ISSN: 2469-5823

Yu. Int Arch Nurs Health Care 2025, 11:204
DOI: 10.23937/2469-5823/1510204
Volume 11 | Issue 1
Open Access

International Archives of
Nursing and Health Care

ORIGINAL RESEARCH

The Effectiveness of a Single Tai Chi Session on State Anxiety Reduction among Accelerated BSN Nursing Students: A Pre-Post Intervention Study

Lihua Yu, DNP, MSN, RN*

Assistant Professor, Barnes-Jewish College, USA

***Corresponding author:** *Lihua Yu, DNP, MSN, RN, Assistant Professor, Barnes-Jewish College Goldfarb School of Nursing, 4483 Duncan Avenue, Saint Louis, MO, 63110, United States*

Abstract

Background: Nursing students experience high levels of anxiety, particularly during challenging periods of time. While various interventions exist, there remains a need for accessible, cost effective, complementary approaches to anxiety reduction.

Objective: To evaluate the effectiveness of a single Tai Chi session in reducing state anxiety among undergraduate nursing students in an Accelerated BSN program.

Design: A pre-post intervention study.

Setting: A private nursing college in the Midwestern United States.

Participants: 56 first-term Accelerated BSN students who completed both pre- and post-intervention assessments.

Methods: Participants attended a 30-minute Tai Chi session comprising warm-up movements, Tai Chi practice, and meditation. State anxiety was measured using Spielberger's State-Anxiety Inventory (S-AI) before and after the intervention. Satisfaction with the session was also assessed.

Results: There was a statistically significant decrease in total S-AI scores ($p < 0.001$, Cohen's $d = 1.80$), positive emotions scores ($p < 0.001$, Cohen's $d = 1.20$), and negative emotions scores ($p < 0.001$, Cohen's $d = 1.20$) following the intervention. Female students showed higher baseline anxiety levels ($p = 0.024$). No significant associations were found between demographic variables and anxiety reduction. 75% of participants reported the session was useful for reducing anxiety, and 96.4% would recommend it to peers.

Conclusions: A single Tai Chi session demonstrated significant effectiveness in reducing state anxiety among undergraduate nursing students. These findings suggest that Tai Chi could serve as a valuable complementary approach to anxiety reduction in nursing education.

Keywords

Tai chi, Anxiety, Nursing students, Anxiety reduction, Mind-body intervention

Introduction

Anxiety, a complex emotional experience characterized by feelings of tension, worried thoughts, and physical changes like increased blood pressure [1], represents a future-oriented mood state involving a complex interplay of cognitive, affective, physiological, and behavioral responses in anticipation of perceived threats [2]. This intricate response system prepares individuals to cope with anticipated events or circumstances perceived as potentially harmful. The prevalence of anxiety is substantial, and certain populations, such as college students, particularly nursing students, appear to be especially vulnerable to experiencing heightened anxiety, especially during challenging periods of time like the COVID-19 pandemic [3-6]. A study conducted by Wang, et al. [7] at a large university system in the United States, involving 2031 undergraduate and graduate students, demonstrated that 38.48% of participants reported moderate-to-severe levels of anxiety, with a significant majority (71.26%) indicating that their stress and anxiety levels had increased during the pandemic.

Citation: Yu L (2025) The Effectiveness of a Single Tai Chi Session on State Anxiety Reduction among Accelerated BSN Nursing Students: A Pre-Post Intervention Study. Int Arch Nurs Health Care 11:204. doi.org/10.23937/2469-5823/1510204

Accepted: January 31, 2025: **Published:** February 02, 2025

The implications of persistent anxiety extend beyond transient emotional distress. As outlined in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V), anxiety can manifest alongside symptoms of depression, such as depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and difficulty concentrating [8]. The frequent co-occurrence of anxiety and mood disturbances highlights the interconnectedness of these mental health challenges. Furthermore, these issues can become chronic or recurrent, significantly impacting an individual's quality of life and ability to engage in self-care [9]. This, in turn, can elevate the risk of developing chronic physical illnesses, including coronary heart disease and cancer, and even increase the risk of mortality due to suicide [10]. Specifically, within the context of nursing education, negative emotional states like anxiety can have detrimental effects on students' motivations, communication skills, and clinical performances [11-14]. Consequently, the experience of stress, anxiety, and depression among nursing students can compromise their ability to provide optimal patient care [15].

Current treatment approaches for anxiety disorders encompass both pharmacological and non-pharmacological interventions. Pharmacological options include medications such as selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants, antiepileptics, antipsychotics, monoamine oxidase inhibitors, and augmentation strategies [16]. However, a single-centered observational study by Mehdi, et al. [17] revealed that concurrent polypharmacy with two antidepressants is as prevalent as monotherapy, raising concerns about the increased risk of adverse effects associated with antidepressant medications. These adverse effects can further contribute to an elevated risk of suicidal ideation and behavior [18]. Non-pharmacological treatment strategies offer alternative approaches, encompassing anxiety psychoeducation, coping strategies, lifestyle changes, relaxation techniques, cognitive-behavioral therapy, mindfulness, and attention training [19]. Despite the availability of these treatments, their effectiveness remains limited, with only about 50-60% of patients experiencing symptom alleviation [20]. This further highlights the need for exploring and evaluating complementary therapies, such as Tai Chi, to address the unmet needs in anxiety management.

Tai Chi is a unique form of mind-body exercise that originated in China. It combines elements of Chinese martial arts with meditative movements that promote balance and healing of both the mind and body [21]. Tai Chi involves mental concentration, physical balance, muscle relaxation, and relaxed breathing, fostering a harmonious integration of mind and body. Rooted in Taoist philosophy, Tai Chi emphasizes holistic principles and has been practiced for centuries in China [22]. The movements in Tai Chi are characteristically gentle and slow, emphasizing diaphragmatic breathing, imagery, meditation, and the coordination of mind and body to achieve relaxation and concentration. Meditation plays a crucial role in Tai Chi practice and is believed to be a key factor in its ability to alleviate anxiety and enhance psychological well-being across diverse populations [23,24]. Research suggests that Tai Chi can influence brain morphology and neural activity, particularly in the prefrontal cortex, a region associated with executive functions and implicated in various psychiatric disorders, including anxiety disorders [24-26]. Numerous studies have examined the potential benefits of Tai Chi for anxiety reduction in various populations. Research has shown positive effects of Tai Chi on anxiety reduction for individuals with a wide range of psychological conditions [21], as well as in non-clinical populations [27-30]. Specifically, studies involving college students, including nursing students, have demonstrated the efficacy of Tai Chi in reducing anxiety levels [31-33].

Despite the availability of various treatments for anxiety, significant limitations and barriers persist. Alternative and complementary approaches like Tai Chi are needed to address these challenges and provide additional avenues for anxiety reduction. Given the growing body of evidence supporting the beneficial effects of Tai Chi on anxiety across diverse populations, including college and nursing students, further research is warranted to explore its therapeutic potential. This study aimed to investigate the effectiveness of Tai Chi in reducing anxiety levels among undergraduate nursing students. We hypothesized that participation in a Tai Chi session will result in a significant reduction in anxiety levels in this population, offering a valuable complementary approach to anxiety management.

Materials and Methods

Study design

The purpose of this study was to evaluate the effectiveness of Tai Chi which was implemented in January 2022 for anxiety reduction in undergraduate nursing students. To evaluate the effectiveness of Tai Chi, the students were asked to complete the State-Anxiety Inventory (S-AI) questionnaire by Spielberger [34] before and after the intervention.

Setting

This study was conducted at a private nursing college in the Midwest United States. The school of nursing has approximately 600 undergraduate students and 60 undergraduate faculty in total in 2022. The Accelerated BSN Program has approximately 200 undergraduate students and 20 faculty.

Participants, sample size calculations, and intervention

Participants: The target population for this study

was a convenience sample of baccalaureate nursing students from the Accelerated BSN program. In order to identify potential participants, school of nursing staff was asked to generate a report of all students meeting the inclusion criteria. Inclusion criteria included current enrollment in the first term of the Accelerated BSN program during the spring 2022 semester. Exclusion criteria consisted of students not meeting the inclusion criteria, and those with physical limitations from standing, bending, or moving extremities.

Sample size calculations: Calculations for sample size were based on the recommendations from G Power 3.1. Using the Chi-Square Test for Independence, df = 1, a power of 0.80, an effect size of 0.50, and a p = 0.05, the minimum total sample size would be 32 subjects (GPower, n.d.) at T1 (pre-Tai Chi session) and T2 (post-Tai Chi session). To allow for attrition, the sample size was increased to 40 subjects in total. If there were less than 32 students available for the sessions, all available students would be included in the course.

Intervention: A 30-minute Tai Chi session was taught to the first term undergraduate nursing students from the Accelerated BSN Program by the investigator at the beginning of the semester in January 2022. This Tai Chi course included five minutes of warm up movement (arm raises and extensions), 20 minutes of Tai Chi practice (slow movement of arms and legs with deep breathing), and five minutes of meditation. The Tai Chi class was given during the first week of school in January 2022. The participants signed in and attendance was clearly documented. The State Anxiety Inventory questionnaire was administered at T1 (before the Tai Chi session) and T2 (at the end of Tai Chi session).

Measurement tools

To collect data on the target population, undergraduate students from the Accelerated BSN Program that met the inclusion criteria during the project's timeframe, was asked to complete surveys in January 2022. At T1 (before the Tai Chi session), participants filled out a demographic form, which included age, race, ethnicity, gender, education level, income, marital status, preexisting anxiety disorder and medication use, and completed the State Anxiety Inventory survey. At T2 (right after the Tai Chi session), participants were asked to complete surveys of the State Anxiety Inventory and satisfaction of the Tai Chi session.

State anxiety inventory: This study used the State Anxiety Inventory (S-AI) developed by Spielberger [34]. The S-AI consists of two independent self-report scales, the State Anxiety Inventory (S-AI) and the Trait Anxiety Inventory (T-AI), which evaluate an individual's mood state at a particular moment and their stable, tension-prone personality traits of anxiety. The S-AI was primarily used to assess the intensity, fear, and neurotic experiences and feelings associated with a specific event or situation in the present or recent past, with 20 items. The S-AI uses a Likert 4-point rating scale, with 1 indicating "not at all" and 4 indicating "very much so". For the 10 positive emotion items, reverse scoring is used, and the final score is calculated as the sum of the scaled items, with higher scores indicating higher levels of state anxiety. The internal consistency coefficients of the State-Trait Anxiety Inventory ranges from 0.86 to 0.95, and test-retest reliability coefficients ranges from 0.65 to 0.75 over a 2-month interval [34].

Satisfaction of the Tai Chi session: The satisfaction survey of the Tai Chi session included two questions assessing participant satisfaction and likelihood of recommending Tai Chi to peers. The questions were: "Was this Tai Chi session helpful in reducing your state anxiety?" and "Would you recommend the Tai Chi session to your peers?"

Data analysis

Data from the surveys reviewed was entered into an Excel spreadsheet for later transfer to Statistical Package for the Social Sciences (SPSS) database. Paired samples t-tests were used to compare pre- and post-intervention scores for the S-AI total score, positive emotions scores, and negative emotions scores. Cohen's d was used to assess the clinical significance of the Tai Chi intervention, with values of 0.20, 0.50, and 0.80 representing small, medium, and large effect sizes, respectively. Given that individual items within the S-AI scale are ordinal data, the Wilcoxon Signed-Rank Test was employed for their analysis. Correspondingly, the Vargha and Delaney's A was used as the effect size measure, with values of 0.56, 0.64, and 0.71 indicating small, medium, and large effect sizes, respectively. Pearson correlation was used to examine the relationship between age and anxiety levels or anxiety reduction levels. The independent samples t-test or one-way ANOVA was used to examine the association between other demographic variables (except age) and anxiety levels or anxiety reduction levels. The Spearman's rank-order correlation was used to identify the association between satisfaction and anxiety reduction. Statistical significance was defined as $p < 0.05$.

Ethical considerations

Ethical considerations included protection of participant information in accordance with Family Educational Rights and Privacy Act (FERPA). The study was conducted after getting approval from the College's Institutional Review Board (IRB). Participants were assigned an identification number to maintain confidentiality. Written informed consent was obtained. The participant population was aged 18 years and older; therefore, written parental consent was unnecessary.

Results

Sample characteristics

Of the 65 first term students enrolled at the

Accelerated BSN Program, 59 students volunteered to participate and were recruited, with 56 participants completing both pre-and-post S-AI surveys as well as the demographic survey. The age range of the students was 21 to 42 with a mean age of 25 (standard deviation, 4.3). The sample was 80.4% female (n = 45) with 19.6% male (n = 11). The predominant race was Caucasian (87.5%, n = 49), with three Asian (5.4%), one Native American/ Pacific Islander (1.8%), and three other (5.4%). The ethnicity was predominately non-Hispanic (n = 54, 96.4%) with two Hispanic (3.6%, n = 2). For education, 91.1% (n = 51) of the participants held a college degree, 8.9% with an advanced degree (n = 5). Marital status was predominately single, never married (78.6%, n = 44), with nine married (16.1%) and three having a domestic partner (5.4%). The predominant household income was less than $10,000 (26.8%, n = 15), followed by $25,000 to $49,999 (21.4%, n = 12), $50,000 to $99,999 (16.1%, n = 9) and $ 100,000 to $149,999 (16.1%, n = 9) respectively, $150,000, or greater (14.3%, n = 8), and $10,000 to $24,999 (5.4%, n = 3). Of the 56 participants, 42.9% (n = 24) had a precondition of anxiety/depression and 39.3% (n = 22) were on one or more anxiety/ depression medications. See Table 1.

When analyzing the correlation between Pre-S-AI Scores and Demographic Variables, it was found that female students had higher total S-AI scores (p = 0.024), positive emotions dimension scores (p = 0.046), and negative dimension scores (p = 0.022) than male students. Students with an advanced degree had a higher level of negative emotion anxiety than students with a college degree (p = 0.031). See Table 2.

Table 1: Demographic characteristics of participating undergraduate nursing students.

Characteristic		N (Total Sample Size)	Percentage (%)
Age*		25.04	4.33
Gender			
	Male	11	19.6
	Female	45	80.4
Race			
	White/Caucasian	49	87.5
	Asian	3	5.4
	Native American/Pacific Islander	1	1.8
	Other	3	5.4
Hispanic or Latino/a			
	Yes	2	3.6
	No	54	96.4
Highest Education Level			
	College degree	51	91.1
	Advanced degree	5	8.9
Marital Status			
	Single, never married	44	78.6
	Married	9	16.1
	Domestic partner	3	5.4
Household Income			
	Less than $10,000	15	26.8
	$10,000-$24,999	3	5.4
	$25,000-$49,999	12	21.4
	$50,000-$99,999	9	16.1
	$100,000-$149,999	9	16.1
	$150,000 or greater	8	14.3
Precondition			
	Yes	24	42.9
	No	32	57.1
Medication			
	Yes	22	39.3
	No	34	60.7

Note: *Age is described as continuous variable using mean and standard deviation.

Table 2: Correlation between pre -SAI scores and demographic variables.

Demographic variables		Pre-SAI total score			Pre-positive emotion			Pre-negative emotion		
		Mean ± SD	r/t/F	p	Mean ± SD	r/t/F	p	Mean ± SD	r/t/F	p
Age		13.14 ± 13.52	**0.126[a]**	**0.355**	26.98 ± 2.90	**0.078[a]**	**0.565**	25.16 ± 7.26	**0.160[a]**	**0.239**
Gender			**2.315[b]**	**0.024**		**2.045[b]**	**0.046**		**2.351[b]**	**0.022**
	Male	44.00 ± 13.46			23.27 ± 6.72			20.73 ± 7.07		
	Female	54.13 ± 12.91			27.89 ± 6.71			26.24 ± 6.95		
Race			**0.744[c]**	**0.531**		**0.454[c]**	**0.716**		**1.129[c]**	**0.346**
	White/ Caucasian	52.04 ± 13.03			27.06 ± 6.64			24.98 ± 7.06		
	Asian	46.67 ± 15.57			23.33 ± 8.74			23.33 ± 7.02		
	Native American/ Pacific Islander	70.00			32.00			38.00		
	Other	53.33 ± 22.50			27.67 ± 11.93			25.67 ± 10.69		
Hispanic or Latino/a			**1.436[b]**	**0.157**		**3.210[b]**	**0.079**		**1.576[b]**	**0.121**
	Yes	65.50 ± 6.36			32.50 ± 0.71			33.00 ± 7.07		
	No	51.65 ± 13.49			26.78 ± 6.95			24.87 ± 7.16		
Highest Level of Education			**1.702[b]**	**0.094**		**1.025[b]**	**0.310**		**2.218[b]**	**0.031**
	College degree	51.20 ± 13.58			26.69 ± 7.06			24.50 ± 7.13		
	Advanced degree	61.80 ± 9.01			30.00 ± 4.53			31.80 ± 5.26		
Marital Status			**1.107[c]**	**0.368**		**0.837[c]**	**0.439**		**1.080[c]**	**0.347**
	Single, never married	52.68 ± 13.71			27.34 ± 7.03			25.34± 7.14		
	Married	53.11 ± 12.91			26.89 ± 6.21			26.22± 8.29		
	Domestic partner	41.33 ± 11.59			22.00 ± 7.21			19.33 ± 4.73		
Income Level			**1.797[c]**	**0.131**		**2.195[c]**	**0.069**		**1.262[c]**	**0.295**
	Less than $10,000	53.27 ± 12.53			27.67 ± 6.22			25.60 ± 6.99		
	$10,000-$24,999	64.00 ± 11.00			35.00 ± 4.58			29.00 ± 6.56		
	$25,000-$49,999	46.08 ± 16.16			23.83 ± 7.99			22.25 ± 8.65		
	$50,000-$99,999	47.78 ± 14.07			24.56 ± 7.07			23.22 ± 7.24		
	$100,000-$149,999	51.89 ± 12.19			26.67 ± 5.92			25.22 ± 7.05		
	$150,000 or greater	59.88 ± 7.92			30.50 ± 5.13			29.38 ± 4.84		
Precondition			**0.428[b]**	**0.671**		**0.639[b]**	**0.525**		**0.190[b]**	**0.850**
	Yes	53.04 ± 14.81			27.67 ± 7.59			25.38 ± 7.81		
	No	51.47 ± 12.67			26.47 ± 6.42			25.00 ± 6.94		
Medication			**0.500[b]**	**0.619**		**0.846[b]**	**0.401**		**0.129[b]**	**0.898**
	Yes	53.27 ± 15.44			27.95 ± 7.86			25.32 ± 8.14		
	No	51.41 ± 12.31			26.35 ± 6.25			25.06 ± 6.75		

Note: S-AI, State Anxiety Inventory. [a]represents r value: Pearson correlation analysis; [b]represents t value: Independent samples t-test; [c]represents F value: One-way ANOVA.

Comparisons of pre- and post-intervention state-anxiety inventory scores

When comparing the S-AI scores at the two timepoints, the Two-Sample t-Test results revealed a large statistically significant decrease in the total score ($p < 0.001$, Cohen's d = 1.80), positive emotions scores ($p < 0.001$, Cohen's d = 1.20), and negative emotions scores ($p < 0.001$, Cohen's d = 1.20). See Table 3.

Comparisons of pre- and post-S-AI item scores

When analyzing the specific items, the Wilcoxon Signed-Rank Test demonstrated a large statistically significant decrease in self-perceived state anxiety associated with 15 questions ($p < 0.05$, $A \geq 0.71$); a moderate statistically significant decrease in self-perceived anxiety for the question "I feel strained" ($p < 0.001$, $A = 0.7$); and a small statistically significant decrease in self-perceived anxiety for the questions "I feel calm" ($p < 0.001$, $A = 0.4$) and "I am relaxed." ($p = 0.004$, $A = 0.4$). See Table 4.

Association between demographic variables and anxiety reduction

When exploring whether demographic variables

Table 3: Comparisons of pre- and post- S-AI scores.

	Mean ± SD		T	p	ES
	pre	post			
S-AI total scores	52.14 ± 13.52	36.35 ± 13.58	10.191	< 0.001	1.8
Positive emotion	26.98 ± 6.90	21.20 ± 7.30	9.062	< 0.001	1.2
Negative emotion	25.16 ± 7.26	18.76 ± 6.87	8.886	< 0.001	1.2

Note: ES: Effect Size; S-AI: State Anxiety Inventory; SD: Standard Deviation. *Cohen's d of 0.20, 0.50, and 0.80 are considered small, medium, and large effect sizes respectively.

Table 4: Comparisons of pre- and post- S-AI item scores.

	Median		Rank				
	Pre (n = 56)	Post (n = 56)	t			p	ES
Positive emotions							
1. I feel calm	2	3	1	41	14	< 0.001	0.4
2. I feel secure	3	3	10	15	31	0.206	5.8
5. I feel at ease	2	3	5	34	17	< 0.001	1.7
8. I feel satisfied	2	3	3	25	28	< 0.001	1.8
10. I feel comfortable	2	3	4	30	22	< 0.001	1.8
11. I feel-self confident	2	3	4	22	30	0.004	2.4
15. I am relaxed	2	3	2	44	10	0.004	0.4
16. I feel content	2	3	4	25	27	< 0.001	2.2
19. I feel steady	2	3	7	18	31	0.013	4.2
20. I feel pleasant	2	3	6	29	21	0.002	2.4
Negative emotions							
3. I am tense	3	2	32	3	21	< 0.001	1.3
4. I feel strained	3	2	39	2	15	< 0.001	0.7
6. I feel upset	1	1	19	11	26	0.076	5.3
7. I am presently worrying over possible misfortunes	3	2	24	3	29	< 0.001	1.8
9. I feel frightened	1	1	18	3	35	0.001	2.2
12. I feel nervous	4	2	35	3	18	< 0.001	1.1
13. I am jittery	2	2	28	5	23	< 0.001	2.3
14. I feel indecisive	2	2	20	8	28	0.024	4.3
17. I am worried	3	2	31	3	22	< 0.001	1.4
18. I feel confused	2	1	23	5	28	< 0.001	2.8

Note: ES: Effect Size; S-AI: State Anxiety Inventory; SD: Standard Deviation. *The Vargha and Delaney (A) were utilized to determine the clinical significance, using values of small (0.56), medium (0.64), and large (0.71).

influence anxiety reduction, we found that there was no statistically significant association between anxiety reduction and demographic variables, preexisting conditions, or medication use (all $p > 0.05$). See Table 5.

Satisfaction with the Tai Chi session and the association with anxiety reduction

Of all 59 participants, 56 completed the satisfaction survey, and all 56 surveys were included in the analysis. The results showed that 75% (n = 42) of participants indicated that Tai Chi was useful for reducing self-perceived state anxiety, with six participants finding the course somewhat helpful (10.7%) and two discovering it a little bit helpful (3.6%). Overall, 96.4% of participants (n = 54) would recommend Tai Chi to their peers. See Table 5. When we explored whether satisfaction was related to anxiety reduction, we found that satisfaction responses were not significantly associated with anxiety reduction ($p > 0.05$). See Supplementary Table S1.

Discussion

This study evaluated the effectiveness of a single 30-minute Tai Chi session in reducing anxiety levels among undergraduate nursing students. The findings revealed a statistically significant reduction in S-AI scores post-intervention, indicating that Tai Chi may serve as an effective non-pharmacological intervention for anxiety management in this population. Additionally, the majority of the participants expressed high satisfaction with the Tai Chi session and a willingness to recommend it to their peers. Notably, demographic variables, pre-existing conditions, and medication use did not significantly influence the extent of anxiety reduction, suggesting the broad applicability of Tai Chi across diverse student subgroups.

Interpretation of main findings

The substantial decrease in S-AI scores following the Tai Chi session underscores its potential as an alternative intervention for anxiety relief among nursing students. The large effect sizes observed across multiple S-AI dimensions not only signify statistical significance but also highlight clinical relevance, suggesting that Tai Chi can produce meaningful improvements in psychological well-being within a brief timeframe [21,29]. This aligns with the understanding of mind-body exercises with a positive effect on brain-derived neurotrophic factors, which improve mood [35].

A noteworthy finding in the study is the higher baseline anxiety levels reported by female students compared to their male counterparts. This echoes existing literature, which generally indicates a higher prevalence of anxiety among female populations [4,36]. One possible explanation for this gender difference is that women are more likely to report and seek help for symptoms associated with anxiety [37,38]. This tendency may lead to higher reported anxiety levels in studies where self-report measures are used. Consequently, it is essential to provide gender-sensitive support and offer resources for female nursing students, while recognizing their specific vulnerabilities to anxiety. Tailoring interventions like Tai Chi to address these unique needs of female nursing students can enhance their effectiveness and accessibility. Future research should explore the specific stressors faced by female nursing students and investigate the effectiveness of gender-specific anxiety interventions within nursing education.

The high satisfaction rates, with 75% of participants finding Tai Chi useful for anxiety reduction and 96.4% willing to recommend it to peers, are particularly encouraging. This is significant given that a substantial proportion of the sample (42.9%) had pre-existing anxiety or depression conditions, and 39.3% were on related medications. Previous studies have demonstrated that mindfulness and body-centered practices are generally well-received among individuals with varying mental health statuses [39,40]. The positive reception in this study suggests that Tai Chi may offer an accessible and

Table 5: Association between demographic variables and anxiety reduction.

Demographic variables	S-AI total Score Change		Positive emotions change		Negative emotions change	
	r/t/F	p	r/t/F	p	r/t/F	p
Age	0.027[a]	0.845	0.008[a]	0.956	0.051[a]	0.709
Gender	1.358[b]	0.18	1.176[b]	0.245	1.203[b]	0.234
Race	0.508[c]	0.68	0.599[c]	0.618	0.434[c]	0.730
Hispanic or Latino/a	0.535[b]	0.60	0.213[b]	0.832	0.701[b]	0.486
Highest Education Level	0.669[b]	0.507	0.874[b]	0.386	0.336[b]	0.739
Marital Status	0.675[c]	0.514	0.199[c]	0.820	0.941[c]	0.397
Household Income	0.729[c]	0.605	0.448[c]	0.813	1.047[c]	0.401
Precondition	0.364[b]	0.717	0.288[b]	0.774	0.349[b]	0.728
Medication	0.044[c]	0.965	0.268[c]	0.790	0.164[c]	0.870

Note: [a]represents r value: Pearson correlation analysis; [b]represents t value: independent samples t-test; [c]represents F value: One-way ANOVA

acceptable form of intervention across diverse mental health backgrounds. Moreover, the lack of significant associations between anxiety reduction and pre-existing conditions or medication use implies that Tai Chi's holistic approach-encompassing physical movement, breathing exercises, and meditation-may provide complementary benefits that are effective irrespective of an individual's baseline mental health status.

Physiologically, Tai Chi may modulate anxiety through multiple pathways. It is known to influence the autonomic nervous system by enhancing parasympathetic activity and reducing sympathetic arousal, which can lead to decreased cortisol levels and improved stress resilience [41,42]. Additionally, the meditative aspects of Tai Chi foster mindfulness and present-moment awareness, which are associated with reduced rumination and enhanced emotional regulation [43]. These physiological and psychological mechanisms likely contribute to the observed reductions in anxiety levels among participants.

Comparison with existing literature

The study's outcomes are largely consistent with existing research on Tai Chi's efficacy in reducing anxiety, yet they also extend current understanding in significant ways. Prior studies have predominantly utilized longer intervention periods-ranging from several weeks to months-to evaluate Tai Chi's impact on mental health outcomes [28,29]. For example, Wang, et al. [21] found that an 8-week Tai Chi program significantly reduced anxiety and stress levels among college students, while Caldwell, et al. [31] reported similar findings over a 12-week intervention. In contrast, this study demonstrates that even a single 30-minute session can produce significant anxiolytic effects, suggesting that Tai Chi may offer both immediate and sustained benefits depending on the frequency and duration of practice. Furthermore, the large effect sizes observed in this study are comparable to, and in some cases exceed, those reported in longer-duration studies [31,33], suggesting the potency of even brief Tai Chi practice. This may be due to the acute relaxation response elicited by the Tai Chi session, which can rapidly reduce physiological markers of anxiety such as heart rate and muscle tension (Li, et al., 2018). However, methodological differences such as sample size, measurement tools, and population characteristics must be considered when comparing effect sizes across studies.

High satisfaction rates (75% finding Tai Chi useful and 96.4% willing to recommend it to peers) underscore the acceptability and feasibility of Tai Chi interventions within nursing education [32,33]. This positive response aligns with broader research on Tai Chi in educational settings, where studies like Dinani, et al. [32] observed high participant satisfaction and perceived benefits in a sample of college students, reinforcing the notion that Tai Chi is a well-received intervention among young adults. Furthermore, our study contributes to the literature by focusing specifically on undergraduate nursing students-a population facing unique stressors related to academic and clinical training [11,15]. Nursing education often involves rigorous coursework, demanding clinical placements, and emotional labor, which can heighten vulnerability to anxiety and burnout [12,13]. By demonstrating Tai Chi's effectiveness in this specific group, the study supports the tailoring of alternative mental health interventions to meet the distinct needs of nursing students and improve their well-beings [44,45].

Moreover, the finding that Tai Chi's effectiveness was not significantly moderated by demographic variables, pre-existing conditions, or medication use, suggests broad applicability across diverse subgroups within the nursing student population. This echoes findings from meta-analyses indicating that mindfulness and physical exercise interventions can be universally beneficial, regardless of baseline mental health status or demographic factors [39,40].

Limitations

This study has several limitations. The convenience sample and small sample size from a single private nursing school limit the generalizability of the findings. The lack of a control group makes it difficult to rule out other contributing factors to anxiety reduction, such as the natural adaptation to the beginning of a semester. Reliance on self-report measures introduces the possibility of social desirability bias and subjective interpretation. The short intervention duration prevents conclusions about the long-term impact of Tai Chi on anxiety. Future research should employ longer, more frequent interventions to evaluate sustained effects. Additionally, the study did not explore the specific mechanisms by which different Tai Chi movements might influence anxiety reduction differently.

Implications for nursing education

The findings have implications for nursing education. Nursing students experience high levels of stress and anxiety, which can negatively affect both academic achievement and clinical performance. Integrating mind-body practices like Tai Chi into nursing curricula could provide a readily accessible, low-cost, and non-pharmacological approach to stress and anxiety management.

Nursing programs could incorporate regular Tai Chi sessions, or other mind-body practices like yoga and meditation, into student wellness programs. Faculty and counselors could be trained to identify and support students experiencing high anxiety levels. Creating a supportive and inclusive learning environment can also mitigate the negative effects of stress and anxiety from both academic and clinical in nursing education and foster student resilience.

Implementing regular Tai Chi sessions or incorporating mind-body practices into wellness programs offers accessible and low-cost strategies to reduce anxiety. Nursing programs and institutions could consider offering Tai Chi as part of student wellness initiatives, scheduling brief sessions before high-stress events such as exams or clinical rotations, and training faculty to facilitate these practices. The high acceptability among students, including those with pre-existing anxiety conditions, suggests that Tai Chi can serve as an inclusive, non-stigmatizing support strategy. By providing diverse mental health resources, nursing programs can cater to the varied needs of their student populations, promoting resilience and enhancing overall academic and clinical performance.

Conclusion

This study provides preliminary evidence of the effectiveness of Tai Chi in reducing anxiety among undergraduate nursing students. The significant decrease in self-reported anxiety and high participant satisfaction suggests the potential value of incorporating Tai Chi into nursing education. Despite limitations, the findings warrant further research with larger samples, control groups, and longer intervention durations to explore the long-term benefits and underlying mechanisms of Tai Chi for anxiety reduction in nursing students. Integrating mind-body practices like Tai Chi into nursing education can contribute to student well-being and enhance their ability to manage stress and anxiety throughout their academic and professional careers.

Acknowledgements

I would like to thank my DNP project committee members: Dr. Jan Sherman (Chair) who guided me through this study, Dr. Miriam Butler and Dr. Judy Smith for their help and support. Thanks to Ling Chen (Shenzhen Hospital, Southern Medical University, China) for statistical analyses and editing, Hongmei Quan (Shenzhen Hospital, Southern Medical University) for reference management, and Sarah Messmer, the librarian at Barnes-Jewish College Goldfarb School of Nursing. I also thank all students who participated in this study.

Conflicts of Interest

The author declares that there are no conflicts of interest.

References

1. Anxiety. American Psychological Association.
2. Chand SP, Marwaha R, Bender RM (2023) Anxiety (Nursing).
3. García-González J, Ruqiong W, Alarcon-Rodriguez R, Requena-Mullor M, Ding C, et al. (2021) Analysis of anxiety levels of nursing students because of e-learning during the covid-19 pandemic. Healthcare 9: 252.
4. Rosenthal L, Lee S, Jenkins P, Arbet J, Carrington S, et al. (2021) A survey of mental health in graduate nursing students during the COVID-19 pandemic. Nurse Educ 46: 215-220.
5. Savitsky B, Findling Y, Ereli A, Hendel T (2020) Anxiety and coping strategies among nursing students during the covid-19 pandemic. Nurse Educ Pract 46: 102809.
6. Temiz Z (2020) Nursing students' anxiety levels and coping strategies during the COVID-19 pandemic. Int Arch Nurs Health Care 6: 150.
7. Wang X, Hegde S, Son C, Keller B, Smith A, et al. (2020) Investigating mental health of US college students during the COVID-19 pandemic: Cross-sectional survey study. J Med Internet Res 22: e22817.
8. (2013) Diagnostic and statistical manual of mental disorders: DSM-5™, 5th edn. American Psychiatric Association.
9. Wilmer MT, Anderson K, Reynolds M (2021) Correlates of quality of life in anxiety disorders: Review of recent research. Curr Psychiatry Rep 23: 77.
10. Hiroeh U, Appleby L, Mortensen PB, Dunn G (2001) Death by homicide, suicide, and other unnatural causes in people with mental illness: A population-based study. Lancet 358: 2110-2112.
11. Shapiro AL (2014) Test anxiety among nursing students: A systematic review. Teaching and Learning in Nursing 9: 193-202.
12. Stebbings J, Taylor IM, Spray CM, Ntoumanis N (2012) Antecedents of perceived coach interpersonal behaviors: the coaching environment and coach psychological well- and ill-being. J Sport Exerc Psychol 34: 481-502.
13. Goff AM (2023) Stressors and learned resourcefulness in baccalaureate nursing students: A longitudinal study. Int J Nurs Educ Scholarsh 20.
14. Moscaritolo LM (2009) Interventional strategies to decrease nursing student anxiety in the clinical learning environment. J Nurs Educ 48: 17-23.
15. Aloufi MA, Jarden RJ, Gerdtz MF, Kapp S (2021) Reducing stress, anxiety and depression in undergraduate nursing students: Systematic review. Nurse Educ Today 102: 104877.
16. Locke AB, Kirst N, Shultz CG (2015) Diagnosis and management of generalized anxiety disorder and panic disorder in adults. Am Fam Physician 91: 617-624.
17. Mehdi S, Manohar K, Shariff A, Din Wani SU, Almuqbil M, et al. (2022) Analysis of antidepressants utilization for patients visiting psychiatric out-patient clinic in a tertiary care hospital. Healthcare 10: 2081.
18. Olfson M, Marcus SC (2009) National patterns in antidepressant medication treatment. Arch Gen Psychiatry 66: 848-856.
19. Sakurai H, Inada K, Aoki Y, Takeshima M, Ie K, et al. (2023) Management of unspecified anxiety disorder: Expert consensus. Neuropsychopharmacol Rep 43: 188-194.
20. Sharma M, Haider T (2015) Tai chi as an alternative and complimentary therapy for anxiety: A systematic review. J Evid Based Complementary Altern Med 20: 143-153.
21. Wang F, Lee EK, Wu T, Benson H, Fricchione G, et al. (2014) The effects of tai chi on depression, anxiety, and psychological well-being: A systematic review and meta-analysis. Int J Behav Med 21: 605-617.
22. Zou L, Loprinzi PD, Yeung AS, Zeng N, Huang T (2019)

The beneficial effects of mind-body exercises for people with mild cognitive impairment: A systematic review with meta-analysis. Arch Phys Med Rehabil 100: 1556-1573.

23. Miller SM, Hui-Lio C, Taylor-Piliae RE (2020) Health benefits of tai chi exercise: A guide for nurses. Nurs Clin North Am 55: 581-600.
24. Yu AP, Tam BT, Lai CW, Yu DS, Woo J, et al. (2018) Revealing the neural mechanisms underlying the beneficial effects of tai chi: A neuroimaging perspective. Am J Chin Med 46: 231-259.
25. Siddiqui SV, Chatterjee U, Kumar D, Siddiqui A, Goyal N (2008) Neuropsychology of prefrontal cortex. Indian J Psychiatry 50: 202-208.
26. Yao Y, Ge L, Yu Q, Du X, Zhang X, et al. (2021) The effect of tai chi chuan on emotional health: Potential mechanisms and prefrontal cortex hypothesis. Evid Based Complement Alternat Med 2021: 5549006.
27. Chang MY, Yeh SCJ, Chu MC, Wu TM, Huang TH (2013) Associations between tai chi chung program, anxiety, and cardiovascular risk factors. Am J Health Promot 28: 16-22.
28. Wang C, Bannuru R, Ramel J, Kupelnick B, Scott T, et al. (2010) Tai Chi on psychological well-being: Systematic review and meta-analysis. BMC Complement Altern Med 10: 23.
29. Zhang S, Zou L, Chen LZ, Yao Y, Loprinzi PD, et al. (2019) The effect of Tai Chi Chuan on negative emotions in non-clinical populations: A meta-analysis and systematic review. Int J Environ Res Public Health 16: 3033.
30. Zheng S, Kim C, Lal S, Meier P, Sibbritt D, et al. (2018) The effects of twelve weeks of tai chi practice on anxiety in stressed but healthy people compared to exercise and wait-list groups-a randomized controlled trial. J Clin Psychol 74: 83-92.
31. Caldwell KL, Bergman SM, Collier SR, Triplett NT, Quin R, et al. (2016) Effects of tai chi chuan on anxiety and sleep quality in young adults: Lessons from a randomized controlled feasibility study. Nat Sci Sleep 8: 305-314.
32. Dinani SK, Mehrabi T, Sadeghi R (2019) The effect of tai chi exercise on stress, anxiety, depression, and self-confidence of nursing students. Jundishapur J Chronic Dis Care 8: e92854.
33. Webster CS, Luo AY, Krägeloh C, Moir F, Henning M (2015) A systematic review of the health benefits of tai chi for students in higher education. Prev Med Rep 3: 103-112.
34. Spielberger CD (1983) Manual for the state-trait anxiety inventory. Palo Alto, CA: Consulting Psychologists Press.
35. Harder JA, Fichorova RN, Srivastava A, Wiley A, Burdick KE, et al. (2022) Brain-derived neurotrophic factor and mood in perimenopausal depression. J Affect Disord 300: 145-149.
36. McLean CP, Anderson ER (2009) Brave men and timid women? A review of the gender differences in fear and anxiety. Clin Psychol Rev 29: 496-505.
37. Richmond K, Levant R, Smalley B, Cook S (2015) The femininity ideology scale (FIS): Dimensions and its relationship to anxiety and feminine gender role stress. Women Health 55: 263-279.
38. Shields SA (2013) Gender and emotion: What we think we know, what we need to know, and why it matters. Psychology of Women Quarterly 37.
39. Goyal M, Singh S, Sibinga EM, Gould NF, Rowland-Seymour A, et al. (2014) Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. JAMA Intern Med 174: 357-368.
40. Khoury B, Lecomte T, Fortin G, Masse M, Therien P, et al. (2013) Mindfulness-based therapy: A comprehensive meta-analysis. Clin Psychol Rev 33: 763-771.
41. Kong J, Wilson G, Park J, Pereira K, Walpole C, et al. (2019) Treating depression with tai chi: State of the art and future perspectives. Front Psychiatry 10: 237.
42. Lu WA, Kuo CD (2003) The effect of tai chi chuan on the autonomic nervous modulation in older persons. Med Sci Sports Exerc 35: 1972-1976.
43. Tang YY, Hölzel BK, Posner MI (2015) The neuroscience of mindfulness meditation. Nat Rev Neurosci 16: 213-225.
44. Erkin Ö, Aykar FS (2021) The effect of the yoga course on mindfulness and self-compassion among nursing students. Perspect Psychiatr Care 57: 875-882.
45. Niedermeier J, Mumba MN, Barron K, Andrabi M, Martin R, et al. (2022) Relationships among exercise, mindfulness, mental health, and academic achievement among prelicensure nursing students. Nurse Educ 47: 184-189.