model as showing statistically significant correlation between resilience, stress and well-being (Klainin-Yobas *et al.*, 2014; Ríos-Risquez *et al.*, 2016). In addition, García-Izquierdo *et al.* (2018) found that nursing students who show lower levels of resilience and higher levels of stress, report worse well-being overall, with (Smith and Yang, 2017) negatively correlating resilience and stress to well-being.

In general, growing research attention has focused on reporting the prevalence of stress, psychological well-being and resilience among nursing students. However wide variability exists (Zhao *et al.*, 2015; Smith and Yang, 2017; He *et al.*, 2018) which may be attributed to the definition of the concept employed and type of collection tools utilised (He *et al.*, 2018). Existing research is primarily focused within countries (Ríos-Risquez *et al.*, 2018), however there is a dearth of international comparative research studies exploring the prevalence of and the relationship between resilience, stress and psychological well-being in nursing students. The aim of this study is to compare levels of resilience, stress and psychological well-being among second year nursing students located in the United Kingdom (UK) and third year students in China.

Methods

Research Design

The present study, underpinned by Lazarus and Folkman's (1984) framework was adopted as it integrates stress and coping theories to explain how an individual reacts to psychologically stressful situations and/or environments (Matthieu and Ivanoff, 2006). Furthermore, this model has been utilised previously among nursing student studies that have looked at the relationship of the current three main concepts (Gibbons *et al.*, 2011).

A quantitative cross-sectional correlational design was adopted to identify and assess the quantitative differences between two student groups. Data was collected in April 2019 across two nursing schools that provide undergraduate nurse education, in the UK and one province in China. Undergraduate nursing education in the UK is a three-year programme, while in China; it is a four-year programme. Based on the curriculum and internship schedules of the two countries, the second year of the UK and the third year of Chinese programme were chosen to compare. The study is described according to the STROBE statement checklist (Von Elm *et al.*, 2007) for cross sectional studies.

Sample

Student registration databases were used as the sampling frames for this study. Using purposive sampling, 259 sec-year nursing students studying the Bachelor of Nursing program in the UK and 350 third-year nursing students studying the Bachelor of Nursing program in China were invited to participate in the survey. Eligibility required nursing students to be aged 18 and over. Power analysis (using a 5% margin of error and 95% confidence level) calculated the minimum sample size as 236 (UK: 155 and China: 184).

Data Collection

An anonymous self-reporting online questionnaire was administrated to nursing students in the two locations via their university email account with a reminder email issued one week later. Following an initial low online response rate from the UK sample, they were offered the opportunity to complete a paper version at the end of class. A participant information sheet accompanied the questionnaire and advised students that return of the questionnaire implied consent. Student confidentiality and anonymity was assured throughout the study.

The questionnaire was composed of three validated tools: Connor-Davidson Resilience Scale-10 (CD-RISC-10), (WHO, 1998) and the Perceived Stress Scale-10 (PSS). In addition, demographic information was gathered. In line with previous Chinese research (Smith and Yang, 2017), one culturally specific question (volunteer for a nursing major) was posed to the Chinese sample (see supplementary file).

Resilience Scale

The Connor-Davidson Resilience Scale -10 (CD-RISC-10) questionnaire consists of 10 items and is available in English (Connor and Davidson, 2003) and Chinese (Yu and Zhang, 2007). Scoring for this tool is rated from zero (not true at all) to four (true nearly all the time) with the sum of the responses reported as the final score (0-40 range), where the highest score indicates the highest level of resilience (Wang *et al.*, 2011). Kong *et al.* (2016) measured resilience among Chinese nursing students and reported to be both credible and reliable. Other research has demonstrated a good overall reliability level with a Cronbach's alpha of 0.73 (Notario-Pacheco *et al.*, 2011) and 0.82 (Duong and Hurst, 2016) for this scale. In the current study, the coefficient was 0.813 in the English version and 0.897 in the Chinese version.

Psychological Well-Being

The (WHO, 1998), available in both English and Chinese, is a publicly available questionnaire consisting of five items. The raw score ranges from 0-25, is calculated by totalling the figures of the five answers where 0 represents the worst and 25 represents the best possible quality of life, with higher scores indicative of greater well-being. The index has demonstrated good psychometric properties (Topp *et al.*, 2015), with internal consistency Cronbach alpha coefficient reported of 0.89 in the Chinese version (Volinn *et al.*, 2010) and 0.82 in the English version (De Wit *et al.*, 2007). In the current study, the

coefficient was 0.860 in the English and 0.872 in the Chinese version.

Perceived Stress

The Perceived Stress Scale (PSS-10) (Cohen *et al.*, 1983), available in both Chinese and English, consists of 10 items on a 5-point Likert scale ranging from 0 (never) to 4 (very often), indicating how often they have felt or thought a certain way within the past month. Scores can range from 0 to 40, with higher composite scores indicative of greater perceived stress. Cronbach alpha coefficient scores for the English version is 0.87-0.91 (Cohen, 1988) and 0.86 in the Chinese version (Leung *et al.*, 2010). In the current study, the coefficient was 0.516 in the English version and 0.618 in the Chinese version.

Validity of the tools was assured through expert reviews and a pilot study with 20 postgraduate nursing students at a Chinese University recruited through personal contacts. No changes were made to the resulting tools.

Data Analysis

Questionnaire responses were transferred into IBM SPSS 25. Data were analyzed using descriptive statistics, independent t-test chi-square, non-parametric test, Spearman rank correlation analysis and a hierarchical stepwise regression analysis to test what were the predictors for resilience in terms of demographic variables. Significance was set at a level of 0.05.

Ethical Considerations

The study was approved by the Ulster University, Institute of Nursing and Health Sciences Ethics Filter Committee (March 2019) and approval obtained from Najing University of Chinese Medicine (Nov 2018). Prior to data collection approval to the use tools were obtained. Participants were informed in writing that return of the questionnaire implied consent.

Results

From the 609 nursing students invited to participate in the study a total of 444 questionnaires were returned (UK 259/255 and China 350/189), giving an overall response rate of 72.9% (UK: 98.5% and China: 54%).

Sociodemographic Characteristics

Respondents mean age in the UK and China was 24.87±6.40 and 21.21±0.87 Table 1. Most were female (UK 92.9% and China 88.9%) and were studying general (adult) nursing (UK 83.9% and China 91.0%). Key differences did exist with regards to religion, marital status, carer dependents and

engagement in part-time work outside of educational studies among the UK participants.

Over, 41% of Chinese respondents had considered leaving nursing compared to 14.9% in the UK. Specific to the Chinese sample, over half (52.4%) reported that that they did not enter nurse education voluntarily.

Prevalence of Resilience, Stress and Psychological Well-Being

Comparisons between two countries are presented in Table 2. The results indicated that there was a significant difference in resilience between students in the UK and China ($p = 0.002$), but not in stress and well-being. Analysis of the scores of resilience revealed the average scores for UK and Chinese nursing students are 26.70 (SD = 5.11) and 25.18 (SD = 5.61), respectively. The average psychological stress scores of UK and Chinese nursing students are 20.94 (SD = 3.87) and 21.54 (SD = 3.64). Finally, in terms of well-being, the average scores of UK and Chinese nursing students are 15.43 (SD = 4.38) and 14.93 (SD = 4.00) respectively, which are considered as moderate level.

Correlations of Resilience, Stress and Psychological Well-Being

In UK, there are significant correlations among resilience, well-being and perceived stress Table 3. Total resilience scores were weakly and positively correlated with the total score of well-being [$r_s = 0.299$, $p < 0.01$], they were negatively weakly correlated with perceived stress [$r_s = -0.152$, $p < 0.05$]. In addition, the total score recorded for perceived stress in the student nurses in UK was negatively weakly correlated with well-being ($r_s = -0.371$, $p < 0.01$). In China, resilience and perceived stress were significantly correlated with well-being, while there is no significant correlation between resilience and perceived stress (Table 3). Total resilience scores were weakly and positively correlated with the total score of well-being [$r_s = 0.365$, $p < 0.01$], however they weren't significantly correlated with perceived stress [$r_s = 0.022$, $p < 0.05$]. The total score recorded for perceived stress were negatively weakly correlated with well-being ($r_s = -0.238$, $p < 0.01$).

Predictors of Resilience

Hierarchical stepwise regression analysis was used to examine if resilience levels varied by factors (age, nursing program, religion, financial support, intention to leave, co-dependent). Two variables, age and intention to leave, significantly predicted resilience ($p = 0.007^*$, $p < 0.001^*$). Furthermore, the direction of the relationship was positive for age ($\beta = 0.12$) and negative for intention to leave ($\beta = -0.31$).

Table 1: Sample characteristics and differences between students in UK and China

| | UK (n = 255) | China (n = 189) | Tests of between-group differences |
|--------------------------------------|---------------|-----------------|------------------------------------|
| Age (years) | | | t = -7.819 p<0.001 |
| Mean (SD) | 24.87 (6.397) | 21.21 (0.872) | |
| Range | 18-49 | 19-26 | |
| Gender | | | $\chi^2 = 2.225$ p>0.05 |
| Male | 18 (7.1%) | 21 (11.1%) | |
| Female | 237 (92.9%) | 168 (88.9%) | |
| Nursing program | | | $\chi^2 = 53.951$ p<0.001 |
| General (adult) nursing | 214 (83.9%) | 172 (91.0%) | |
| Mental health nursing | 41 (16.1%) | - | |
| Midwifery | - | 17 (9.0%) | |
| Religion | | | $\chi^2 = 378.361$ p<0.001 |
| No religion | 15 (5.9%) | 186 (98.4%) | |
| Protestant | 85 (33.3%) | 0 | |
| Roman Catholic | 136 (53.3%) | 0 | |
| Christian (other) | 10 (3.9%) | 2 (1.1%) | |
| Other | 1 (0.4%) | 1 (0.5%) | |
| Prefer not to say | 8 (3.1%) | 0 | |
| Relationship status | | | $\chi^2 = 42.268$ p<0.001 |
| Single | 202 (79.2%) | 134 (70.9%) | |
| Married | 27 (10.6%) | 0 | |
| Other (Divorced, Separated, Widowed) | 26 (10.2%) | 55 (29.1%) | |
| Employment status | | | $\chi^2 = 82.685$ p<0.001 |
| Part-time | 207 (81.2%) | 75 (39.7%) | |
| Full-time | 1 (0.4%) | 0 | |
| None | 47 (18.4%) | 114 (60.3%) | |
| Live status | | | $\chi^2 = 316.008$ p<0.001 |
| Alone | 4 (1.6%) | 2 (1.1%) | |
| With parents/family | 181 (71.0%) | 22 (11.6%) | |
| With spouse/significant other | 49 (19.2%) | 0 | |
| With friend(s)/roommate(s) | 10 (3.9%) | 164 | (86.8%) |
| Other | 11 (4.3%) | 1 (0.5%) | |
| Types of financial support | | | $\chi^2 = 89.314$ p<0.001 |
| Financial aid-grants100 | (27.0%) | 2 (0.6%) | |
| Financial aid-loans | 2 (0.5%) | 12 (3.8%) | $\chi^2 = 11.008$ p<0.001 |
| Financial aid-work study | 18 (4.9%) | 27 (8.6%) | $\chi^2 = 6.224$ p<0.05 |
| Scholarships | 6 (1.6%) | 40 (12.7%) | $\chi^2 = 41.359$ p<0.001 |
| Parental/Spouse/family support | 58 (15.6%) | 184 | (58.6%) $\chi^2 = 243.672$ |
| Employment | 118 (31.8%) | 45 (14.3%) | $\chi^2 = 23.578$ p<0.001 |
| Other | 69 (18.6%) | 4 (1.3%) | $\chi^2 = 49.155$ p<0.001 |
| Have Children | | | $\chi^2 = 42.719$ p<0.001 |
| Yes | 57 (22.4%) | 2 (1.1%) | |
| No | 198 (77.6%) | 187 | (98.9%) |
| Only child in family | | | (54.5%) |
| Yes | - | 103 | |
| No | - | 86 (45.5%) | |
| Volunteer for a nursing major | | | |
| Yes | - | 90 (47.6%) | |
| No | - | 99 (52.4%) | |
| Non-demographic character | | | |
| Intention to leave | | | $\chi^2 = 67.051$ p<0.001 |
| Never | 52 (20.4%) | 2 (1.1%) | |
| Almost Never | 53 (20.8%) | 38 (20.1%) | |
| Sometimes | 112 (43.9%) | 70 (37.0%) | |
| Fairly Often | 30 (11.8%) | 50 (26.5%) | |
| Very Often | 8 (3.1%) | 29 (15.3%) | |

Note: SD: Standard Deviation

Table 2: Description and comparisons of variables of students in UK and China

| | UK (n = 255) | | China (n = 189) | | Cronbach's alpha | | Z | P-value |
|------------------|--------------|------|-----------------|------|------------------|-------|--------|---------|
| | M | SD | M | SD | UK | China | | |
| Resilience | 26.70 | 5.11 | 25.18 | 5.61 | 0.813 | 0.897 | -3.039 | 0.002* |
| Well-being | 15.43 | 4.38 | 14.93 | 4.00 | 0.860 | 0.872 | 1.211 | 0.226 |
| Perceived stress | 20.94 | 3.87 | 21.54 | 3.64 | 0.516 | 0.618 | -1.958 | 0.050 |

*p<0.05

Table 3: Spearman rank correlations of the main variables of the study

| | Resilience | Well-being | Perceived stress |
|------------------|------------|------------|------------------|
| Resilience | - | 0.299** | -0.152* |
| Well-being | 0.365** | - | -0.371** |
| Perceived stress | 0.022 | -0.238** | - |

Note. The Chinese nursing student sample is represented in the lower left diagonal matrix with blue colour (n = 189). The UK nursing student sample is represented in the upper right diagonal matrix with grey colour (n = 255)

**p<0.01 (2-tailed)

*p<0.05 (2-tailed)

Discussion

To date, this is the first study to evaluate the relationship between resilience, stress and psychological well-being in nursing students across two countries. Findings show a significant difference in resilience between students in the UK and China, but not for stress and well-being. Levels of resilience were found to be influenced by age and intention to leave. There was only a weakly significant correlation between resilience and stress and well-being in both countries.

Compared with the previous studies, the average resilience scores (UK: 26.70±5.11 and China: 25.18±5.61) of both countries in the current study, were generally lower than previous research undertaken in Spain (Ríos-Risquez *et al.*, 2016; García-Izquierdo *et al.*, 2018) and Australia (He *et al.*, 2018). Whilst, stress scores in this study (UK: 20.94±3.87 and China: 21.54±3.64) are similar to those reported by (Bodys-Cupak *et al.*, 2016) in Poland with a PSS mean score of 20.79 (SD = 5.50) for 394 first year undergraduate nursing students. However, the average stress scores of both countries' nursing students are generally lower than other countries (Smith and Yang, 2017; He *et al.*, 2018).

In this study, well-being scores (UK: 15.43±4.38, China: 14.93±4.00) are similar to research stemming from Turkey and Hong Kong (Vandali, 2017; Chow *et al.*, 2018). However, the scores reported tend to be generally higher than other studies conducted in China and Spain (Zhao *et al.*, 2015; Ríos-Risquez *et al.*, 2016; Smith and Yang, 2017). Both age and intention to leave nursing were found to affect resilience level scores. Results indicate that the older the student nurse the greater the levels of resilience were reported, reflecting previous research (Galvin *et al.*, 2015; Ríos-Risquez *et al.*, 2016; Chow *et al.*, 2018). However, differences between the

Chinese and UK sample in this study may be attributed to the former being a younger cohort (mean age of 21), while in the UK the distribution of age showed greater variation with a considerable proportion aged 30 plus years.

Intention to leave nurse education was also found to differ between the UK and China, with more Chinese students considering leaving nurse education. However, this finding may be attributed to three issues. First, over half the Chinese sample did not enter nurse education voluntarily, a cultural issue highlighted in previous Chinese studies (Wang *et al.*, 2011; Smith and Yang, 2017). Second, Chinese students reported they were dependent on parental financial support to enter and stay on the course. However, UK nursing student's tuition fees were funded by the Department of Health and they also can receive a non-income assessed bursary to help with living costs (DHSC, 2017). Finally, the lower average age of Chinese students suggests that they have less life experience than UK students.

Correlations between resilience and stress and well-being between UK and China nursing students show statistical significance. Results suggest that higher scores for resilience and lower scores for perceived stress result in better psychological well-being for students in both countries. Such findings support Lazarus and Folkman's transactional model of stress framework (1984), highlighting the relationships between the three variables and supports previous research (Klainin-Yobas *et al.*, 2014; Ríos-Risquez *et al.*, 2016; Smith and Yang, 2017; García-Izquierdo *et al.*, 2018). Results from this study suggest that nursing students are experiencing stress, which is affecting their psychological well-being, but resilience is a protective factor. Given this, educationalists need to consider how to improve students coping strategies within the nursing curriculum. In

addition, the importance of the family on career choice is an area that requires consideration especially recruiters and marketers recruited to pre-registration programmes. Moreover, there is need to educate parents about the influence in the area of career choice and implications of this on the child are also advocated.

Study Limitations

Findings from this study are based on purposive sampling from two educational institutions, of differing year groups in the UK (year 2) and China (year 3), which may limit the generalisability of the findings. Findings are based upon student's self-reported measures, which may be at different life stages with different emotional intelligence levels, introducing the risk of distortions and subjectivity. Moreover, whilst the three measures used are internationally recognised, low internal consistency scores in the PSS scale, may have contributed to bias in the results of the analysis performed for this variable. However, the findings of this study are consistent with previous literature published in this area. The reliability of resilience and well-being in the current study are good. The sample sizes well exceeded the minimum sizes determined by the power analysis.

Conclusion and Recommendation

This study adds to the empirical literature related to resilience, psychological stress and well-being among nursing students from two geographical locations. It shows resilience differs between nursing students in China and in the UK but shows no difference for stress and well-being. This difference was influenced by age and intention to leave. In addition, it was found that there is a weak statistically significant correlation between resilience and stress and well-being in both countries. Intervention studies are required to ensure student nurses, especially younger students, are equipped with strategies to cope with stress during their education. Furthermore, to improve the generalisability, a comparative study involving a larger cohort of educational institutions and student year groups is recommended.

Acknowledgement

We acknowledge and thank the nursing students who participated in this survey.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contributions

All authors were involved in the development of the study design.

Zhuang-Shuang Li and Xiu-Jun Guo: Were involved in data collection.

Felicity Hasson and Paul Slater: Undertook the analysis and manuscript writing and all authors were involved in the critical revisions and intellectual content.

Permission to use Scales

Approval to use the tool CD-RISC (Nov 2018) and PSS (Nov 2018) has been gained from the authors. The WHO 5 Well-being Index is a publicly available tool; therefore, author permission is not required.

Ethics

Ethical approval was obtained from Ulster University Institute of Nursing and Health Sciences Ethics Filter Committee and from Nanjing University of Chinese Medicine. The main ethical issues related to the protection of participant information, consent, autonomy and confidentiality were addressed. Participants were informed that return of the questionnaire implied consent. Participation was voluntary and respondents could withdraw from the study prior to submission, without any penalty.

References

- Aloba, O., Olabisi, O., & Aloba, T. (2016). The 10-item Connor–Davidson Resilience Scale: Factorial structure, reliability, validity and correlates among student nurses in southwestern Nigeria. *Journal of the American Psychiatric Nurses Association*, 22(1), 43-51. <https://doi.org/10.1177/1078390316629971>
- Arvidsdotter, T., Marklund, B., Kylén, S., Taft, C., & Ekman, I. (2016). Understanding persons with psychological distress in primary health care. *Scandinavian Journal of Caring Sciences*, 30(4), 687-694. <https://doi.org/10.1111/scs.12289>
- Ayaz-Alkaya, S., Yaman-Sözbir, Ş., & Bayrak-Kahraman, B. (2018). The effect of nursing internship program on burnout and professional commitment. *Nurse Education Today*, 68, 19-22. <https://doi.org/10.1016/j.nedt.2018.05.020>
- Bodys-Cupak, I., Majda, A., Zalewska-Puchała, J., & Kamińska, A. (2016). The impact of a sense of self-efficacy on the level of stress and the ways of coping with difficult situations in Polish nursing students. *Nurse Education Today*, 45, 102-107. <https://doi.org/10.1016/j.nedt.2016.07.004>

- Brajsa-Zganec, A., Lipovcan, L. K., Ivanovic, D., & Larsen, Z. P. (2017). Well-being of nursing students: role of affect regulation, self-esteem, family cohesion and social support. *The Open Public Health Journal*, 10(1). <https://doi.org/10.2174/1874944501710010069>
- Chamberlain, D., Williams, A., Stanley, D., Mellor, P., Cross, W., & Siegloff, L. (2016). Dispositional mindfulness and employment status as predictors of resilience in third year nursing students: a quantitative study. *Nursing Open*, 3(4), 212-221. <https://doi.org/10.1002/nop2.56>
- Chernomas, W. M., & Shapiro, C. (2013). Stress, depression and anxiety among undergraduate nursing students. *International Journal of Nursing Education Scholarship*, 10(1), 255-266. <https://doi.org/10.1515/ijnes-2012-0032>
- Chow, K. M., Tang, W. K. F., Chan, W. H. C., Sit, W. H. J., Choi, K. C., & Sally, C. H. A. N. (2018). Resilience and well-being of university nursing students in Hong Kong: a cross-sectional study. *BMC Medical Education*, 18(1), 1-8. <https://doi.org/10.1186/s12909-018-1119-0>
- Cohen, S. (1988). Perceived stress in a probability sample of the United States.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 385-396. <https://doi.org/10.2307/2136404>
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety*, 18(2), 76-82. <https://doi.org/10.1002/da.10113>
- De Wit, M., Pouwer, F., Gemke, R. J., Delemarre-Van De Waal, H. A., & Snoek, F. J. (2007). Validation of the WHO-5 well-being INDEX in adolescents with type 1 diabetes. *Diabetes care*, 30(8), 2003-2006. <https://doi.org/10.2337/dc07-0447>
- DHSC. (2017). NHS bursary reform. Department of Health and Social Care. <https://www.gov.uk/government/publications/nhs-bursary-reform/nhs-bursary-reform>
- Duong, C., & Hurst, C. P. (2016). Reliability and validity of the Khmer version of the 10-item Connor-Davidson Resilience Scale (Kh-CD-RISC10) in Cambodian adolescents. *BMC Research Notes*, 9(1), 297. <https://doi.org/10.1186/s13104-016-2099-y>
- Galvin, J., Suominen, E., Morgan, C., O'Connell, E. J., & Smith, A. P. (2015). Mental health nursing students' experiences of stress during training: a thematic analysis of qualitative interviews. *Journal of Psychiatric and Mental Health Nursing*, 22(10), 773-783. <https://doi.org/10.1111/jpm.12273>
- García-Izquierdo, M., Ríos-Risquez, M. I., Carrillo-García, C., & Sabuco-Tebar, E. D. L. Á. (2018). The moderating role of resilience in the relationship between academic burnout and the perception of psychological health in nursing students. *Educational Psychology*, 38(8), 1068-1079. <https://doi.org/10.1080/01443410.2017.1383073>
- Gibbons, C., Dempster, M., & Moutray, M. (2011). Stress, coping and satisfaction in nursing students. *Journal of Advanced Nursing*, 67(3), 621-632. <https://doi.org/10.1111/j.1365-2648.2010.05495.x>
- Grant, L., & Kinman, G. (2014). Emotional resilience in the helping professions and how it can be enhanced. *Health and Social Care Education*, 3(1), 23-34. <https://doi.org/10.11120/hsce.2014.00040>
- He, F. X., Turnbull, B., Kirshbaum, M. N., Phillips, B., & Klainin-Yobas, P. (2018). Assessing stress, protective factors and psychological well-being among undergraduate nursing students. *Nurse Education Today*, 68, 4-12. <https://doi.org/10.1016/j.nedt.2018.05.013>
- Hua, Q., Chunging, N. I., Liu, F., & Zhang, M. (2006). Mental health status of nursing students at different studying stages. *Chinese Journal of Tissue Engineering Research*, 10(6), 150-152.
- Jimenez, C., Navia-Osorio, P. M., & Diaz, C. V. (2010). Stress and health in novice and experienced nursing students. *Journal of Advanced Nursing*, 66(2), 442-455. <https://doi.org/10.1111/j.1365-2648.2009.05183.x>
- Klainin-Yobas, P., Keawkerd, O., Pumpuang, W., Thunyadee, C., Thanoi, W., & He, H. G. (2014). The mediating effects of coping on the stress and health relationships among nursing students: A structural equation modelling approach. *Journal of Advanced Nursing*, 70(6), 1287-1298. <https://doi.org/10.1111/jan.12283>
- Kong, L., Liu, Y., Li, G., Fang, Y., Kang, X., & Li, P. (2016). Resilience moderates the relationship between emotional intelligence and clinical communication ability among Chinese practice nursing students: A structural equation model analysis. *Nurse Education Today*, 46, 64-68. <https://doi.org/10.1016/j.nedt.2016.08.028>
- Labrague, L. J., McEnroe-Petitte, D. M., Gloe, D., Thomas, L., Papathanasiou, I. V., & Tsaras, K. (2017). A literature review on stress and coping strategies in nursing students. *Journal of Mental Health*, 26(5), 471-480. <https://doi.org/10.1080/09638237.2016.1244721>
- Lanz, J. J. (2020). Evidence-Based Resilience Intervention for Nursing Students: a Randomized Controlled Pilot Trial. *International Journal of Applied Positive Psychology*, 1-14. <https://doi.org/10.1007/s41042-020-00034-8>

- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. Springer publishing company.
- Leung, D. Y., Lam, T. H., & Chan, S. S. (2010). Three versions of Perceived Stress Scale: validation in a sample of Chinese cardiac patients who smoke. *BMC Public Health*, 10(1), 513. <https://doi.org/10.1186/1471-2458-10-513>
- Lo, R. (2002). A longitudinal study of perceived level of stress, coping and self-esteem of undergraduate nursing students: An Australian case study. *Journal of Advanced Nursing*, 39(2), 119-126. <https://doi.org/10.1046/j.1365-2648.2000.02251.x>
- Luo, Y., & Wang, H. (2009). Correlation research on psychological health impact on nursing students against stress, coping way and social support. *Nurse Education Today*, 29(1), 5-8. <https://doi.org/10.1016/j.nedt.2008.05.019>
- Maguire, D. (2018). Nursing student numbers: Should we panic yet?. *Kings Fund*, 14.
- Matthieu, M. M., & Ivanoff, A. (2006). Using stress, appraisal and coping theories in clinical practice: Assessments of coping strategies after disasters. *Brief Treatment and Crisis Intervention*, 6(4), 337. <https://doi.org/10.1093/brief-treatment/mhl009>
- McFadden, P., Mallett, J., Campbell, A., & Taylor, B. (2019). Explaining self-reported resilience in child-protection social work: The role of organisational factors, demographic information and job characteristics. *The British Journal of Social Work*, 49(1), 198-216. <https://doi.org/10.1093/bjsw/bcy015>
- Notario-Pacheco, B., Solera-Martínez, M., Serrano-Parra, M. D., Bartolomé-Gutiérrez, R., García-Campayo, J., & Martínez-Vizcaíno, V. (2011). Reliability and validity of the Spanish version of the 10-item Connor-Davidson Resilience Scale (10-item CD-RISC) in young adults. *Health and quality of life outcomes*, 9(1), 63. <https://doi.org/10.1186/1477-7525-9-63>
- Reeve, K. L., Shumaker, C. J., Yearwood, E. L., Crowell, N. A., & Riley, J. B. (2013). Perceived stress and social support in undergraduate nursing students' educational experiences. *Nurse education today*, 33(4), 419-424. <https://doi.org/10.1016/j.nedt.2012.11.009>
- Ríos-Risquez, M. I., García-Izquierdo, M., Sabuco-Tebar, E. D. L. A., Carrillo-García, C., & Martínez-Roche, M. E. (2016). An exploratory study of the relationship between resilience, academic burnout and psychological health in nursing students. *Contemporary Nurse*, 52(4), 430-439. <https://doi.org/10.1080/10376178.2016.1213648>
- Ríos-Risquez, M. I., García-Izquierdo, M., Sabuco-Tebar, E. D. L. A., Carrillo-García, C., & Solano-Ruiz, C. (2018). Connections between academic burnout, resilience and psychological well-being in nursing students: A longitudinal study. *Journal of advanced nursing*, 74(12), 2777-2784. <https://doi.org/10.1111/jan.13794>
- Smith, G. D., & Yang, F. (2017). Stress, resilience and psychological well-being in Chinese undergraduate nursing students. *Nurse Education Today*, 49, 90-95. <https://doi.org/10.1016/j.nedt.2016.10.004>
- Stephens, T. M. (2013, April). Nursing student resilience: a concept clarification. In *Nursing forum* (Vol. 48, No. 2, pp. 125-133). <https://doi.org/10.1111/nuf.12015>
- Sull, A., Harland, N., & Moore, A. (2015). Resilience of health-care workers in the UK; a cross-sectional survey. *Journal of Occupational Medicine and Toxicology*, 10(1), 20. <https://doi.org/10.1186/s12995-015-0061-x>
- Taylor, R., Thomas-Gregory, A., & Hofmeyer, A. (2020). Teaching empathy and resilience to undergraduate nursing students: A call to action in the context of Covid-19. *Nurse Education Today*. <https://doi.org/10.1016/j.nedt.2020.104524>
- Thomas, L. (2002). Student retention in higher education: the role of institutional habitus. *Journal of Education Policy*, 17(4), 423-442. <https://doi.org/10.1080/02680930210140257>
- Thomas, L. J., & Revell, S. H. (2016). Resilience in nursing students: An integrative review. *Nurse Education Today*, 36, 457-462. <https://doi.org/10.1016/j.nedt.2015.10.016>
- Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 well-being Index: a systematic review of the literature. *Psychotherapy and Psychosomatics*, 84(3), 167-176. <https://doi.org/10.1159/000376585>
- Trudel-Fitzgerald, C., Millstein, R. A., von Hippel, C., Howe, C. J., Tomasso, L. P., Wagner, G. R., & VanderWeele, T. J. (2019). Psychological well-being as part of the public health debate? Insight into dimensions, interventions and policy. *BMC Public Health*, 19(1), 1-11. <https://doi.org/10.1186/s12889-019-8029-x>
- Vandali, V. (2017). Nursing Profession: A Review. *International Journal of Nursing Education and Research*, 5(4), 444-447.
- Volinn, E., Yang, B., He, J., Sheng, X., Ying, J., Volinn, W., ... & Zuo, Y. (2010). West China hospital set of measures in Chinese to evaluate back pain treatment. *Pain Medicine*, 11(5), 637-647. <https://doi.org/10.1111/j.1526-4637.2010.00846.x>
- Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Annals of internal medicine*, 147(8), 573-577. <https://doi.org/10.7326/0003-4819-147-8-200710160-00010>

- Wang, D.H., Zhou, J. & Yu, Q. (2014). Correlation of baccalaureate nursing freshmen's resilience, adaptation and caring ability in private academy. *J Nurs Adm*, 10. http://en.cnki.com.cn/Article_en/CJFDTOTAL-HLGL201412010.htm
- Wang, H., Li, X., Hu, X., Chen, H., Gao, Y., Zhao, H., & Huang, L. (2011). Perceptions of nursing profession and learning experiences of male students in baccalaureate nursing program in Changsha, China. *Nurse Education Today*, 31(1), 36-42. <https://doi.org/10.1016/j.nedt.2010.03.011>
- West, M., Eckert, R., Collins, B., & Chowla, R. (2017). *Caring to change. How compassionate leadership can stimulate innovation in health care.* London, UK: The King's Fund.
- WHO. (1998). *Wellbeing measures in primary health care/the DEPCARE project: report on a WHO meeting, Stockholm, Sweden 12-13 February 1998.* In *Wellbeing measures in primary health care/the DEPCARE project: report on a WHO meeting, Stockholm, Sweden 12-13 February 1998.*
- Woo, J., & Newman, S. A. (2019). Transition from nursing student to registered nurse in singapore: Professional and organizational perspectives. <https://sigma.nursingrepository.org/handle/10755/16796>
- Yıldırım, N., Karaca, A., Cangur, S., Acıkgöz, F., & Akkus, D. (2017). The relationship between educational stress, stress coping, self-esteem, social support and health status among nursing students in Turkey: A structural equation modeling approach. *Nurse Education Today*, 48, 33-39. <https://doi.org/10.1016/j.nedt.2016.09.014>
- Yu, X., & Zhang, J. (2007). Factor analysis and psychometric evaluation of the Connor-Davidson Resilience Scale (CD-RISC) with Chinese people. *Social Behavior and Personality: An International Journal*, 35(1), 19-30. <https://doi.org/10.2224/sbp.2007.35.1.19>
- Zhao, F. F., Lei, X. L., He, W., Gu, Y. H., & Li, D. W. (2015). The study of perceived stress, coping strategy and self-efficacy of Chinese undergraduate nursing students in clinical practice. *International Journal of Nursing Practice*, 21(4), 401-409. <https://doi.org/10.1111/ijn.12273>