### RESEARCH



# Survey of psychological resilience among university students majoring in long-termcare-related disciplines in Taiwan



Chia-Chen Chang<sup>1</sup>, Chen-Yin Tung<sup>1</sup>, Su-Hao Fan<sup>2</sup> and Wei-Hsiang Huang<sup>3,4\*</sup>

### Abstract

**Background** The psychological resilience of university students majoring in long-term-care (LTC)–related disciplines is crucial for workforce retention and effective care provision in this field. This study aims to investigate the differences in levels of psychological resilience among these students in Taiwan.

**Methods** This cross-sectional study involved 258 participants selected via stratified random sampling from 23 universities across Taiwan from November 2021 to November 2022, representing a diverse educational context. The research instrument used was the Resilience Scale for Adults, a validated psychological resilience questionnaire. The independent variables included participants' demographic data, while the dependent variables encompassed five dimensions of resilience: personal strength, family cohesion, social resources, social skills, future organizational style, and total resilience score. Data analysis was performed using descriptive statistics, independent-samples t-tests, analysis of variance, and multiple regression analysis.

**Results** Participants with LTC work experience and leadership roles in campus clubs demonstrated significantly higher scores in personal strength (LTC: t = 2.04, p = 0.04, d = 0.29; leadership: t = 2.89, p = 0.01, d = 0.45), social resources (leadership: t = 2.47, p = 0.01, d = 0.34), social skills (leadership: t = 4.51, p = 0.01, d = 0.62), and future organizational style (LTC: t = 2.72, p = 0.01, d = 0.39). Higher academic performance was linked to greater personal strength, social resources, future organizational style, and total resilience (F = 4.69–3.12, p < 0.05). Regression analysis confirmed the predictive value of leadership experience and LTC work on various resilience dimensions. These results underscore the importance of practical exposure and extracurricular engagement in fostering resilience.

**Conclusion** Students engaged in club activities, leadership roles, and LTC work displayed higher psychological resilience. Educational institutions should foster club participation, leadership experiences, and partnerships with workplaces to enhance student resilience and professional readiness.

Keywords Long-term-care-related disciplines, University students, Psychological resilience

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#### Introduction

Since 2003, Taiwan has been facing the challenges of an aging population and a severe shortage of healthcare labor [1]. The scope of long-term-care (LTC) work includes home-based care, community care, and institutional care, and the aging population creates a significant job market in this area. Research on Taiwanese healthcare workforce data from 2010 to 2019 indicates that cities near Taipei face the greatest shortages of LTC professionals, despite no increase in demand for LTC facilities [1]. This suggests that the existing LTC facilities in Taiwan lack an adequate workforce, and the proportion of graduates from relevant fields entering the LTC job market may be relatively low. Considering Taiwan's LTC policy, it is evident that where it concerns the development and employment of LTC manpower, it promotes short career spans. Therefore, one study suggests that the government should reconsider LTC capacity and quality in its policies [2]. Further examination of the problems faced in LTC work domestically and internationally reveals that both the United States and Taiwan struggle with an inadequate workforce and a labor shortage, primarily due to aging populations and a lack of LTC services in family and community settings [3].

University students majoring in LTC-related disciplines often face unique stressors compared to students in other fields. This includes emotional challenges associated with caring for older adults, clinical internships that demand extensive physical and mental effort, and concerns about entering a demanding job market. Such challenges can exacerbate psychological distress, making psychological resilience a critical factor for their academic and professional success [4, 5].

Psychological resilience refers to an individual's ability to withstand stress in adverse circumstances, influencing their capacity to cope with stress [6]. It can be understood as the ability to adapt positively to challenging events [7]. A study involving 141 university students demonstrated that psychological resilience significantly predicts mental health [8]. Additionally, greater psychological resilience in the workplace is linked to reduced depression, absenteeism, and productivity issues [9]. Originally emerging from psychopathology research [10], the study of resilience now spans positive psychology, adult development, and stress-coping literature.

The work performed by nursing professionals and LTC workers often involves similar stressors. A meta-analysis of data from 2009 to 2019 on newly graduated nursing professionals highlighted that work-related stress predicts resignation intentions, but higher levels of psychological resilience and team cohesion reduce these

intentions [11]. This underscores the importance of resilience in retaining professionals in the demanding LTC sector, where workforce shortages remain a significant issue in Taiwan. Understanding the psychological resilience of LTC students may thus help educational institutions implement targeted reforms to enhance retention.

Research also shows that enhancing resilience among LTC workers can reduce disturbances caused by illness or changes in mental health [12]. Studies from Spain and Singapore indicate that high resilience levels reduce depression and alleviate stress-related burdens for LTC caregivers [13, 14]. Among nursing professionals, enhancing resilience has been shown to reduce burnout, improve job satisfaction, and strengthen workplace engagement [15, 16].

Previous research highlights that college students face significant stress, with increasing focus on the protective effects of resilience [17]. Students with higher resilience report better stress perception, emotional regulation, social connections, and reduced anxiety [17]. Studies involving nursing and medical students further demonstrate that resilience mediates academic stress, reduces fatigue, and improves mental health [18–20]. Thus, understanding and promoting resilience during academic years is vital for future professional success.

In summary, this study investigates differences in the psychological resilience levels among college students in Taiwan majoring in LTC-related disciplines. This research is significant due to the limited existing studies on this population and its potential to provide valuable insights for educational reforms aimed at improving student resilience.

#### Methods

#### **Study Design and Procedure**

This cross-sectional study utilized an online questionnaire to collect data between November 2021 and November 2022. Participants were selected through stratified random sampling from 23 universities across Taiwan. Invitations were sent via email, including details about the study purpose, procedures, and instructions for completing the survey. Participants who consented to participate accessed the survey through a provided link, beginning with an informed consent statement. Those selecting "Yes" proceeded to the questionnaire, while those selecting "No" exited automatically.

The survey, designed to enhance comfort and accuracy by being completed in familiar settings, took approximately 15 min. To encourage participation, respondents received a 50 TWD convenience store gift card as an incentive.

#### Variable selection and measurement

The selection of variables was guided by recommendations from relevant literature.

#### Independent variables

**Binary categorical variables** Gender, Age (below 22 years /22 years and above), LTC work experience (yes/no), non-LTC work experience (yes/no), campus club participation (yes/no), and holding a leadership role in a campus club (yes/no).

**Ternary categorical variables** Academic performance ranking (upper, middle, or lower tertiles) and religious beliefs (Christian/Catholic, Buddhist/Taoist, and no religious belief).

#### Dependent variables

The dependent variables were measured using a validated psychological resilience questionnaire, encompassing five continuous dimensions of resilience: individual strength, family cohesion, social resources, social skills, and future organizational style. Higher scores in these dimensions indicated greater levels of psychological resilience.

The research framework, illustrating the relationships among the independent and dependent variables, is presented in Fig. 1.

#### Instrument validation

#### Measurement tool description

The Resilience Scale for Adults (RSA) was employed to assess psychological resilience in this study. Originally developed to measure resilience among burn injury patients, the RSA contains 33 items and was adapted and translated into Chinese for local application [21, 22]. The Chinese version demonstrated robust internal consistency (Cronbach's  $\alpha$ =0.89) and test–retest reliability (0.89 over 3–4 weeks). Following a construct validity analysis, the scale was refined to 29 items across five dimensions: individual strength, family cohesion, social resources, social skills, and future organizational style. A seven-point Likert scale was used for responses, with higher scores reflecting greater psychological resilience.

#### Validity and reliability testing

Item analysis To ensure the validity and quality of the measurement tool, item analysis was conducted using descriptive statistics, extreme-group comparisons, and homogeneity tests [23]. Items were retained if their means fell within  $\pm 1.5$  SDs of the overall mean and their SD exceeded 0.75, ensuring representativeness and variability. Items marked as reverse-scored were coded accordingly for consistency. Extreme-group comparisons retained items with a critical ratio>3 and statistically significant differences (p < 0.05). Homogeneity tests ensured significant item-total correlations (r > 0.3) and that the Cronbach's alpha ( $\alpha$ ) of the scale did not increase after deleting any single item. All retained items are listed in Table 1, confirming high measurement quality.

**Confirmatory factor analysis (CFA)** CFA was performed to assess the construct validity of the RSA, using established thresholds for model fit: RMSEA<0.08, CFI>0.90, and SRMR<0.08 [24]. Convergent validity was confirmed when factor loadings exceeded 0.50, composite



Fig. 1 Research framework diagram. Note: Independent variables include demographic data, categorized as binary or ternary variables, while dependent variables represent the dimensions of psychological resilience

 
 Table 1
 Item Analysis and Reliability Assessment of the Research Instrument

Items	Descrip statisti assessi metho	otive cal ment d	Critical Ratio	Homogeneity test (total score α=0.9	t 924)
	Mean	SD		Correlation be- tween items and total score ( <i>R</i> )	Cronbach's α when items are deleted
E1	4.891	1.205	6.352***	0.450	0.923
A2	4.329	1.579	7.661***	0.484	0.923
B3	5.140	1.470	7.366***	0.432	0.923
E4	4.426	1.635	10.697***	0.617	0.921
E5	4.430	1.507	9.062***	0.557	0.921
C6	5.950	1.297	9.683***	0.583	0.921
B7	5.636	1.671	9.976***	0.558	0.922
C8	4.570	1.739	8.535***	0.481	0.923
C9	5.829	1.342	11.160***	0.653	0.920
C10	5.353	1.298	9.082***	0.562	0.921
A11	5.318	1.338	9.953***	0.618	0.920
B12	5.519	1.618	7.920***	0.484	0.923
B13	5.787	1.313	10.569***	0.603	0.921
C14	5.574	1.237	9.892***	0.585	0.921
C15	5.806	1.361	10.808***	0.622	0.920
B16	5.508	1.442	11.212***	0.628	0.920
A17	4.721	1.507	12.463***	0.655	0.920
A18	4.771	1.391	9.873***	0.596	0.921
D19	4.612	1.587	12.900***	0.633	0.920
C20	5.593	1.187	9.679***	0.642	0.920
D21	4.857	1.492	11.424***	0.600	0.921
D22	5.442	1.343	11.335***	0.578	0.921
B23	5.643	1.313	9.833***	0.580	0.921
D24	4.930	1.453	11.782***	0.563	0.921
C25	5.252	1.276	10.389***	0.639	0.920
A26	4.446	1.563	9.209***	0.550	0.922
B27	4.233	1.771	5.731***	0.428	0.924
A28	5.318	1.541	10.950***	0.613	0.921
E29	5.190	1.471	8.682***	0.555	0.921

Note This table summarizes item statistics, including means, standard deviations, item-total correlations, and Cronbach's  $\alpha$  if deleted. Items were excluded if their mean exceeded  $\pm$  1.5 standard deviations from the scale mean (i.e., >7.31 or <2.97) or if their standard deviation was less than 0.75

reliability (CR) was greater than 0.60, and the average variance extracted (AVE) surpassed 0.36 [25]. Discriminant validity was verified by ensuring that the inter-construct correlations were lower than the square root of the AVE for each construct. The CFA results demonstrated good model fit, with acceptable indices for personal strength, family cohesion, social resources, social skills, and future organizational style.

**Reliability analysis** Internal consistency was evaluated using Cronbach's alpha ( $\alpha$ ), with a threshold of >0.70 indicating strong reliability [26]. The results showed high reliability across all constructs: personal strength ( $\alpha$ =0.78),

family cohesion ( $\alpha$ =0.85), social resources ( $\alpha$ =0.84), social skills ( $\alpha$ =0.85), and future organizational style ( $\alpha$ =0.85). These findings indicate that each dimension was effectively measured, demonstrating strong consistency and homogeneity among the items.

#### Participants and target population

The participants in this study were fourth-year undergraduates (or second-year students in two-year programs) from 23 colleges across Taiwan offering caregiving programs during the period from November 2021 to November 2022. To be included, participants must have completed at least 30 h of clinical internship as part of their caregiver training program. According to statistics from the Taiwan Ministry of Education in 2021, there were a total of 1,157 undergraduates enrolled in caregiving programs nationwide [27], which defined the target population for this study.

#### Sampling method

To ensure representative sampling, we employed a stratified random sampling method, following the framework used in previous nationwide college surveys [28]. Colleges were stratified by geographic region into four strata: North (9 colleges), Central (3 colleges), South (10 colleges), and East (1 college). Random selection of colleges within each stratum was conducted using Excel software's random number generation to ensure an unbiased process. Participants from the selected colleges were further chosen using the same randomization method within Excel software, minimizing human bias. This approach maintained both regional representation and adherence to the study's inclusion criteria concerning academic year and completion of clinical internship hours.

#### Sample size and response rate

A total of 263 questionnaires were distributed, with 258 valid and complete responses collected, resulting in a high response rate of 98.10%. To ensure sufficient statistical power for the multiple regression analysis, a sample size estimation was performed using G\*Power. With a power of 0.80, an alpha level of 0.05, and an estimated effect size of 0.15 [29], a minimum sample size of 92 participants was required. Our final sample of 258 participants far exceeded this threshold, providing robust statistical power (actual power=0.804) for detecting significant relationships among the variables of interest in the multiple regression analysis.

#### Statistical analyses

Statistical analyses were conducted using IBM SPSS for Windows version 22.0, STATA version 14.0, and G\*Power version 3.1.7, with a significance level of 5% for Type I error. Item analysis, confirmatory factor analysis (CFA), and reliability analysis were performed to ensure the quality and validity of the questionnaire items. Descriptive statistics, including frequency distributions, means, and standard deviations, were used to summarize participant characteristics and response distributions. Inferential statistics, such as independent-samples t-tests, analysis of variance (ANOVA), and effect sizes measured using Cohen's d, were applied to explore relationships among variables. Multiple regression analyses were conducted to assess the impact of independent variables on psychological resilience dimensions and the total resilience score, while controlling for other variables, allowing for a more comprehensive examination of predictors and their unique contributions to outcomes.

To further investigate significant differences identified through ANOVA, planned post hoc analyses were performed using Scheffe's test to control for potential Type I errors due to multiple comparisons. Assumptions regarding normal distribution and the independence of variables were met to ensure the robustness of the analyses.

#### Results

#### Demographics

The majority of participants (205, 79.5%) were female. Regarding age, 109 participants (42.3%) were below 22 years, while 149 (57.7%) were 22 years and above (Table 2). A total of 65 participants (25.2%) had experience in LTC work, whereas 193 (74.8%) did not. Non-LTC work experience was reported by 173 participants

	Ta	ble 2	Demographic	characteristics of	participants	(N = 258)
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Demographic variable	Group	Number ( <i>N</i> )	Per- cent- age (%)
Gender	Male	53	20.5%
	Female	205	79.5%
Age	Under 22	109	42.3%
	Over 22	149	57.7%
LTC work experience	Y	65	25.2%
	Ν	193	74.8%
Non-LTC work experience	Y	173	67.1%
	Ν	85	32.9%
Campus-club activities	Y	124	48.1%
	Ν	134	51.9%
Campus-club leadership	Υ	74	28.7%
	Ν	184	71.3%
Academic ranking (tertiles)	Upper	109	42.2%
	Middle	119	46.1%
	Lower	30	10.5%
Religious beliefs	Catholicism and Christianity	35	13.6%
	Buddhism and Taoism	187	72.5%
	No beliefs	36	14.0%

(67.1%). In terms of campus-club experience, 124 participants (48.1%) had participated in campus-club activities, and 74 (28.7%) held leadership roles in campus clubs. For academic performance, 109 students (42.3%) ranked in the upper tertile, 119 (46.1%) in the middle tertile, and 30 (11.6%) in the lower tertile. Most participants (187, 72.5%) identified with Buddhist or Taoist beliefs.

#### Responses for each dimension and overall resilience

For the personal strength construct, which comprised six items, the average score was 28.90, with a SD of 6.18 (Table 3). The highest-scoring items were A11 ("My personal issues") and A28 ("When things get tough, I tend to"), with average scores of 5.32 (SDs of 1.34 and 1.54, respectively). The lowest-scoring item was A2 ("When unexpected things happen"), with an average score of 4.33 (SD=1.58). For family cohesion, the average score was 37.47 (SD=7.44), with B13 ("My family characteristics are") scoring the highest (mean=5.79, SD=1.31) and B27 ("In my family, family members like to") scoring the lowest (mean=4.23, SD=1.77).

In the social resources construct, the average score was 43.93 (SD=7.46), with C6 ("I can discuss personal matters with someone") scoring the highest (mean=5.95, SD=1.30) and C8 ("I enjoy") scoring the lowest (mean=4.57, SD=1.74). Social skills had an average score of 19.84 (SD=4.86), with D22 ("When I'm with others") scoring the highest (mean=5.44, SD=1.34) and D19 ("New friendships") scoring the lowest (mean=4.61, SD=1.59). For future organizational style, the average score was 18.94 (SD=4.85), with E29 ("My future goals are clear") scoring the highest (mean=5.19, SD=1.47). The lowest-scoring items were E4 ("I feel my future is") and E5 ("How to achieve my future goals"), each with an average score of 4.43 (SDs=1.64 and 1.51, respectively). The overall psychological resilience score, encompassing all 29 items, had an average score of 149.07 (SD=23.83), with a range of 88 to 201.

## Independent and dependent variable relationships: analysis and findings

### Bivariate analysis results for psychological resilience dimensions

(1) The initial analyses involved independent-samples t-tests and ANOVA to assess differences in psychological resilience dimensions based on various demographic factors. The key findings are summarized as follows:

- a. Independent-samples t-Test results (table 4)
  - **Personal strength**: Participants with LTC work experience scored higher (M = 30.25, SD = 6.53) compared to those without (M = 28.45, SD = 6.01), t = 2.04, *p* = 0.04, d = 0.29. Similarly, participants

#### **Table 3** Summary of items and response statistics for psychological resilience constructs (N=258)

Construct	Item name	Number of items	Total mean	Total SD	ltem mean	Item SD
Personal	#A2. When unexpected things happen	6	28.90	6.18	4.33	1.58
strength	A11. My personal issues				5.32	1.34
	#A17. My abilities				4.72	1.51
	A18. My judgment and decisions				4.77	1.39
	#A26. I'm skilled at				4.45	1.56
	A28. When things get tough, I tend to				5.32	1.54
Family cohesion	B3. The experiences in my family about what is important in life	7	37.47	7.44	5.14	1.47
	#B7. I feel				5.64	1.67
	#B12. When family members experience a crisis or emergency				5.52	1.62
	B13. My family characteristics are				5.79	1.31
	#B16. When things get tough, my family				5.51	1.44
	B23. Facing others, my family members show				5.64	1.31
	B27. In my family, family members like to				4.23	1.77
Social resources	C6. I can discuss personal matters with someone	8	43.93	7.46	5.95	1.30
	#C8. l enjoy				4.57	1.74
	#C9. Those who are good at encouraging me are				5.83	1.34
	C10. The connections I have with my friends are				5.35	1.30
	C14. Staying flexible in social situations				5.57	1.24
	#C15. The support I receive comes from				5.81	1.36
	C20. When needed				5.59	1.19
	#C25. My close friends or family members				5.25	1.28
Social skills	#D19. New friendships	4	19.84	4.86	4.61	1.59
	D21. Making new friends				4.86	1.49
	#D22. When I'm with others				5.44	1.34
	D24. Coming up with a good topic for conversation is				4.93	1.45
Future organi-	E1. My future plans are	4	18.94	4.85	4.89	1.20
zational style	#E4. I feel my future is				4.43	1.64
	#E5. How to achieve my future goals				4.43	1.51
	E29. My future goals are clear				5.19	1.47
					minimum	maximum
Total psycho- logical resil-		29	149.07	23.83	88	201

#### ience score

Note: This table summarizes descriptive statistics for psychological resilience constructs, including means and standard deviations. Items marked with "# reversescored" are reverse-coded for consistent score interpretation, with higher scores indicating stronger resilience

with non-LTC work experience scored higher (M = 29.49, SD = 6.40) than those without (M = 27.72, SD = 5.58), t = 2.28, p = 0.02, d = 0.29. Campus club experience and leadership roles were also associated with higher scores, with leadership roles having the largest effect size (M = 30.64, SD = 6.21 vs. M = 28.20, SD = 6.05, t = 2.89, p = 0.01, d = 0.40).

- Social resources: Campus club leaders scored higher (M = 45.72, SD = 7.42) than non-leaders (M = 43.21, SD = 7.37), t = 2.47, p = 0.01, d = 0.34.
- Social skills: Campus club participants scored higher (M = 20.82, SD = 4.72) compared to non-participants (M = 18.94, SD = 4.84), t = 3.15, p = 0.01, d = 0.39. Leadership roles further increased scores (M = 21.92, SD = 4.26 vs. M = 19.00, SD = 4.85), t = 4.51, p = 0.01, d = 0.62.

- **Future organizational style**: Participants with LTC work experience scored higher (M = 20.33, SD = 5.08) than those without (M = 18.47, SD = 4.70), t = 2.72, *p* = 0.01, d = 0.39.
- b. ANOVA results (table 5)
  - **Personal strength**: A significant difference was observed based on academic performance (F = 4.69, p = 0.01,  $\eta^2$  = 0.04). Scheffe's post hoc analysis indicated that high-performing students (M = 30.05, SD = 6.33) scored significantly higher than low-performing students (M = 26.26, SD = 6.08).
  - Social resources: Significant differences were found based on academic performance (F = 3.12, p = 0.04,  $\eta^2 = 0.03$ ). Scheffe's post hoc test revealed

								12.22									
Variable	ltems	z	Personal	strength	_			Family co	ohesion				Social re	sources			
			Mean	SD	t	d	p	Mean	SD	t	р	σ	Mean	SD	t	d	q
Gender	Male	53	27.96	6.94	-1.24	0.22	0.19	36.15	7.63	-1.44	0.15	0.22	42.06	8.40	-1.87	0.07	0.32
	Female	205	29.15	5.97				37.81	7.37				44.41	7.14			
Age	Under 22	109	28.41	5.61	-1.12	0.27	0.14	37.98	7.20	0.95	0.34	0.12	43.73	7.60	-0.35	0.72	0.05
	Over 22	149	29.26	6.57				37.09	7.61				44.07	7.38			
LTC work experience	~	65	30.25	6.53	2.04	0.04	0.29	37.52	8.45	0.07	0.94	0.01	44.72	7.65	1.00	0.32	0.14
	z	193	28.45	6.01				37.45	7.09				43.66	7.40			
Non-LTC work experience	~	173	29.49	6.40	2.28	0.02	0.29	37.54	7.47	0.22	0.82	0.03	44.39	7.50	1.44	0.15	0.19
	z	85	27.72	5.58				37.32	7.42				42.98	7.34			
Campus-club activities	~	124	29.85	5.80	2.38	0.02	0.30	38.23	7.91	1.58	0.11	0.16	44.81	7.47	1.83	0.07	0.23
	z	134	28.03	6.42				36.76	6.94				43.11	7.39			
Campus-club leadership	~	74	30.64	6.21	2.89	0.01	0.40	38.66	7.68	1.64	0.10	0.23	45.72	7.42	2.47	0.01	0.34
	z	184	28.20	6.05				36.98	7.31				43.21	7.37			
Variable	ltems	z	Social sk	ills				Future oi	rganizati	onal style			Total psy	chologica	l resilience so	ore	
			Mean	SD	t	٩	q	Mean	SD	t	٩	q	Mean	SD	t	٩	p
Gender	Male	53	19.43	4.92	-0.68	0.50	0.11	18.87	5.45	-0.12	0.91	0.02	144.47	25.40	-1.58	0.12	0.24
	Female	205	19.95	4.86				18.96	4.70				150.26	23.32			
Age	Under 22	109	19.77	4.94	-0.20	0.84	0.03	18.31	4.09	-1.85	0.07	0.23	148.21	22.16	-0.50	0.62	0.06
	Over 22	149	19.89	4.82				19.40	5.32				149.70	25.03			
LTC work experience	~	65	20.85	4.55	1.94	0.05	0.28	20.33	5.08	2.72	0.01	0.39	153.68	24.80	1.81	0.07	0.26
	z	193	19.50	4.93				18.47	4.70				147.52	23.35			
Non-LTC work experience	~	173	20.16	4.94	1.49	0.14	0.20	19.50	4.91	2.70	0.01	0.27	151.08	24.14	1.94	0.05	0.26
	z	85	19.20	4.67				17.79	4.57				145.00	22.77			
Campus-club activities	~	124	20.82	4.72	3.15	0.01	0.39	19.59	4.39	2.08	0.04	0.26	153.28	24.01	2.76	0.01	0.34
	z	134	18.94	4.84				18.34	5.20				145.18	23.06			
Campus-club leadership	~	74	21.92	4.26	4.51	0.01	0.62	19.70	4.54	1.61	0.11	0.22	156.64	24.41	3.29	0.01	0.45
	z	184	19.00	4.85				18.63	4.96				146.03	22.96			
Note This table presents the resmall (0.2), medium (0.5), and la	sults of indepe irge (0.8)	ndent-sar	nples t-tests	comparing	g psycholog	gical resilie	ince dimer	sions acros	s groups b	ased on de	mograph	ic variables	. Effect size	s (Cohen's c	l) are reported	and interp	reted as

**Table 4** Results of independent-samples t-Test for psychological resilience dimensions (N= 258)

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that high-performing students (M = 44.59, SD = 6.75) scored higher than low-performing students (M = 40.63, SD = 9.56).

- Future organizational style: Differences based on academic performance were significant (F = 3.68, p = 0.03,  $\eta^2$  = 0.03). Scheffe's post hoc analysis showed that high-performing students (M = 19.40, SD = 5.04) had higher scores than lowperforming students (M = 16.63, SD = 5.17).
- Family cohesion (religious beliefs): Significant differences were observed (F = 3.74, p = 0.03,  $\eta^2 = 0.03$ ). Scheffe's post hoc analysis indicated that participants identifying with Buddhist/Taoist beliefs (M = 38.10, SD = 6.55) scored higher than those with no religious affiliation (M = 34.44, SD = 8.83).

c. Total psychological resilience score

- Independent-Samples t-Test (Table 4): Campus club participants had higher scores (M = 153.28, SD = 24.01) compared to non-participants (M = 145.18, SD = 23.06), t = 2.76, p = 0.01, d = 0.34. Leadership roles were associated with even higher scores (M = 156.64, SD = 24.41 vs. M = 146.03, SD = 22.96), t = 3.29, p = 0.01, d = 0.45.
- **ANOVA** (Table 5): Significant differences were found based on academic performance (F = 3.33, p = 0.04,  $\eta^2 = 0.03$ ), with high performers scoring higher (M = 151.86, SD = 23.39) than low performers (M = 138.78, SD = 23.69).

#### Multiple regression analysis results

To further investigate the relationships identified in the bivariate analyses, variables with significant differences were transformed into dummy variables and included in multiple regression models to control for potential confounders. This section reports only the significant predictors (p < 0.05), as summarized in Table 6. For transparency, the complete regression model, which includes both significant and non-significant predictors, is provided in Appendix 1.

#### Regression analysis results (table 6)

- **Family cohesion**: Religious beliefs significantly predicted family cohesion (B = -0.35, p = 0.01), with individuals identifying with a religion scoring lower than those without any religious affiliation. This model accounted for 3% of the variance (R<sup>2</sup> = 0.03, adjusted R<sup>2</sup> = 0.02).
- **Social resources**: Campus club leadership was positively associated with social resources (B = 2.38, *p* = 0.02), while lower academic performance showed

a negative association (B = -3.58, p = 0.02). This model explained 5% of the variance (R<sup>2</sup> = 0.05, adjusted R<sup>2</sup> = 0.04).

- Social skills: Campus club leadership emerged as a significant positive predictor of social skills (B = 2.74, p = 0.01). The model explained 7% of the variance (R<sup>2</sup> = 0.07, adjusted R<sup>2</sup> = 0.07).
- Future organizational style: Positive associations were observed for long-term care work experience (B = 1.98, *p* = 0.01), non-long-term care work experience (B = 1.47, *p* = 0.02), and campus club participation (B = 1.44, *p* = 0.02), while lower academic performance negatively predicted future organizational style (B = -2.60, *p* = 0.01). This model accounted for 10% of the variance (R<sup>2</sup> = 0.10, adjusted R<sup>2</sup> = 0.09).
- Total resilience score: Campus club leadership showed a marginally significant positive association with the total psychological resilience score (B = 8.33, p = 0.05), while lower academic performance was significantly negatively associated (B = -10.72, p = 0.02). This model explained 7% of the variance (R<sup>2</sup> = 0.07, adjusted R<sup>2</sup> = 0.05).

#### Discussion

This study primarily investigated the psychological resilience of university students in Taiwan majoring in LTCrelated disciplines. Prior research has indicated that work-related stress in nursing can predict intention to resign. However, individuals with higher levels of psychological resilience and team cohesion are less likely to develop such intentions [11]. Therefore, we explored patterns in psychological resilience among university students in LTC-related disciplines based on various demographic variables. Our findings provide valuable insights for educational institutions seeking to implement reforms that could enhance workforce retention.

Our analysis of binary categorical demographic data revealed that students with LTC work experience, non-LTC work experience, extracurricular activity participation, and leadership roles in such activities scored significantly higher on measures of personal strength, social resources, social skills, future organizational style, and overall psychological resilience. This suggests that practical experience and extracurricular involvement may play a role in building resilience.

These findings align with prior research. For example, a study involving 498 nursing professionals found that individuals with less work experience exhibited higher psychological resilience compared to those with over five years of experience [30]. Additionally, a study of 178 ado-lescent students highlighted a significant positive association between happiness, campus activity participation, and psychological resilience [31]. Similarly, research

Variable	Items	Z	Person	al stren	gth				Family c	ohesion				
			Mean	S	ш	đ	η²	Scheffe	Mean	SD	Ľ	٩	η²	Scheffe
Academic ranking	Upper	109	30.05	6.33	4.69	0.01	0.04	Upper > middle	37.70	7.53	0.45	0.64	0.04	
	Middle	119	28.50	5.91					37.61	7.21				
	Lower	30	26.26	6.08					36.22	8.22				
Religious beliefs	Catholicism & Christianity	35	29.43	6.82	09.0	0.55	0.01		37.20	9.59	3.74	0.03	0.03	Buddhism & Taoism > No beliefs
	Buddhism & Taoism	187	29.00	6.16					38.10	6.55				
	No beliefs	36	27.92	5.73					34.44	8.83				
Variable	ltems	z	Social	esource	SS				Social sl	cills				
			Mean	SD	ц	٩	η²	Scheffe	Mean	SD	Ľ	٩	η²	Scheffe
Academic ranking	Upper	109	44.59	6.75	3.12	0.04	0.03	Upper > Lower	20.13	4.78	0.56	0.57	0.04	
	Middle	119	44.19	7.41					19.77	4.71				
	Lower	30	40.63	9.56					19.04	6.01				
Religious beliefs	Catholicism & Christianity	35	43.37	9.08	0.41	0.67	0.01		19.83	5.01	1.26	0.29	0.01	
	Buddhism & Taoism	187	44.18	7.35					20.07	4.97				
	No beliefs	36	43.14	6.33					18.67	4.06				
Variable	ltems	z	Future	organiz	ational	ityle			Total ps	ychologi	cal resili¢	ance sco	e	
			Mean	SD	L.	٩	η²	Scheffe	Mean	SD	Ľ	٩	դ²	Scheffe
Academic ranking	Upper	109	19.40	5.04	3.68	0.03	0.03	Upper > Lower	151.86	23.39	3.33	0.04	0.03	Upper > Lower
	Middle	119	19.08	4.48					149.15	23.78				
	Lower	30	16.63	5.17					138.78	23.69				
Religious beliefs	Catholicism & Christianity	35	20.26	5.08	1.51	0.22	0.01		150.09	29.27	1.45	0.24	0.01	
	Buddhism & Taoism	187	18.75	4.90					150.09	23.65				
	No beliefs	36	18.64	4.30					142.81	17.82				

**Table 6** Significant predictors in multiple regression analysis for psychological resilience dimensions and total score (N=258)

Variable	В	SE	β	t	p	R <sup>2</sup>	Adj R <sup>2</sup>
Family cohesion						0.03	0.02
Intercept	37.96	0.49		76.88	< 0.001		
Religious beliefs (Ref: No beliefs)	-0.35	1.32	-0.16	-2.66	0.01		
Social resources						0.05	0.04
Intercept	43.68	0.57		76.76	< 0.001		
Campus-club leadership (Ref: N)	2.38	1.02	0.14	2.34	0.02		
Academic ranking (Ref: lower)	-3.58	1.49	-0.15	-2.40	0.02		
Social skills						0.07	0.07
Intercept	18.94	0.41		46.66	< 0.001		
Campus-club leadership (Ref: N)	2.74	0.86	0.26	3.18	0.01		
Future organizational style						0.10	0.09
Intercept	17.06	0.61		28.11	< 0.001		
LTC work experience (Ref: N)	1.98	0.68	0.18	2.91	0.01		
Non-LTC work experience (Ref: N)	1.47	0.62	0.14	2.35	0.02		
Campus-club activities (Ref: N)	1.44	0.59	0.15	2.45	0.02		
Academic ranking (Ref: lower)	-2.60	0.95	-0.17	-2.75	0.01		
Total psychological resilience score						0.07	0.05
Intercept	146.54	2.09		70.13	< 0.001		
Campus-club leadership (Ref: N)	8.33	4.31	0.16	1.93	0.05		
Academic ranking (Ref: lower)	-10.72	4.73	-0.14	-2.27	0.02		

Note: This table summarizes only the significant predictors (p<0.05) identified in the multiple regression analysis. The full regression model, including both significant and non-significant predictors, is provided in Appendix 1 for transparency

involving 945 high school students indicated that school activity participation can enhance psychological resilience and subjective wellbeing [32].

differences. This similarity in gender distribution may account for the congruence in findings.

Further analysis of ternary categorical data revealed that students with better academic performance scored significantly higher in personal strength, social resources, future organizational style, and overall psychological resilience. Religious beliefs were also significantly associated with family cohesion. This aligns with a study conducted in Japan involving 229 nursing students, which demonstrated a significant link between psychological resilience and academic performance [33]. Another study involving 118 medical students reported a similar association between psychological resilience and academic achievement [34]. Moreover, a meta-analysis of 34 studies found a moderate positive correlation between religious beliefs and psychological resilience [35].

Age was positively correlated with personal strength, social skills, and future organizational style, indicating that these aspects of psychological resilience tend to increase with age. This finding is consistent with a study showing that nursing professionals over the age of 40 exhibit higher levels of psychological resilience than younger nurses [30].

Lastly, our results showed no statistically significant differences in psychological resilience between genders. The gender distribution in this study (20.5% male, 79.5% female) was similar to a prior study on psychological resilience among medical students (21.2% male, 78.8% female [34]), which also reported no gender-based

#### Limitations of the study

#### Internal validity and measurement bias

This study utilized a cross-sectional survey method, which identifies associations between variables but cannot establish causal relationships. Future research should consider experimental or longitudinal designs to address this limitation. Additionally, the use of an online questionnaire, necessitated by the COVID-19 pandemic, may have introduced measurement bias. The remote nature of data collection posed challenges in ensuring respondents fully understood the questions, and the self-reported measures are susceptible to social desirability bias, potentially affecting data accuracy.

#### External validity and generalizability

The study sample consisted exclusively of university students majoring in LTC-related disciplines, which restricts the generalizability of the findings to broader populations, such as practicing LTC professionals. This specificity may impact the external validity and application of the results to other contexts, necessitating caution when interpreting their relevance.

## Recommendations for future research and practice *Recommendations for future research*

While this study utilized a survey to achieve its objectives, it is crucial to acknowledge that this approach can only reveal associations between variables and cannot establish causal relationships. We recommend that future researchers consider employing experimental research methods to explore and confirm causal relationships between variables. Additionally, this study's post hoc analyses, while informative, carry a potential risk of Type I errors due to multiple comparisons. We suggest that future research incorporate larger sample sizes and employ more stringent multiple comparison correction methods to further mitigate this risk and enhance the robustness of findings.

#### Practical recommendations for educational institutions

Our findings indicate that university students with experience as club leaders scored higher for personal strength (t=2.89, p=0.01, d=0.40), social resources (t=2.47, p=0.01, d=0.34), and social skills (t=4.51, p=0.01, d=0.62) than those without such experience. This pattern was further supported by multiple regression analysis, which revealed that campus club leadership remained a significant positive predictor of social resources (B=2.38, p=0.02) and social skills (B=2.74, p=0.01). Therefore, educational institutions should encourage students to participate actively in extracurricular activities and seek leadership roles in these settings.

Moreover, students with work experience in LTCrelated fields demonstrated higher levels of personal strength (t=2.04, p=0.04, d=0.29) and future organizational style (t=2.72, p=0.01, d=0.39) compared to their peers without such experience. Regression results similarly highlighted the positive association between LTC work experience and future organizational style (B=1.98, p=0.01). Educational institutions should consider strengthening collaborations with relevant workplace partners to expand internship opportunities, which may bolster students' psychological resilience and enhance their readiness for professional roles.

#### Conclusions

This study revealed that LTC work experience, non-LTC work experience, participation in extracurricular activities, and leadership roles were linked to higher levels of psychological resilience, including personal strength, social resources, social skills, and future organizational style. Multiple regression analysis confirmed that campus club leadership and strong academic performance were significant predictors of resilience. Students involved in extracurricular activities, especially in leadership roles, exhibited greater overall resilience. Additionally, LTC work experience was associated with higher personal strength and future organizational style, highlighting the value of practical exposure in developing resilience-related skills.

### Implications for practice, education, and workforce development

This study addresses the challenges of recruiting graduates from long-term care (LTC)-related disciplines into Taiwan's LTC workforce by examining factors that influence students' psychological resilience, which is crucial for reducing workplace mental health issues and increasing professional retention [9].

Our findings highlight that practical LTC work experience, active campus engagement, and strong academic performance significantly enhance students' resilience. Involvement in campus clubs, especially in leadership roles, and higher academic achievement were linked to improved personal strength, social resources, and social skills. Similarly, LTC-related work experience was associated with stronger personal strength and a future-oriented organizational style.

To better prepare students for caregiving roles, educational institutions should prioritize hands-on learning, extracurricular involvement, leadership development, and partnerships with relevant workplaces to expand internships. These efforts will enhance resilience, address LTC workforce shortages, and support mental health in healthcare settings.

#### **Supplementary Information**

The online version contains supplementary material available at https://doi.or g/10.1186/s40359-024-02313-4.

Supplementary Material 1

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#### Author contributions

Chia-Chen Chang, Chen-Yin Tung, and Wei-Hsiang Huang contributed to the conception of the article. Wei-Hsiang Huang performed the data collection and analysis. The first draft of the manuscript was written by Chia-Chen Chang, and all authors commented on previous versions of the manuscript. Chia-Chen Chang was supervised by Chen-Yin Tung and Wei-Hsiang Huang to critically revise the work. Su-Hao Fan assisted with the data collection and facilitated participant recruitment for the survey.

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#### Data availability

The datasets generated and/or analyzed during the current study are not publicly available because of the regulations stipulated by the Institutional Review Board of the National Taiwan Normal University's Research Ethics

#### Declarations

#### Ethical approval

This study was reviewed and approved by the Institutional Review Board of the Research Ethics Review Committee of the National Taiwan Normal University (approval number: 202106ES003). All participants in this study signed an informed consent form before being enrolled. All authors confirm that all informed consent was obtained from all subjects and that the entire study was conducted according to the appropriate guidelines and regulations of the country in which it took place.

#### **Consent for publication**

Not applicable.

#### Competing interests

The authors declare no competing interests.

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#### References

- Wu KF, Hu JL, Chiou H. Degrees of Shortage and Uncovered Ratios for Long-Term Care in Taiwan's Regions: Evidence from Dynamic DEA. Int J Environ Res Public Health. 2021;18(2).
- Shih CM, Wang YH, Liu LF, Wu JH. Profile of Long-Term Care recipients receiving home and community-based services and the factors that influence utilization in Taiwan. Int J Environ Res Public Health. 2020;17(8).
- 3. Cao X, Hou SI. Home and community-based services between the USA and Taiwan. Innov Aging. 2021;5(Suppl 1):347–8.
- 4. Cha C, Baek G. Factors influencing the burnout dimensions among nurses: a cross-sectional study in South Korea. Nurs Open. 2023;10(12):7725–37.
- McDermott RC, Fruh SM, Williams S, Hauff C, Graves RJ, Melnyk BM, et al. Nursing students' resilience, depression, well-being, and academic distress: testing a moderated mediation model. J Adv Nurs. 2020;76(12):3385–97.
- Troy AS, Willroth EC, Shallcross AJ, Giuliani NR, Gross JJ, Mauss IB. Psychological resilience: an affect-Regulation Framework. Ann Rev Psychol. 2023;74:547–76.
- Clark S, Loe E, Merlo LJ, Estores IM. Assessing psychological resilience and distress among Graduate Health Profession Students during the COVID-19 pandemic. Psychol Res Behav Manage. 2023;12:27536130231185072.
- Au A, Caltabiano NJ, Vaksman O. The impact of sense of belonging, resilience, time management skills and academic performance on psychological wellbeing among university students. Cogent Educ. 2023;10(1):2215594.
- Shatté A, Perlman A, Smith B, Lynch WD. The positive effect of resilience on stress and business outcomes in difficult work environments. J Occup Environ Med. 2017;59(2):135–40.
- Staudinger UM, Marsiske M, Baltes PB. Resilience and reserve capacity in later adulthood: potentials and limits of development across the life span. Dev Psychopathol. 1995;2:801–47.
- Jarden RJ, Jarden A, Weiland TJ, Taylor G, Bujalka H, Brockenshire N, et al. New graduate nurse wellbeing, work wellbeing and mental health: a quantitative systematic review. Int J Nurs Stud. 2021;121:103997.
- Palacio GC, Krikorian A, Gómez-Romero MJ, Limonero JT. Resilience in caregivers: a systematic review. Am J Hospice Palliat Med. 2020;37(8):648–58.
- Durán-Gómez N, Guerrero-Martín J, Pérez-Civantos D, López Jurado CF, Palomo-López P, Cáceres MC. Understanding resilience factors among caregivers of people with Alzheimer's Disease in Spain. Psychol Res Behav Manage. 2020;13:1011–25.
- Ong HL, Vaingankar JA, Abdin E, Sambasivam R, Fauziana R, Tan ME, et al. Resilience and burden in caregivers of older adults: moderating and mediating effects of perceived social support. BMC Psychiatry. 2018;18(1):27.

- Yu F, Raphael D, Mackay L, Smith M, King A. Personal and work-related factors associated with nurse resilience: a systematic review. Int J Nurs Stud. 2019;93:129–40.
- Foster K, Roche M, Delgado C, Cuzzillo C, Giandinoto JA, Furness T. Resilience and mental health nursing: an integrative review of international literature. Int J Ment Health Nurs. 2019;28(1):71–85.
- Long R, Kennedy M, Malloy Spink K, Lengua LJ. Evaluation of the implementation of a well-being Promotion Program for College Students. Front Psychiatry. 2021;12:610931.
- Gong Z, Wang H, Zhong M, Shao Y. College students' learning stress, psychological resilience and learning burnout: status quo and coping strategies. BMC Psychiatry. 2023;23(1):389.
- Wei H, Dorn A, Hutto H, Webb Corbett R, Haberstroh A, Larson K. Impacts of nursing student burnout on Psychological Well-Being and Academic Achievement. J Nurs Educ. 2021;60(7):369–76.
- Schneider K, Breuer G, Luibl L, Paulsen F, Scholz M, Burger PHM. Vulnerable in the end - longitudinal study among medical students on mental health and personal and work-related resources over a 5.5-year-period. Annals Anat -Anatomischer Anzeiger. 2023;250:152155.
- Friborg O, Hjemdal O, Rosenvinge JH, Martinussen M, Aslaksen PM, Flaten MA. Resilience as a moderator of pain and stress. J Psychosom Res. 2006;61(2):213–9.
- 22. Wang SY. Associations of sense of self, resilience and posttraumatic stress symptoms among burn patients. Taipei city: National Taiwan University; 2007.
- 23. McCowan RJ, McCowan SC. Item analysis for Criterion-Referenced tests. Online Submission; 1999.
- Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. Multivariate data analysis. Uppersaddle River. Multivariate Data Analysis. Up Saddle River. 1998;5(3):207– 19. 5th ed.
- 25. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. J Mark Res. 1981;18(1):39–50.
- 26. Nunnally J. Psychometric theory 2nd edition. New York: McGraw; 1978.
- Ministry of Education. Highlights of Education Statistics: Taiwan Ministry of Education. 2021 [Available from: https://depart.moe.edu.tw/ed4500/News\_C ontent.aspx?n=5A930C32CC6C3818&sms=91B3AAE8C6388B96&s=B7F6EA80 CA2F63EE
- Lin MP, Ko HC, Wu JY. Prevalence and psychosocial risk factors associated with internet addiction in a nationally representative sample of college students in Taiwan. Cyberpsychology Behav Social Netw. 2011;14(12):741–6.
- 29. Cohen J. Statistical power analysis for the behavioral sciences. routledge; 2013.
- Foster K, Roche M, Giandinoto JA, Furness T. Workplace stressors, psychological well-being, resilience, and caring behaviours of mental health nurses: a descriptive correlational study. Int J Ment Health Nurs. 2020;29(1):56–68.
- McKeering P, Hwang Y-S, Ng C. A study into wellbeing, student engagement and resilience in early-adolescent international school students. J Res Int Educ. 2021;20(1):69–92.
- 32. Arantzazu R-F, Estibaliz R-D, Inge A-S. The role of Resilience and Psychological Well-being in School Engagement and Perceived Academic performance: an exploratory model to improve academic achievement. In: Blandina B-M, editor. Health and Academic Achievement. Rijeka: IntechOpen; 2018. Ch. 10.
- Tanji F, Nanbu H, Ono M, Abe N, Nitta J. The association between resilience and academic performance among nursing students: a cross-sectional study in Japan. J Rural Med. 2021;16(4):206–13.
- Popa-Velea O, Pîrvan I, Diaconescu LV. The impact of Self-Efficacy, optimism, resilience and perceived stress on academic performance and its subjective evaluation: a cross-sectional study. Int J Environ Res Public Health. 2021;18(17):8911.
- Schwalm FD, Zandavalli RB, de Castro Filho ED, Lucchetti G. Is there a relationship between spirituality/religiosity and resilience? A systematic review and meta-analysis of observational studies. J Health Psychol. 2022;27(5):1218–32.

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