

COVID-19 Stress Perception, Resilience, and Well-Being Among Nurse Practitioners in the Post-Pandemic Era: A Cross-Sectional Study

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Article Info:

Received:
(2026-01-12)

Revised:
(2026-03-16)

Approved:
(2026-03-18)

Published:
(2026-03-25)

Abstract

Background: The COVID-19 pandemic imposed sustained psychological stress on healthcare professionals, including Nurse Practitioners (NPs). In the post-pandemic era, understanding how perceived pandemic-related stress, resilience, and well-being interact is crucial for supporting workforce sustainability and mental health.

Aims: To examine the relationships between perceived COVID-19 stress, resilience, and subjective well-being among NPs in Taiwan and identify key predictors of well-being. **Methods:** A cross-sectional correlational design. Online survey data were analysed and collected from 254 Taiwanese NPs between June and September 2023 using the Perceived Stress Scale of COVID-19, Resilience Scale for Adults, and Subjective Well-Being Scale. Data were analysed using descriptive statistics, Pearson's correlation, and multiple linear regression.

Results: The regression model explained a significant portion of the variation in subjective well-being (R^2 65.5%; adjusted $R^2 = .655$). Perceived COVID-19 stress was negatively associated with resilience ($r = -.394$, $p < .01$) and subjective well-being ($r = -.373$, $p < .01$). Resilience was strongly and positively correlated with well-being ($r = .802$, $p < .01$) and emerged as the strongest predictor in regression analysis ($\beta = .802$, $p < .001$). Perceived stress did not significantly predict well-being ($p = .259$). **Conclusion:** Nursing managers can incorporate resilience-enhancing strategies, such as stress management workshops, mentoring programs, peer support, and reflective practices, into organisational policies to strengthen workforce sustainability.

Keywords: COVID-19 stress; resilience; well-being; nurse practitioner; post-pandemic



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Cite this as: Lin, W.-D., Wu, P.-L., & Pai, H.-C. (2026). COVID-19 Stress Perception, Resilience, and Well-Being Among Nurse Practitioners in the Post-Pandemic Era: A Cross-Sectional Study. *Journal of Pubnursing Sciences*, 4(01), 1-14. <https://doi.org/10.69606/jps.v4i01.452>

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Introduction

The COVID-19 pandemic, although officially declared over by the World Health Organisation in May 2023, has left enduring physical and psychological impacts on the global population (Hamada, 2025). Although COVID-19 emerged in 2019, its psychological and occupational consequences for healthcare professionals have persisted beyond the acute phase of the pandemic, particularly during the transition to the post-pandemic period following the World Health

Organisation's declaration that ended the global health emergency in May 2023. Healthcare workers, particularly Nurse Practitioners (NPs) at the forefront of patient care, experienced elevated levels of anxiety, depression, post-traumatic stress symptoms, and sleep disturbances, highlighting a critical need to address workforce mental health (Sanabria-Delgado et al., 2025). In Taiwan, NPs are advanced practice nurses with specialised clinical care, educational, and coordinating roles in hospital settings (Taiwan Association of Nurse Practitioners (TANP), 2025). Their substantial clinical and

organisational responsibilities make them especially vulnerable to occupational stress and its psychological consequences in periods of crisis and recovery (de Lisser et al., 2024; Rogers et al., 2024; Stephenson & Warner-Stidham, 2024). Resilience, defined as the ability to adapt and recover from adversity, has been consistently recognised as a crucial protective factor against pandemic-related mental health issues, including anxiety, depression, and burnout (Hollaar et al., 2025; Moissoglou et al., 2024; Pasha et al., 2025). Despite the importance of this topic, a significant research gap remains. The existing literature, while examining various aspects of general nurse well-being, lacks studies that specifically focus on the advanced practice NPs in the post-pandemic context (Hsu et al., 2024). Crucially, there is a paucity of research that: (1) jointly examines how perceived stress of COVID-19 and multidomain resilience are related to overall subjective well-being in the post-pandemic period, and (2) identifies which specific resilience components most strongly predict the well-being of NPs, particularly within the Taiwan healthcare system.

Although the global health emergency status was lifted in May 2023, the psychological aftermath of the COVID-19 pandemic persists (Hamada, 2025). Healthcare workers faced a disproportionate psychosocial burden, reporting increased rates of stress, anxiety, depression, post-traumatic stress symptoms, and sleep disturbances (Chen & Cheng, 2024; Konagalla et al., 2025). This burden was derived from multiple sources of front-line stress, including fear of infection, heavy workload, moral distress associated with patient suffering, and workplace instability (Stephenson & Warner-Stidham, 2024).

NPs and advanced practice registered nurses (APRNs) have distinct roles in front-line care and often face increased occupational stress and psychological burden due to clinical and organisational responsibilities (Lee et al., 2024). Their pivotal role as intermediaries between physicians, nursing staff, and patients places them under substantial clinical and organisational pressure, rendering them particularly vulnerable to occupational stress during and after public health crises. NPs in Taiwan are highly specialised advanced practice nurses. They complete dedicated training and certification to provide advanced clinical care, education, consultation, and care coordination in various hospital settings. Their central position within the care team, which often serves as a bridge among physicians, nursing staff, and patients, inherently exposes them to substantial clinical and organisational pressures (TANP, 2025).

Frontline nursing staff reported multiple sources of pandemic stress, including fear of infection, heavy workload, moral distress associated with patient suffering, and workplace instability (Stephenson &

Warner-Stidham, 2024). These factors collectively elevated perceived stress and related mental health problems (Sanabria-Delgado et al., 2025). Empirical evidence consistently supports a triad of relationships among perceived stress, resilience, and subjective well-being in healthcare populations: 1) Perception of stress and well-being: Studies widely report an inverse relationship between high perceived pandemic stress and subjective well-being, suggesting that increased stress directly compromises mental health outcomes (Asselmann et al., 2024; Sanabria-Delgado et al., 2025); 2) Resilience and well-being: In contrast, resilience is strongly and positively associated with subjective well-being (Liu & Fernando, 2024; Pasha et al., 2025); 3) The buffering role of resilience: Critically, resilience may serve as a mediator or buffer, mitigating the negative impact of pandemic stress on an individual's well-being (Brites et al., 2024). Understanding which subdomains of resilience (e.g., personal strength, social competence) contribute most to positive outcomes is essential for designing targeted interventions (Hollaar et al., 2025).

Post-pandemic evidence indicates ongoing challenges for the nursing workforce, including persistent burnout, reduced job satisfaction, and increased turnover intentions (Ditchburn & Koh, 2024). Both organisational factors (e.g., staffing, leadership support) and individual resources (e.g., resilience, coping skills) influence these outcomes. Although numerous studies have examined stress and well-being among general nursing populations, few have focused specifically on advanced practice NPs in the post-pandemic context (Hsu et al., 2024). Furthermore, limited research has jointly examined perceived COVID-19 stress, multidimensional resilience, and overall subjective well-being, or identified which resilience components most strongly predict well-being among NPs within the Taiwanese healthcare system. Given the advanced clinical responsibilities and leadership roles of NPs, research addressing their unique stressors and resilience resources is essential to inform role-specific interventions. Therefore, this study aimed to examine the associations among perceived COVID-19 stress, resilience, and subjective well-being among Taiwanese NPs in the post-pandemic era, and to identify key predictors of subjective well-being.

Methods

Design, Participants, and Setting

This study employed a cross-sectional, correlational design reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. Participants were

recruited by convenience sampling from the active membership base of the Taiwan Association of Nurse Practitioners (TANP). Participants were eligible if they met the following criteria: 1. Voluntary participation and informed consent; 2. Employment status: officially employed as full-time nursing staff in hospitals across Taiwan, regardless of the hospital accreditation level; 3. Professional status: either certified NPs (having completed training and passed the national examination per Article 7-1 of the Nurses Act, with at least three months of active practice) or Trainee Candidate NPs (currently undergoing academic and clinical training under physician supervision per Article 24, Paragraph 3 of the Nurses Act, but not yet certified). Exclusion Criteria: NPs or Trainee Candidate NPs who were part-time or hourly employees.

Sample Size

The required sample size was calculated using G*Power software (version 3.1.9.2) for an F-test in linear multiple regression (Fixed Model, R^2 deviation from zero). Setting the effect size at $R^2 = 0.11$ (medium), the α error at 0.05, and the statistical power at 0.80, the minimum required sample size was 193 participants. The final sample size of 254 participants successfully exceeded this minimum requirement, ensuring adequate statistical power.

Measures

Data were collected on three primary psychological constructs using validated questionnaires.

1. Demographic and Professional Characteristics

Data collected included standard demographic variables (e.g., gender, age, educational level, marital status, number of children, place of residence), and key professional variables (e.g., work shift pattern, average monthly income, NP experience, total clinical nursing experience, specialty department, job position, professional rank, the accreditation level of the employing institution, and institution level).

2. Perceived Stress Scale of COVID-19

The perceived stress of COVID-19 was measured using the Perceived Stress Scale of COVID-19 (PSS-10-C), an adaptation of the PSS-10 (Cohen et al., 1983) modified for the pandemic context (Campo-Arias et al., 2020). Previous studies using the Spanish version of the PSS-10 reported internal consistency (Cronbach's α) ranging from 0.65 to 0.86 (Campo-Arias et al., 2020;

Pedrozo-Pupo et al., 2020). The original author authorised the translation of the instrument into the Chinese version used in this study. The scale consists of 10 items rated on a five-point Likert scale ranging from 0 (never) to 4 (always). After reverse-scoring four items (Items 4,5,7,8), the total score was standardised to a 0–100 scale. The Chinese version demonstrated excellent content validity index (CVI = 0.96). A pilot test with 20 nurses who had cared for COVID-19 patients yielded a Cronbach's α of 0.80, and the reliability in the current study was 0.82.

3. Resilience Scale for Adults

Resilience was assessed using the 29-item Resilience Scale for Adults (RSA) (Hjemdal et al., 2006). The Chinese version (Wang, 2007) measures five subscales: personal strength, family cohesion, social resource, social competence, and structured style. Responses are given on a 7-point semantic differential scale, with 14 items being reverse-scored (Items 2,4,5,7,8,9,12,15,16,17,19,22,25,26). Total scores (ranging from 0 to 203) were standardised to a 0–100 scale, with higher scores indicating greater resilience. Friberg et al. (2006) reported an internal consistency coefficient (Cronbach's α) of 0.88 and a four-month test-retest reliability ranging from 0.69 to 0.84 (Friberg et al., 2003). In the Chinese version, the overall Cronbach's α was 0.89, and the subscales ranged from 0.83 to 0.92, with an intraclass correlation coefficient (ICC) of 0.89 (Wang, 2007); and internal consistency in this study was high (Cronbach's $\alpha = 0.898$).

4. Subjective Well-Being Scale

Subjective well-being was measured using a 24-item scale revised and developed by Lai (2012) specifically for nursing professionals. The scale encompasses four dimensions: life satisfaction, physical and mental health, interpersonal relationships, and self-affirmation. Items are rated on a 5-point Likert scale (1=strongly disagree to agree 5=strongly). Total scores (ranging from 24 to 120) were standardised to a 0–100 scale, with higher scores denoting greater well-being. Chen et al. (2013) reported Cronbach's α values ranging from 0.80 to 0.97 across subscales and 0.96 for the total scale in a study on nurses' well-being. In the present study, the Cronbach's α for the total scale was 0.945.

Data Collection

Data were collected electronically between June and September 2023 using a secure online questionnaire. The first page provided potential

respondents with detailed information about the study's purpose and procedures. Only participants who gave their electronic informed consent completed the survey. All responses were collected anonymously and automatically stored in a secure database, ensuring participant confidentiality.

Data Analysis

Data analysis was performed using SPSS software (version 26.0). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarise participants' demographic and clinical characteristics. Inferential analyses included Independent t-tests and one-way ANOVA to examine group differences in the main variables. Pearson correlation analysis was utilised to determine the associations among perceived COVID-19 stress, resilience, and subjective well-being. Multiple linear regression analysis was conducted to identify the significant predictors of subjective well-being among NPs.

Ethical Considerations

This study received approval from the Institutional Review Board in Taiwan (No: CS2-23047) prior to data collection. All ethical principles were strictly followed. Electronic informed consent was obtained from all participants. The study was entirely voluntary, and

participants were assured of their right to withdraw at any time without consequence. Anonymity and strict confidentiality were maintained for all collected data to protect participants' privacy and rights.

Results

Participant Characteristics

A total of 254 NPs participated in this study. The average age of the sample was 39.80 ± 7.26 years. Participants were highly experienced, with a mean total clinical nursing experience of 17.11 ± 7.43 years and an average NP experience of 8.56 ± 6.64 years. The majority of the participants were female (89.0%), while male participants accounted for 11.0%. In terms of educational level, most participants held a bachelor's degree (76.0%), followed by master's or doctoral degrees (20.1%) and associate degrees (3.9%). Regarding marital status, 58.3% were married, 40.2% were unmarried, and 1.5% were widowed or divorced. Nearly half of the participants (49.6%) reported having no children, 38.2% had two children, and 12.2% had one child. Geographically, the largest proportion of NPs worked in Central Taiwan (53.5%), followed by the Northern (23.2%), Southern (22.8%), and Eastern (0.4%) regions.

Table 1. Differences in demographic characteristics and well-being among NPs ($n = 254$)

Demographic Characteristics	<i>n</i> (%)	<i>Mean</i> \pm <i>SD</i>	<i>F</i>	<i>p</i>
Age		39.80 ± 7.26		
Total years of nursing experience		17.11 ± 7.43		
Years of NPs		8.56 ± 6.64		
Gender				
Male	28 (11.0)			
Female	226 (89.0)			
Education level			0.648	0.524
Associate degree	10 (3.9)			
Bachelor's degree	193 (76.0)			
Master's/Doctoral degree	51 (20.1)			
Marital status			2.346	0.098
Married	148 (58.3)			
Unmarried	102 (40.2)			
Widowed/Divorced	4 (1.5)			
Number of children			2.629	0.074
None	126 (49.6)			
One child	31 (12.2)			
Two children	97 (38.2)			
Region (Taiwan)			0.615	0.606
Northern region	59 (23.2)			
Central region	136 (53.5)			
Southern region	58 (22.8)			
Eastern region	1 (0.4)			
Work shift pattern			0.890	0.412

Three-shift rotation (8-4-12)	70 (27.6)			
Two-shift rotation (12-12)	79 (31.1)			
Day shift only	105 (41.3)			
Average monthly income (NTD)		56640.63±11221.64	2.067	0.086
30,001–40,000	8 (3.1)			
40,001–50,000	64 (25.2)			
50,001–60,000	95 (37.4)			
60,001–70,000	58 (22.8)			
70,001–80,000 / ≥80,001	29 (11.5)			
Specialty Department				
Internal medicine	86 (33.9)		0.777	0.461
Surgical	56 (22.0)			
Critical care, Pediatrics, Psychiatry				
Obstetrics/Gynaecology, Others	112 (44.1)			
Job Position				
Trainee candidate NPs	29 (11.4)			
Certified NPs	225 (88.6)			
Institution Level			1.982	0.082
Medical Center	87 (34.3)			
Regional Hospital	126 (49.5)			
District Hospital	38 (15.0)			
Health Centre/Clinic/Nursing Institution	3 (1.2)			

NPs = Nurse Practitioners

Regarding work shifts, 41.3% worked day shifts only, 31.1% worked two-shift rotations, and 27.6% worked three-shift rotations. The average monthly income was NT\$56,640.63 ± 11,221.64, with the highest earnings between NT\$50,001–60,000 (37.4%), followed by NT\$60,001–70,000 (22.8%), NT\$40,001–50,000 (25.2%), and NT\$70,001 or above (11.5%). Most NPs worked in internal medicine (33.9%), surgical units (22.0%), or other departments (44.1%), including critical care, paediatrics, obstetrics/gynaecology, and psychiatry. The majority of participants were certified NPs (88.6%), while 11.4% were trainee candidates. Almost half of the NPs (49.5%) worked in regional hospitals, followed by 34.3% in medical centres and 15.0% in district hospitals. Only a small proportion (1.2%) worked in community-based settings such as health centres, clinics, or nursing institutions. This distribution indicates that most NPs in the study were employed in higher-level healthcare institutions, reflecting the concentration of advanced nursing practice in hospital settings in Taiwan. The preliminary analysis did not indicate statistically significant differences in subjective well-being in any of the reported demographic variables ($p > 0.05$) (Table 1).

Descriptive Statistics of Key Variables

The descriptive analysis of the primary psychological variables—perceived stress, resilience, and subjective well-being—revealed distinct profiles for the

NPs in the post-pandemic era (Table 2). The mean score of the PSS-10-C was 17.32 ± 5.88, with a standardised score of 43.29 (on a 0–100 scale), indicating a moderate level of perceived stress among NPs during the pandemic. The mean total score on the RSA was 150.45 ± 24.75, with a standardised score of 74.48, indicating that participants generally demonstrated high resilience. Among the five subscales, the highest mean standardised score was observed in social resources, 78.18 (30.48 ± 6.09), followed by family cohesion, 75.74 (37.11 ± 6.48), personal strength, 72.57 (43.78 ± 7.90), social competence, 69.98 (19.59 ± 5.01), and structured style, 69.57 (19.48 ± 4.66).

These results indicate that the NPs perceived strong external and interpersonal support, as well as considerable personal coping abilities. For the Subjective Well-Being Scale, the mean score was 87.91 ± 13.48, with a standardised score of 73.26, reflecting a generally favourable level of well-being among the participants. Among the subscales, interpersonal relationships had the highest standardised score, 78.36 (23.50 ± 3.42), followed by life satisfaction, 74.33 (26.02 ± 4.44), self-affirmation, 73.78 (14.76 ± 2.64), and physical and mental health, 67.51 (23.63 ± 5.06). These findings suggest that while NPs maintained good social and interpersonal relationships, their physical and mental health was relatively less optimal compared to other domains of well-being (Table 2).

Table 2. Descriptive Statistics of the Perceived Stress Scale of COVID-19, Resilience Scale, and Subjective Well-Being Scale ($n = 254$)

Variable	Range	Mean \pm SD	Standardised Score (0-100)
Perceived Stress Scale of COVID-19	(0-40)	17.32 \pm 5.88	43.29
Resilience Scale	(0-203)	150.45 \pm 24.75	74.48
Personal strength	(6-42)	30.48 \pm 6.09	72.57
Family cohesion	(7-49)	37.11 \pm 6.48	75.74
Social resource	(8-56)	43.78 \pm 7.90	78.18
Social competence	(4-28)	19.59 \pm 5.01	69.98
Structured style	(4-28)	19.48 \pm 4.66	69.57
Subjective Well-Being Scale	(24-120)	87.91 \pm 13.48	73.26
Life satisfaction	(7-35)	26.02 \pm 4.44	74.33
Interpersonal relationships	(6-30)	23.50 \pm 3.42	78.36
Physical and mental health	(7-35)	23.63 \pm 5.06	67.51
Self-affirmation.	(4-20)	14.76 \pm 2.64	73.78

Differences in Key Variables by Demographic and Professional Status

An independent t-test was employed to examine whether perceived stress, resilience, and subjective well-being differed based on participants' gender, professional certification status, and supervisory role. Overall, the analysis found no statistically significant differences among these critical variables (Table 3). No significant differences were observed between male and female NPs in their levels of perceived stress ($t = 0.65$, $p = 0.51$), resilience ($t = 1.04$, $p = 0.30$), and subjective well-being ($t = 0.48$, $p = 0.63$). Regarding professional certification status, the comparison between certified NPs and trainee candidate NPs also yielded no significant differences in

the main psychological variables: perceived stress ($t = -0.27$, $p = 0.79$), subjective well-being ($t = -1.30$, $p = 0.20$), and resilience ($t = -1.88$, $p = 0.06$). Although certified NPs reported a marginally higher mean resilience score ($M = 151.49$) than trainees ($M = 142.38$), this difference fell just short of statistical significance. Finally, supervisory status was not a significant determinant of the measured outcomes. Supervisory status (supervisor vs non-supervisory NPs) did not differ significantly in perceived stress ($t = -0.99$, $p = 0.33$), resilience ($t = 1.33$, $p = 0.18$), or subjective well-being ($t = 0.98$, $p = 0.33$) (Table 3). These findings collectively suggest that the core outcomes of stress, resilience, and well-being in this sample of Taiwanese NPs were independent of traditional demographic and professional hierarchy factors.

Table 3. Independent t-test of perceived stress, resilience, and subjective well-being by gender, position, and job title among Nurse Practitioners ($n = 254$)

Variable	df	t	p
Perceived Stress Scale of COVID-19			
Male	252	0.65	0.51
Female			
Trainee Candidate NPs	252	-0.27	0.79
Certified NPs			
NP Supervisor	252	-0.99	0.32
Non-supervisory NPs			
Resilience Scale			
Male	252	1.04	0.30
Female			
Trainee Candidate NP	252	-1.88	0.06
Certified NPs			
NP Supervisor	252	1.33	0.18
Non-supervisory NPs			
Subjective Well-Being Scale			
Male	252	0.48	0.63
Female			
Trainee Candidate NPs	252	-1.30	0.20
Certified NPs			
NP Supervisor	252	0.98	0.33
Non-supervisory NPs			

Note. M = Mean; SD = Standard Deviation; df = degrees of freedom; NPs = Nurse Practitioners $p > .05$

Correlations between Perceived COVID-19 Stress, Resilience, and Subjective Well-Being

Pearson correlation analysis was conducted to examine the linear relationships between demographic variables, perceived COVID-19 stress, resilience, and subjective well-being. The findings revealed strong and theoretically consistent associations among the core psychological constructs (Table 4). Pearson correlation analysis showed that age was strongly correlated with total years of nursing experience ($r = .948, p < .01$) and years of NP experience ($r = .695, p < .01$). Monthly income was positively correlated with structured style ($r = .181, p < .01$) and personal strength ($r = .140, p < .05$). Perceived COVID-19 stress showed significant negative correlations with resilience ($r = -.394, p < .01$) and all its subscales, including personal strength ($r = -.415, p < .01$), family cohesion ($r = -.248, p < .01$), social resources ($r = -.279, p < .01$), social competence ($r = -.268, p < .01$), and structured style ($r = -.442, p < .01$). Similarly, COVID-19 stress was negatively correlated with total subjective well-being ($r = -.373, p < .01$) and its subdimensions—life satisfaction ($r = -.323, p < .01$), interpersonal relationships ($r = -.333, p < .01$), physical and mental health ($r = -.324, p < .01$), and self-affirmation ($r = -.311, p < .01$). In contrast, resilience was positively and strongly correlated with subjective well-being ($r = .802, p < .01$) and its four domains: life satisfaction ($r = .706, p < .01$), interpersonal relationships ($r = .770, p < .01$), physical and mental health ($r = .635, p < .01$), and self-affirmation ($r = .695, p < .01$). These results indicate that higher resilience was associated with greater well-being, while greater perceived stress was associated with lower resilience and well-being among NPs (Table 4).

Multiple Regression Analysis: Predictors of Subjective Well-Being

Multiple linear regression analysis was conducted to determine the strongest independent predictors of overall Subjective Well-Being and its four subdimensions among NPs. The models included demographic variables, perceived COVID-19 stress, and the five resilience subscales as independent variables. For total subjective well-being, the model was significant ($F = 80.910, p < .001$), explaining 65.5% of the variance (adjusted $R^2 = .655$). Resilience was the strongest positive predictor ($\beta = .802, p < .001$), while perceived COVID-19 stress was not a significant predictor ($p = .259$). This pattern suggests that resilience may play a dominant protective role, potentially accounting for the variance shared between perceived

stress and well-being. Regarding the subdimensions, the life satisfaction model was significant ($F = 36.186, p < .001$), explaining 49.3% of the variance. Personal strength ($\beta = .201, p = .014$), family cohesion ($\beta = .158, p = .013$), social resources ($\beta = .233, p = .006$), and structured style ($\beta = .154, p = .020$) were significant positive predictors.

For interpersonal relationships, the model accounted for 59.0% of the variance ($F = 61.602, p < .001$). Significant positive predictors were personal strength ($\beta = .216, p = .003$), family cohesion ($\beta = .179, p = .002$), social resources ($\beta = .317, p < .001$), and social competence ($\beta = .123, p = .033$). The physical and mental health model explained 45.0% of the variance ($F = 30.561, p < .001$). Social competence ($\beta = .337, p < .001$), structured style ($\beta = .196, p = .004$), and personal strength ($\beta = .189, p = .028$) were significant positive predictors. Lastly, the self-affirmation model explained 54.6% of the variance ($F = 44.478, p < .001$). Personal strength ($\beta = .442, p < .001$) and social competence ($\beta = .196, p = .001$) were significant positive predictors, while other variables were not significant. Overall, resilience and its subdimensions—particularly personal strength, social competence, and structured style—emerged as the most important predictors of NPs' subjective well-being. At the same time, perceived stress did not significantly predict well-being outcomes (Table 5).

Discussion

Synthesis and Interpretation of the Findings

This study surveyed 254 NPs in Taiwan, most of whom were middle-aged female nurses with bachelor's degrees and extensive clinical experience. These characteristics align with national NPs workforce profiles, which reflect a predominantly female, mid-career population balancing clinical, administrative, and educational responsibilities (TANP, 2025). The absence of significant differences in subjective well-being between demographic groups suggests that age, gender, and experience exert limited influence compared to psychosocial factors such as resilience. Similar findings have been observed among frontline nurses, where psychological resources—rather than demographic attributes—were found to be stronger determinants of well-being during and after the pandemic (Foster et al., 2024).

Table 4. Correlations among demographic characteristics, perceived covid-19 stress, resilience, and subjective well-being among Nurse Practitioners (n = 254)

Variables	Age	Monthly income	Total years of nursing experience	Years of NPs	COVID-19 stress	Resilience	Personal strength	Family cohesion	Social resources	Social competence	Structured style
Age											
Monthly income	.087										
Total years of nursing experience	.948**	.093									
Years of NPs	.695**	.046	.720**								
COVID-19 stress	-.099	-.140*	-.081	-.067							
Resilience (total)	.076	.080	.093	.029	-.394**						
Personal strength	.100	.140*	.124*	.061	-.415**	.875**					
Family cohesion	.110	-.012	.125*	.062	-.248**	.767**	.521**				
Social resources	-.002	.013	.005	-.047	-.279**	.911**	.718**	.699**			
Social competence	.089	.053	.103	.047	-.268**	.771**	.645**	.405**	.662**		
Structured style	.024	.181**	.039	.015	-.442**	.729**	.708**	.386**	.521**	.488*	
Subjective well-being	.091	.102	.111	.006	-.373**	.802**	.747**	.544**	.702**	.662**	.626**
Life satisfaction	.050	.126**	.072	.010	-.323**	.706**	.638**	.528**	.635**	.521**	.547**
Interpersonal relationships	.054	.014	.053	-.038	-.333**	.770**	.676**	.597**	.721**	.585**	.524**
Physical and mental health	.113	.084	.134*	.009	-.324**	.635**	.601**	.385**	.513**	.596**	.539**
Self-affirmation	.096	.133*	.120	.046	-.311**	.695**	.715**	.380**	.599**	.602**	.566**

* p < .05 ** p < .01 *** p < .001

NPs = Nurse Practitioners

Table 5. Multiple regression analysis of factors predicting subjective well-being and its subdimensions among Nurse Practitioners

Model/Dependent Variable	Independent variable	B	SE _b	β	t	p	R ² change	F	P	R ²	Adjusted R ²
Subjective Well-Being (total)	COVID-19 stress	-.109	.096	-.047	-1.132	.259	.663	80.910	.000	.663	.655
	Resilience (total)	.437	.020	.802	21.319	.000	.139				
	Personal strength	.637	.148	.288	4.295	.000	.643				
	Family cohesion	.225	.109	.108	2.067	.040	.296				
	Social resources	.298	.117	.174	2.539	.012	.493				
	Social competence	.609	.142	.227	4.302	.000	.438				
	Structured style	.457	.156	.158	2.937	.004	.392				
	Monthly income	2.31	.000	.059	1.276	.203	.016	36.186	.000	.507	.493
	COVID-19 stress	-.027	.038	-.036	-0.710	.478	.104				
	Personal strength	.147	.059	.201	2.471	.014	.407				
Life Satisfaction	Family cohesion	.108	.043	.158	2.497	.013	.279				
	Social resources	.131	.047	.233	2.795	.006	.404				
	Social competence	.075	.056	.085	1.335	.183	.272				
	Structured style	.146	.062	.154	2.341	.020	.299				
	COVID-19 stress	-.032	.027	-.054	-1.188	.236	.111	61.602	.000	.599	.590
	Personal strength	.122	.041	.216	2.960	.003	.457				
	Family cohesion	.095	.030	.179	3.151	.002	.356				
	Social resources	.137	.032	.317	4.236	.000	.520				
	Social competence	.084	.039	.123	2.140	.033	.342				
	Structured style	.039	.043	.053	.895	.371	.274				
Physical and Mental Health	Total years of nursing experience	.039	.033	.057	1.175	.241	.018	30.561	.000	.465	.450
	COVID-19 stress	-.043	.045	-.050	-.946	.345	.105				
	Personal strength	.157	.071	.189	2.215	.028	.362				
	Family cohesion	.044	.052	.056	.836	.404	.149				
	Social resources	-.001	.057	-.001	-0.10	.992	.264				
	Social competence	.340	.067	.337	5.041	.000	.355				
	Structured style	.212	.074	.196	2.867	.004	.291				
	Monthly income	9.327	.000	.040	.913	.362	.018	44.478	.000	.559	.546
	COVID-19 stress	-.001	.022	-.001	-.025	.980	.097				
	Personal strength	.191	.033	.442	5.740	.000	.511				
Self-Affirmation	Family cohesion	-.030	.024	-.073	-1.213	.226	.145				
	Social resources	.050	.026	.150	1.906	.058	.359				
	Social competence	.103	.032	.196	3.240	.001	.363				
	Structured style	.056	.035	.099	1.600	.111	.320				

p < .05* ; p < .01** ; p < .001***

Participants reported a moderate level of residual perceived stress but concurrently exhibited high levels of resilience and favourable subjective well-being. This finding demonstrates that, despite ongoing challenges

related to workload and evolving post-pandemic healthcare needs, this advanced practice group has successfully adapted and possesses effective coping mechanisms (Huang et al., 2025). The high resilience

scores, particularly in the social and familial domains (social resources, family cohesion), underscore the strength of collectivist cultural values in Taiwan, where strong interpersonal support networks are crucial adaptive resources for healthcare professionals (Chen, 2025). However, the relative vulnerability identified in the physical and mental health subscale of well-being highlights a persistent pattern of fatigue and emotional exhaustion, observed globally in post-COVID research (Murat et al., 2021; Shaheen et al., 2024; Umbetkulova et al., 2024). The lack of significant differences in the core variables based on gender, certification status, or supervisory role is notable. Unlike some earlier pandemic studies that reported higher distress among female or novice nurses (Czepiel et al., 2024), this suggests that the role of advanced practice NPs may foster shared professional maturity and capacity to manage occupational stressors, regardless of gender or hierarchical position. Although certified NPs had slightly higher resilience scores than trainees, suggesting that clinical experience and professional confidence can enhance coping mechanisms, this non-significant difference suggests that targeted mentoring and training during the professionalisation phase of NPs can significantly enhance resilience development (Labrague et al., 2025).

Consistent with prior research, perceived COVID-19 stress was negatively correlated with resilience and well-being, while resilience showed strong positive correlations with all dimensions of well-being. These findings support the buffering hypothesis, which posits that resilience mitigates the adverse effects of stress on mental health and life satisfaction (Chu et al., 2024). Specifically, NPs who demonstrated greater personal strength, social competence, and family cohesion tended to maintain higher levels of subjective well-being despite pandemic-related stress. Such results underscore the multifaceted nature of resilience as both an individual and a social resource that enhances emotional regulation and professional functioning (Rodríguez-Rey et al., 2024). Strengthening resilience through structured support programs and reflective practice may thus protect NP well-being in future crises (Coetzee et al., 2025).

The regression models revealed that resilience—especially personal strength, social competence, and structured style—was the most powerful predictor of subjective well-being, while perceived stress did not significantly predict well-being when resilience was included. This pattern reinforces the mediating role of resilience in stress-well-being relationships (Hasan & Alsulami, 2024). In this study, the disappearance of the predictive effect of perceived stress in the regression model may indicate that resilience serves as a key psychological resource that buffers the impact of stress on well-being. The findings indicate that interventions that

enhance resilience may yield greater improvements in well-being than those that merely aim to reduce perceived stress. In particular, personal strength and social competence were consistent predictors in multiple domains of well-being, suggesting that self-efficacy and interpersonal effectiveness are essential elements of professional fulfilment (Cavallari et al., 2025; Çiçek et al., 2025). These results echo evidence from international NP studies demonstrating that resilience training, mindfulness, and peer support interventions improve quality of life, job engagement, and retention (Wong et al., 2024).

Overall, this study contributes to understanding the psychosocial mechanisms underlying NPs' well-being in the post-pandemic era. By identifying resilience as a central predictor, the findings support integrating structured resilience-building programs and organisational support systems to maintain psychological health and professional performance among NPs.

Limitations

Despite the valuable contributions, this study is subject to several limitations that affect the interpretation and generalizability of the findings. First, causal inference is precluded by the cross-sectional design, which prevents the establishment of temporal or causal relationships. Future research could utilise longitudinal or experimental designs to rigorously test the hypothesised buffering or mediating pathways of resilience between stress and well-being. Second, self-report bias: reliance solely on self-reported questionnaires may introduce common method bias or social desirability effects. Incorporating qualitative interviews or objective physiological measures in future studies would provide a richer, more comprehensive understanding of NPs' experiences. Third, generalizability: the sample was drawn exclusively from Taiwanese NPs and consisted primarily of female nurses in non-supervisory roles, which limits the generalizability of results to other cultural, geographical, or healthcare systems. Further research could aim to include more diverse samples across genders, roles, and clinical settings to explore potential variations in the relationship among stress, resilience, and well-being.

Implications for Nursing Practice, Theory, and Policy

The present findings offer meaningful implications for the management, practice, and education in the post-pandemic era. Given that resilience emerged as the strongest predictor of well-being, the focus of nursing leadership could shift from reactive crisis management to proactive resilience development. Nursing administrators and leaders could prioritise initiatives that strengthen

NPs' psychological resources and adaptive capacities. Proactive monitoring of staff well-being and allocation of institutional resources to resilience-building programs are essential. Structured peer support systems, mentoring programs, and reflective practice sessions can help NPs rebuild self-confidence, enhance coping ability (personal strength), and mobilise interpersonal resources (social resources and Social Competence). Encouraging NPs to seek support from family and peers actively has also been shown to improve psychological well-being and overall happiness (Woo et al., 2025). From a theoretical perspective, the results reinforce resilience as a central protective mechanism within the stress-well-being frameworks in advanced nursing practice. The differential effects of resilience subdimensions suggest that well-being is supported through both individual resources (e.g., self-efficacy, emotional regulation) (Chu et al., 2024; Çiçek et al., 2025) and interpersonal resources (e.g., social competence and support) (Coetzee et al., 2025; Moisoglou et al., 2024), thereby extending existing nursing stress and adaptation theories in the post-pandemic context. At the policy level, integrating targeted stress management and resilience training into continuous career development can help address relative deficiencies in physical and mental health. Resilience cultivation could be embedded within both pre-service and continuing education for NPs. Incorporating resilience-focused content into curricula (such as stress-adaptation frameworks, reflective learning, and emotion regulation strategies) can strengthen learners' self-efficacy and professional identity (Hollaar et al., 2025; Wong et al., 2024). This proactive educational approach promotes workforce sustainability, improves psychological preparedness for future public health emergencies, and strengthens NPs' professional commitment and capacity for lifelong learning.

Conclusion

This study provides evidence that NPs in Taiwan, despite experiencing moderate perceived COVID-19 stress, maintained high resilience and generally favourable subjective well-being in the post-pandemic period. Resilience, particularly the subdimensions of personal strength, social competence, and Structured Style, emerged as the most potent and consistent predictor of well-being, effectively mitigating the direct impact of perceived pandemic stress. These findings highlight that resilience is the key psychological resource for sustaining NPs' psychological health. This study recommends that nursing leaders and educators prioritise implementing structured, evidence-based resilience-building programs (e.g., peer support, mentorship, mindfulness training) within clinical supervision and continuing education

frameworks. By fostering NPs' coping resources and self-confidence, healthcare organisations can promote sustained well-being, enhance professional commitment, and ensure preparedness for future healthcare challenges.

Declaration of Conflicting Interest

No conflict of interest to declare.

Funding

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgment

The authors thank all the nurse practitioners who participated in this study.

Author's Contribution

LIN contributed to the study's conception and design, data acquisition, and data analysis, and wrote the first draft of the manuscript. **WU** conception and design, data acquisition, and data analysis, wrote the first draft of the manuscript, revised the final draft, and gave final approval of the version to be published. **PAI** contributed to the study's data analysis and interpretation.

All authors performed the analysis, interpreted the data, discussed the results, and commented on the manuscript. All listed authors should have contributed to the manuscript substantially and have agreed to the final submitted version. Review editorial standards and scroll down for a description of authorship criteria.

Data Availability Statement

1. The dataset generated during and analysed during the current study is available from the corresponding author upon reasonable request.
2. Data available upon request due to restrictions.
3. The data are not publicly available due to ethical restrictions on participant privacy.
4. Data are available upon reasonable request from the corresponding author.

Declaration of Use of AI in Academic Writing

Nothing to declare.

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