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EFFECT OF TAI CHI ON STRESS, ANXIETY, AND SELF-PERCEIVED HAPPINESS: A LONGITUDINAL INTERVENTION STUDY

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Abstract

This intervention follow-up study evaluated anxiety and stress levels and self-perceived happiness of individuals linked to the health field who did not practice Tai Chi and compared these variables before and after practicing this art. One hundred twenty-three participants were subdivided into two groups: G1) Older health professionals (n=41) and G2) Younger pre-university students interested in the health field (n=82). Participants received a 60-minute Tai Chi class. The Perceived Stress Scale (PSS-14) was applied before the practice, and the State-Trait Anxiety Inventory (STAI) and Andrews Face Scale were used before and after the class. Generalized linear models and the Bowker symmetry test were applied for data analysis. 46.3% and 30.5% of participants in G1 and G2 had mild stress levels, and 43.9% and 46.3% had moderate stress levels, respectively. After practicing Tai Chi, both groups presented significantly lower mean anxiety scores. In G1, 31.7% of participants went from moderate to mild anxiety levels after practice, 19.5% from severe to moderate, and 7.3% from severe to mild. In G2, 28.2% of participants went from moderate to mild anxiety levels after practice, 18.3% from severe to moderate, and 6.1% from severe to mild. Furthermore, 100.0% of individuals in G1 and 96.3% in G2 were happy after the class. Tai Chi was effective in reducing anxiety levels and improving self-perceived happiness.

Keywords: Anxiety. Perception. Psychological Stress. Tai Chi. Tai Ji.

1. Introduction

Modern life demands that individuals are constantly active and perform numerous tasks. Such requirements, added to poor diet, lack of time, and little/no rest and leisure, may trigger the onset of concerning health conditions, such as anxiety and stress, affecting the body and mind (Vannuci et al. 2017; Zheng et al. 2018; Azevedo et al. 2018).

Anxiety and stress may be harmful to health, making individuals susceptible to developing diseases (Yaribeygi et al. 2017; Weger and Sandi 2018; Zou et al. 2018a; Zou et al. 2018b) and symptoms related to cognition (decreased concentration, memory, and learning), social skills (social withdrawal), and physiological manifestations (shortness of breath, dizziness, heart palpitations, increased body

temperature, loss of appetite, and immune, cardiovascular, and gastrointestinal tract problems) (Yaribeygi et al. 2017; Weger and Sandi 2018; Zou et al. 2018a). Psychological symptoms (impacts on mood, anger, worry, hypersensitivity, emotional lability, hyperexcitability, and excessive and debilitating fear) are also common. Depending on severity (mild to severe), these symptoms can last from months to years (Sharma and Haider 2015; Remes et al. 2016; Fernandes et al. 2018).

Untreated stress and anxiety may be associated with the development of comorbidities and other psychiatric disorders (Post-Traumatic Stress Disorder (PTSD) and depression) and substance abuse. These disorders lead to more extensive use of health services, decreased productivity at work, unemployment, and impairment of social relationships, decreasing the quality of life and well-being (Sharma and Haider 2015; Fernandes et al. 2018; Kandola et al. 2018). The scientific literature indicates that non-pharmacological approaches and alternative therapies can aid individuals in handling stressful situations and anxiety. Cognitive-behavioral therapy, meditation, physical exercises, and mind-body activities, such as yoga and Tai Chi, exemplify alternative treatments (Zheng et al. 2018).

Tai Chi Chuan or Tai Chi, an ancient art that originated in China, involves cultivating the mind and body by performing slow, smooth, and low-impact movements. Practitioners switch their weight from one foot to another while moving their arms (Zheng et al. 2014; Sharma and Haider 2015; Zou et al. 2018b). People of any age and physical condition can practice Tai Chi. The method combines several elements, such as martial arts, stretching, relaxation, diaphragmatic breathing, cognitive tools (focus and images), meditation, and mental concentration, representing a tool for health promotion (Zheng et al. 2014; Zou et al. 2018a; Zou et al. 2018b).

Practicing Tai Chi can be an effective and safe non-pharmacological therapy to prevent and manage stress (Abbott and Lavretsky 2013; Wang et al. 2014; Gallego et al. 2016; Zheng et al. 2018), anxiety (Chang et al. 2013; Field et al. 2013; Wang et al. 2014; Rawtaer et al. 2015; Caldwell et al. 2016; Gallego et al. 2016; Zheng et al. 2018), sleep quality (Field et al. 2013; Siu et al. 2021), depression (Zheng et al. 2018; Liu et al. 2018), and mood disorders (Abbott and Lavretsky 2013; Laird et al. 2018), and improve self-esteem and overall psychosocial well-being (Abbott and Lavretsky 2013; Wang et al. 2014). Moreover, Tai Chi is more patient-centered, which can be more cost-effective than pharmacological treatments and help patients cope with stress and anxiety (Wang et al. 2014; Caldwell et al. 2016).

In this context, through the National Policy on Integrative and Complementary Practices (PNPIC) implemented in 2006, the Brazilian Ministry of Health included Tai Chi among the bodily practices composing Traditional Chinese Medicine (TCM) offered by the Brazilian public health system in the Family Health Strategy program to guarantee integrality of care and stimulate inherent body mechanisms for disease prevention and health recovery. This activity also provides an environment where people are welcomed by others willing to listen. Individuals become empowered in the health-disease process and find a balance in the mind, body, and surroundings, promoting integration with the environment and society (Brasil 2005; Sousa et al. 2012; Galvanese et al. 2017; Antunes and Fraga 2021).

However, the benefits of practicing Tai Chi have rarely been discussed and explored in Brazil due to the scarcity of studies on the Brazilian population. Therefore, investigations demonstrating the relevance of implementing this activity are required for promoting self-care and physical and emotional well-being. Studies are also needed to analyze the prevention and control of comorbidities, such as hypertension and diabetes, demonstrating the need for further investigation of the potential of Tai Chi practice in promoting the health of populations assisted in the primary care of the public health system. Therefore, this study aimed to evaluate anxiety and stress levels and self-perceived happiness of individuals linked to the health field who were not Tai Chi practitioners and compare these variables before and after the practice.

2. Material and Methods

Type of Study and Ethical Aspects

It was a longitudinal intervention study conducted according to the Norms and Ethical Guidelines of Resolution No. 466/2012 of the Brazilian Health Council of the Ministry of Health and approved by the

Research Ethics Committee (CEP) of the Piracicaba School of Dentistry (FOP-UNICAMP), Protocol: CAAE:33386620.3.0000.5418).

Participants

The sample included 123 individuals divided into two groups: G1) Older health professionals (n=41) and G2) Younger pre-university students interested in the health field (n=82). The study was conducted from September 2019 to October 2020. Those invited to participate were students from a specialization course who had graduated in the health field (n=41) and pre-university students participating in an Institutional Scientific Initiation Scholarship Program for High School, also in the health field (n= 82) at the School of Dentistry of Piracicaba (FOP-Unicamp), São Paulo, Brazil. The study included individuals who practiced physical activities or not. The exclusion criteria were people with systemic changes and/or special needs that would impair them in filling out the questionnaires and understanding the study objective and those who did not accept the methodology.

The sample was calculated with the Gpower program. The sample size provided a test power of 80% (β=0.20), at a 5% significance level (α=0.05), and a minimum detected effect size of f=0.22 (mean) for comparisons between groups and f=0.13 (small) for comparisons between time intervals and interactions.

Procedures

The volunteers were invited to participate in the study, and after being verbally informed about the objectives and methodology, they signed a Free and Informed Consent Form**.** Recruitment and data collection occurred at FOP-Unicamp where the volunteers participated in a theoretical-practical Tai Chi class of 60 minutes taught by an experienced instructor certified by the Brazilian Society of Tai Chi Chuan and Oriental Culture (SBTCC). Tai Chi practice and data collection took place on different days for each group. In the classes, the participants received verbal and visual instructions. They were methodically instructed to pause and, with deep breathing, perform part of the long form of the long yang style of Tai Chi Chuan. They also performed a series of eight Chi Kung exercises created by the Brazilian Society of Tai Chi Chuan and Oriental Culture, called Wu Chi posture, pole posture, crane exercise, hugging the tree, flight of the goose, swimming in the air, caressing clouds, side stretching, gentle hands of Buddha, preparatory form, initial form, caressing the bird's tail, simple whip, raise hands and take a step, white heron spreads its wings, and defend knee to the left and push.

Before Tai Chi practice, the Perceived Stress Scale (PSS-14) was used to assess the perceived stress level of volunteers (Cohen et al. 1983). This instrument includes 14 questions answered with a five-point Likert scale, measuring the degree to which the individuals perceived the life events of the previous month as stress inducers and their consequences (symptoms and conditions of morbidity), thus predicting health-related outcomes from one to two months. This scale could not measure short-term changes (less than a month between measurements), so it was impossible to apply it before and after Tai Chi practice (Cohen et al. 1983). Therefore, the instrument was only used for sample characterization.

The State-Trait Anxiety Inventory (STAI-S) and the Andrews Face Scale (self-perceived happiness and well-being) were applied before and after the theoretical-practical Tai Chi class. The STAI-S is reliable in assessing the reaction of individuals to stress and emotions at a given time (Zheng et al. 2018; Spielberger et al. 1970). STAI-S consists of 20 questions that rate feelings (“how do you feel now”; “at this moment”) and relates them to statements through a four-point Likert scale of 1- absolutely not; 2- somewhat; 3- quite significantly; 4- considerably (Spielberger et al. 1970; Zheng et al. 2018).

Furthermore, the following question: “Which of these faces best represent how you feel right now?” was used along with the Andrews Face Scale (McDowell and Newell 1996), which included seven circle-shaped figures corresponding to faces identified from A to G that illustrated expressions varying from a broad smile to sadness. Thus, the higher the value attributed to the face, the lower the degree of psychological well-being (McDowell and Newell 1996; Scalco et al. 2011). This instrument was chosen because it offers easy application and assimilation, guaranteeing equal stimulation to all individuals. It has

a test-retest reliability of 0.7 (McDowell and Newell 1996) and is reliable for assessing the psychological well-being of individuals (Scalco et al. 2011).

Data analysis

Descriptive and exploratory data analyses were performed. Subsequently, the anxiety score data before and after Tai Chi practice were analyzed with generalized linear models for repeated measures over time. Anxiety levels and self-perceived happiness were analyzed with the Bowker symmetry test. The analyses were performed using the SAS (Statistical Analysis System, version 9.4, 2010) and R (R Core Team 2019) programs at a 5% significance level.

3. Results

In the group of health professionals (G1), the participants were trained in the health field as follows: 12.2% in nursing, 12.2% in speech therapy, 24.4% in nutrition, 31.7% in dentistry, and 19.5% in psychology (Table 1). In the group of pre-university students (G2), all volunteers (100.0%) were students interested in the health field.

Table 1. Descriptive analysis of the profile of participants in the two Groups assessed.

Variable	Categories	Group	
		G1 - Graduates	G2 – Pre-University participants
Sex - Frequency (%)	Female	40 (97.6%)	53 (64.6%)
	Male	1 (2.4%)	29 (35.4%)
Age – mean (standard deviation)	-	35.7 (9.5)	16.2 (0.8)
Profession - Frequency (%)	Student	0 (0.0%)	82 (100.0%)
	Nurse	5 (12.2%)	0 (0.0%)
	Speech Therapist	5 (12.2%)	0 (0.0%)
	Nutritionist	10 (24.4%)	0 (0.0%)
	Dentist	13 (31.7%)	0 (0.0%)
	Psychologist	8 (19.5%)	0 (0.0%)
Stress score – median (minimum and maximum)	-	27.0 (0.0-40.0)	31.5 (6.0-51.0)
Stress level - Frequency (%)	No stress	4 (9.8%)	6 (7.3%)
	Mild	19 (46.3%)	25 (30.5%)
	Moderate	18 (43.9%)	38 (46.3%)
	Severe	0 (0.0%)	13 (15.8%)

(Note: No stress (score from 0 to 14), Mild stress (score from 15 to 28), Moderate stress (score from 29 to 42), Severe stress (score from 43 to 56).

The mean stress score in G1 assessed before Tai Chi practice was 27.0, ranging from zero to 40.0 on a scale from zero to 56 (Figure 1). In G2, the mean stress score was 31.5, ranging from 6.0 to 51.0. According to the scores, 46.3% and 30.5% of the participants in G1 and G2 presented mild stress levels, and 43.9% and 46.3% had moderate levels, respectively. Moreover, 15.8% of the students showed severe stress levels.

There was no significant difference between the groups regarding anxiety scores, which significantly decreased in both groups after Tai Chi practice (Table 2 and Figure 2).

The anxiety level (Table 3) of 58.5% and 52.4% of participants improved in G1 and G2, respectively ($p<0.05$). In G1, 31.7% of individuals went from moderate to mild anxiety levels after the practice, 19.5% from severe to moderate, and 7.3% from severe to mild. In G2, 28.2% went from moderate to mild anxiety levels after the practice, 18.3% from severe to moderate, and 6.1% from severe to mild ($p<0.05$).

Table 3 shows the changes in self-perceived happiness after the Tai Chi class. Most participants had previously felt happy, corresponding to 90.2% and 76.8% of participants in G1 and G2, respectively. All individuals in G1 marked a happy face after the practice, with 7.3% changing from neutral to happy and one participant (2.4%) going from sad to happy. In G2, there was an improvement in self-perceived happiness for 19.5%, with 18.3% feeling neutral and becoming happy and one participant going from sad to happy. In this group, only three participants (3.6%) did not feel happy after the practice, two (2.4%) felt happy and became neutral, and one (1.2%) felt neutral and remained this way.

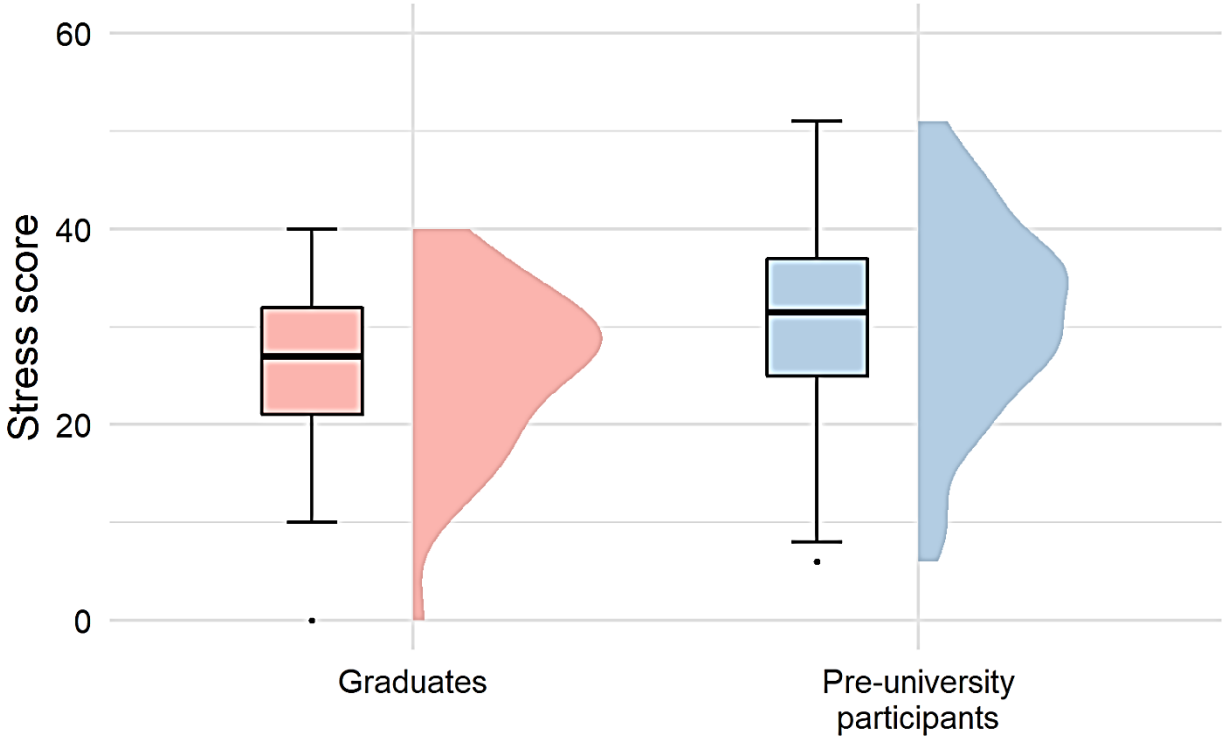

Figure 1. Distribution of stress scores in the two groups assessed.

Table 2. Anxiety score in the two groups assessed, before and after the practice of Tai Chi.

Group	Time interval			
	[1]Before		[2]After	
	Mean (standard deviation)	Median (minimum and maximum	Mean (standard deviation)	Median (minimum and maximum
Graduates	42.78 (9.25) Aa	44.00 (24.00-59.00)	32.00 (7.17) Ba	31.00 (20.00-50.00)
Pre-University participants	43.76 (9.53) Aa	42.50 (24.00-64.00)	32.95 (7.83) Ba	33.00 (20.00-57.00)

[1]Before Tai Chi practice; [2]After Tai Chi practice. Different letters (capitals in horizontal and lower case in vertical) indicate statistically significant differences ($p \leq 0.05$); p(Group)=0.4788; p(time)<0.0001; p(interaction) = 0.7399.

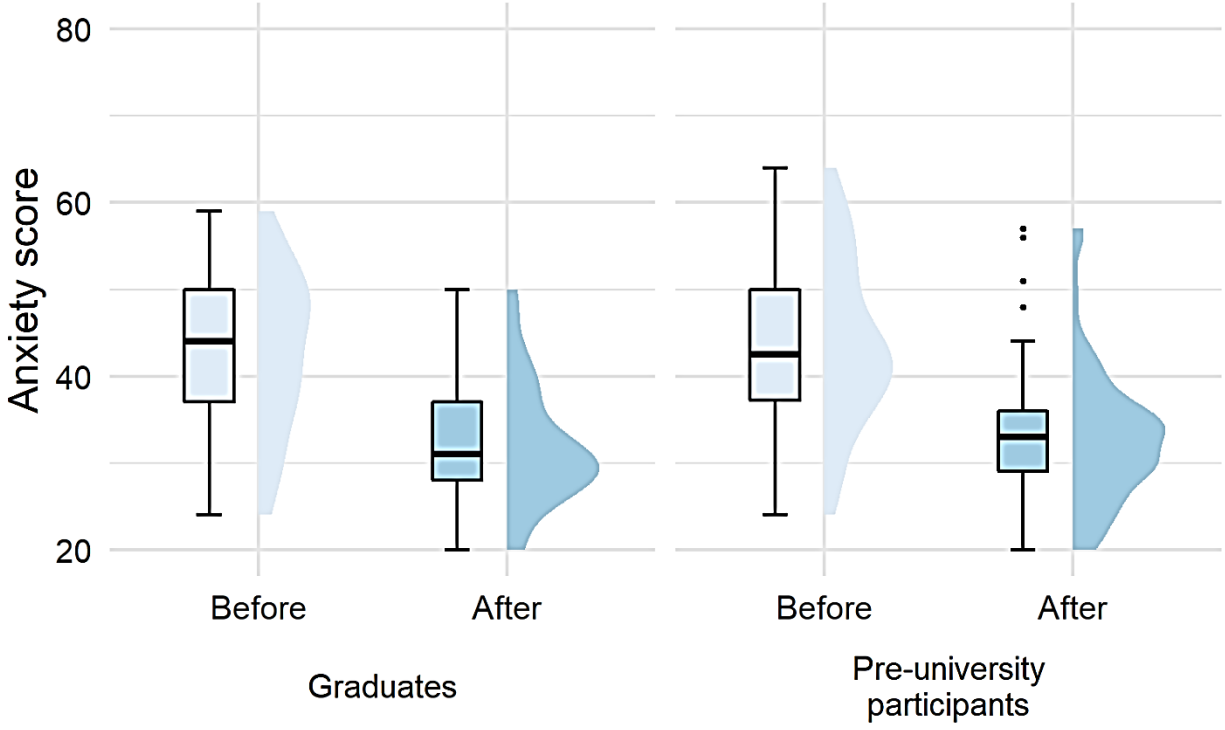

Figure 2. Box plot Anxiety score in the two groups assessed, before and after the practice of Tai Chi.

Table 3. Frequency (%) of participants considering anxiety levels and perception of happiness before and after Tai Chi practice.

Variable	Group	[1]Before	[2]After		
			Mild	Moderate	Severe
Anxiety	Graduates	Mild	4 (9.8%)	1 (2.4%)	0 (0.0%)
		Moderate	13 (31.7%)	11 (26.8%)	0 (0.0%)
		Severe	3 (7.3%)	8 (19.5%)	1 (2.4%)
	p-value			p< 0.0001.	
	Pre-University participants	Mild	7 (8.5%)	0 (0.0%)	0 (0.0%)
		Moderate	23 (28.0%)	28 (34.2%)	1 (1.2%)
		Severe	5 (6.1%)	15 (18.3%)	3 (3.7%)
	p-value			p< 0.0001.	
			Happy	Neutral	Sad
Happiness	Graduates	Happy	37 (90.2%)	0 (0.0%)	0 (0.0%)
		Neutral	3 (7.3%)	0 (0.0%)	0 (0.0%)
		Sad	1 (2.4%)	0 (0.0%)	0 (0.0%)
	p-value			-	
	Pre-University participants	Happy	63 (76.8%)	2 (2.4%)	0 (0.0%)
		Neutral	15 (18.3%)	1 (1.2%)	0 (0.0%)
		Sad	1 (1.2%)	0 (0.0%)	0 (0.0%)
	p-value			-	

[1]Before Tai Chi practice; [2]After Tai Chi practice. Anxiety Mild (score from 20 to 30), Moderate (score from 31 to 49), Severe (score from 50 to 80).

4. Discussion

Regular Tai Chi practice has been encouraged worldwide and is known for improving the quality of life and well-being of people with different health conditions (Xu et al. 2021). This study confirmed the hypothesis that practicing Tai Chi would help reduce the anxiety levels of practitioners and improve self-perceived happiness.

Tai Chi was effective in decreasing anxiety levels and increasing the self-perceived happiness of individuals, corroborating the findings in the literature affirming that such practice is a safe exercise that improves the health of practitioners of all ages (Zhang et al. 2012; Chang et al. 2013; Wang et al. 2014; Webster et al. 2015; Caldwell et al. 2016). The psychological benefits included decreased anxiety, depression symptoms, compulsion, somatization, phobia, hostility, and mood disorders. Other advantages comprised improved sleep quality and interpersonal sensitivity. The practice promoted happiness, overall psychological well-being, and physical fitness with increased flexibility, balance, and better lung capacity. Moreover, health institutions and services may consider Tai Chi to promote the physical and psychological well-being of the community (Zhang et al. 2012; Webster et al. 2015).

Therefore, studies have indicated the effectiveness of Tai Chi practice in managing stress (Webster et al. 2015) because physical exercise reduces stress-related hormones, such as adrenaline and cortisol, and stimulates endorphin release for mood enhancement (Zheng et al. 2018). Thus, regularly practicing physical activities should be encouraged to help individuals reduce stress levels, decrease emotional suffering and negative feelings, and improve well-being.

The Brazilian Ministry of Health has acknowledged the benefits of bodily practices that encourage physical activity and aim to expand care and mind-body integration. Considering these routines produce the effects of psychological relaxation and well-being, the Ministry of Health has facilitated access to integrative and complementary practices, such as Tai Chi (Galvanese et al. 2017; Barbosa et al. 2019). According to Barbosa et al. (2020), bodily practices are among the integrative and complementary exercises most offered in Brazilian municipalities. However, activities such as Tai Chi still require consolidation and strengthening because they are most frequently encouraged and promoted by health professionals without managerial support, making the offer weak and unstable.

Individuals who regularly participate in bodily practice groups provided at Family Health Centers have reported improvements in physical health and their reactions to adverse daily life events. Moreover,

they have reported expanding social networks and interpersonal relationships because Tai Chi group practice favors companionship and social support (Galvanese et al. 2017; Ma et al. 2018).

The self-perceived happiness of the volunteers in this study was evaluated with a visual face scale before and after a Tai Chi class. After the intervention, most volunteers felt happy, and none reported sadness. This subjective assessment is significant because happiness is associated with positive health outcomes. Psychological conditions, such as anxiety and stress, can affect mood and self-perceived happiness (an aspect of subjective well-being and personal construction) (Cardona Arango et al. 2019). Therefore, people who consider themselves happy tend to respond more adaptively to everyday experiences, such as making decisions, perceiving and interpreting social situations, and recovering from adverse events (such as failure) than those who consider themselves unhappy (Zou et al. 2018a; Zou et al. 2018b; Cardona Arango et al. 2019).

Understanding the effect of an intervention such as Tai Chi practice on the well-being of people may be relevant to recognize the determinants of happiness. That would contribute to creating policies and strategies to increase well-being and quality of life, especially for individuals most vulnerable to developing stress and anxiety (Scalco et al. 2011).

It is worth noting that, despite the positive results for mental and physical health in some studies (Yin et al. 2014; Jiang et al. 2016; Riskowski and Almeheyawi 2019), authors have warned that the evidence is still low or inconclusive to recommend the Tai Chi intervention to all patients seeking mental health improvements. They indicate the need for further studies with finer designs aiming to collect better evidence and improve the investigation of the role of Tai Chi in improving mental health.

The limitation of this study was that the analyzed population included only health professionals and pre-university students. Future investigations must assess the effect of Tai Chi practice on other subjects and longer follow-up times.

Further research is required to extend the exploration of the potential effects of Tai Chi practice on the prevention and management of stress and anxiety in different populations, especially those assisted in the public health system. Other studies could address the long-term impact of Tai Chi practice on anxiety and stress symptoms.

5. Conclusions

This study concluded that Tai Chi practice was effective in reducing anxiety levels and improving self-perceived happiness in the analyzed population.

Authors' Contributions: CEZÁRIO, L.R.A: conception and design, acquisition of data, and drafting the manuscript; AMBROSANO, G.M.B: analysis and interpretation of data and drafting the manuscript; AMBROSANO, G.B: analysis and interpretation of data, and drafting the manuscript; TAÍRA, A.: conception and design, acquisition of data, and drafting the manuscript; POSSOBON, R.F.: conception and design, acquisition of data, interpretation of data and drafting the manuscript; MENEGHIM, M.C: conception and design, analysis and interpretation of data and drafting the manuscript; CORTELLAZZI, K.L.: conception and design, acquisition of data, interpretation of data and drafting the manuscript. All authors have read and approved the final version of the manuscript.

Conflicts of Interest: The authors declare no conflicts of interest.

Ethics Approval: The study was approved by the Research Ethics Committee of the Piracicaba Dental School, University of Campinas (UNICAMP) (protocol number CAAE:33386620.3.0000.5418) in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

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References

ABBOTT, R., and LAVRETSKY, H. Tai Chi and Qigong for the treatment and prevention of mental disorders. *Psychiatric Clinics North America*. 2013, **36**(1), 109-119. https://doi.org/10.1016/j.psc.2013.01.011

ANTUNES, P.C. and FRAGA A.B. Integrative mind-body practices: concept proposal for the field of Traditional and Complementary Medicine. Práticas corporais integrativas: proposta conceitual para o campo das Práticas Integrativas e Complementares em Saúde. *Ciencia e Saude Coletiva*. 2021, **26**(9), 4217-4232. https://doi.org/10.1590/1413-81232021269.14082020

AZEVEDO, R.R., et al. Correlação entre estresse percebido e níveis de atividade física de recepcionistas de academias. *Revista Brasileira de Pesquisa em Saúde*. 2018, **5**(9), 16-19.

BARBOSA, F.E.S., et al. Oferta de Práticas Integrativas e Complementares em Saúde na Estratégia Saúde da Família no Brasil. *Cadernos de Saúde Publica*. 2019, **36**(1), e00208818. doi:10.1590/0102-311X00208818

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Política nacional de práticas integrativas e complementares no SUS : atitude de ampliação de acesso / Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. – 2. ed. – Brasília : Ministério da Saúde, 2015. 96 p.

CALDWELL, K.L., et al. Effects of tai chi chuan on anxiety and sleep quality in young adults: lessons from a randomized controlled feasibility study. *Nature Science Sleep*. 2016, **8**, 305-314. https://doi.org/10.2147/NSS.S117392

CARDONA ARANGO, D., et al. La felicidad como predictor de funcionalidad familiar del adulto mayor en tres ciudades de Colombia. *Hacia la Promocio de la Salud*. 2019, **24**(1), 97-111. https://doi.org/10.17151/hpsal.2019.24.1.9

CHANG, M.Y., et al. Associations between Tai Chi Chung program, anxiety, and cardiovascular risk factors. *American Journal Health Promotion*. 2013, **28**(1), 16-22. https://doi.org/10.4278/ajhp.120720-QUAN-356

COHEN, S., KAMARCK, T. and MERMELSTEIN, R. A global measure of perceived stress. *Journal of Health and Social Behavior*. 1983, **24**(4), 385-396.

FERNANDES, M.A., et al. Prevalência dos transtornos de ansiedade como causa de afastamento de trabalhadores. *Revista Brasilseira de Enfermagem.* 2018, **71**(5), 2213-2220. https://doi.org/10.1590/0034-7167-2017-0953

FIELD T., et al. Tai chi/yoga reduces prenatal depression, anxiety and sleep disturbances. *Complementery Therapies in Clinical Practice*. 2013, **19**(1), 6-10. https://doi.org/10.1016/j.ctcp.2012.10.001

GALLEGO, J., et al. Effect of Mind/ Body Interventions on Levels of Anxiety, Stress and Depression Among Future Primary School Teacher: A Controlled Study. *Revista de Psicodidáctica*. 2016, **21**(1), 87-101. https://doi.org/10.1387/RevPsicodidact.13256

GALVANESE, A.T.C., et al. Contribuições e desafios das práticas corporais e meditativas à promoção da saúde na rede pública de atenção primária do Município de São Paulo, Brasil. *Cadernos de Saude Publica*. 2017, **33**(12), e00122016. https://doi.org/10.1590/0102-311X00122016

JIANG, D., KONG, W. and JIANG, J.J. The Role of Tai Chi in Mental Health Management-Lessons Learned from Clinical Trials. *Reviews on Recent Clinical Trials*. 2016, **11**(4), 324-332. https://doi.org/10.2174/1574887111666160729100829

KANDOLA, A., et al. Moving to Beat Anxiety: Epidemiology and Therapeutic Issues with Physical Activity for Anxiety. *Current Psychiatry Reports*. 2018, **20**(8), 63. https://doi.org/10.1007/s11920-018-0923-x

KONG, J., et al. Treating Depression With Tai Chi: State of the Art and Future Perspectives. *Frontiers in Psychiatry*. 2019, **10**, 237. https://doi.org/10.3389/fpsyt.2019.00237

LAIRD, K.T., et al. Mind-Body Therapies for Late-Life Mental and Cognitive Health. *Current Psychiatry Reports*. 2018, **20**(1), 2. https://doi.org/10.1007/s11920-018-0864-4

LIU, J., et al. The Effects of Tai Chi on Heart Rate Variability in Older Chinese Individuals with Depression. *International Journal of Environmental Research and Public Health*. 2018, **15**(12), 2771. https://doi.org/10.3390/ijerph15122771

MA, C., et al. The impact of group-based Tai chi on health-status outcomes among community-dwelling older adults with hypertension. *Heart & Lung*. 2018, **47**(4), 337-344. https://doi.org/10.1016/j.hrtlng.2018.04.007

MCDOWELL, I. and NEWELL, C. Measuring health. A guide to rating scales and questionnaires. New York: Oxford University Press; 1996, 1-766.

RAWTAER, I., et al. Psychosocial interventions with art, music, Tai Chi and mindfulness for subsyndromal depression and anxiety in older adults: A naturalistic study in Singapore. *Asia-Pacific Psychiatry*. 2015, **7**(3), 240-250. https://doi.org/10.1111/appy.12201

REMES, O., et al. A systematic review of reviews on the prevalence of anxiety disorders in adult populations. *Brain and Behavior*. 2016, **6**(7), e00497. https://doi.org/10.1002/brb3.497

RISKOWSKI, J.L., e ALMEHEYAWI, R. Effects of Tai Chi and Qigong in Children and Adolescents: A Systematic Review of Trials. *Adolescent Research Review*. 2019, **4** ,73-91. https://doi.org/10.1007/s40894-017-0067-y

SCALCO, D.L., ARAUJO, C.L. and BASTOS, J.L. Autopercepção de Felicidade e Fatores Associados em Adultos de uma Cidade do Sul do Brasil: Estudo de Base Populacional. *Psicologia: Reflexão e Crítica.* 2011, **24**(4), 648-657. https://doi.org/10.1590/S0102-79722011000400004

SHARMA, M. and HAIDER, T. Tai chi as an alternative and complimentary therapy for anxiety: a systematic review. *Journal of Evidence-Based Complementary and Alternative Medicine*. 2015, **20**(2), 143-153. https://doi.org/10.1177/2156587214561327

SIU, P.M., et al. Effects of Tai Chi or Exercise on Sleep in Older Adults With Insomnia: A Randomized Clinical Trial. *JAMA Network Open*. 2021, **4**(2), e2037199. https://doi.org/10.1001/jamanetworkopen.2020.37199

SOUSA, I.M., et al. Práticas integrativas e complementares: oferta e produção de atendimentos no SUS e em municípios selecionados. *Cadernos de Saude Publica*. 2012, **28**(11), 2143-2154. https://doi.org/10.1590/s0102-311x2012001100014

SPIELBERGER, C.D., GORSUCH, R.L. and LUSHENE R.E. Test manual for the State Trait Anxiety Inventory. Palo Alto, California: Consulting Psychologists Press, 1970.

VANNUCI, A., FLANNERY, K.M. and OHANNESSIAN, C.M. Social media use and anxiety in emerging adults. *Journal of Affective Disorders*. 2017, **207**, 163-166. https://doi.org/10.1016/j.jad.2016.08.040

WANG, F., et al. The effects of tai chi on depression, anxiety, and psychological well-being: a systematic review and meta-analysis. *International Journal of Behavioral Medicine*. 2014, **21**(4), 605-617. https://doi.org/10.1007/s12529-013-9351-9

WEGER, M. and SANDI, C. High anxiety trait: A vulnerable phenotype for stress-induced depression. *Neuroscience and Biobehavioral Reviews*. 2018, **87**, 27–37. https://doi.org/10.1016/j.neubiorev.2018.01.012

WEBSTER, C.S., et al. A systematic review of the health benefits of Tai Chi for students in higher education. *Preventive Medicine Reports*. 2015, **3**, 103-112. https://doi.org/10.1016/j.pmedr.2015.12.006

XU, S., BAKER, J.S. and REN, F. The Positive Role of Tai Chi in Responding to the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*. 2021, **18**(14), 7479. https://doi.org/10.3390/ijerph18147479

YARIBEYGI, H., et al. The impact of stress on body function: A review. *EXCLI Journal*. 2017, **16**, 1057-1072. https://doi.org/10.17179/excli2017-480

YIN, J. and DISHMAN, R.K. The Effect of Tai Chi and Qigong practice on depression and anxiety symptoms: A systematic review and meta-regression analysis of randomized controlled trials. *Mental Health and Physical* Activity. 2014, **2014**(3), 135-146. https://doi.org/10.1016/j.mhpa.2014.08.001

ZHANG, L., et al. A review focused on the psychological effectiveness of tai chi on different populations. *Evidence-Based Complementary and Alternative Medicine*. 2012, **2012**, 678107. https://doi.org/10.1155/2012/678107

ZHENG, S., et al. Protocol: the effect of 12 weeks of Tai Chi practice on anxiety in healthy but stressed people compared to exercise and wait-list comparison groups: a randomized controlled trial. *Journal of Acupuncture and Meridian Studies*. 2014, **7**(3), 159-165. https://doi.org/10.1016/j.jams.2014.01.003

ZHENG, S., et al. 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. *Journal of Clinical Psychology*. 2018, **74**(1), 83-92. https://doi.org/10.1002/jclp.22482

ZOU, L., et al. Effects of Mind¯Body Exercises (Tai Chi/Yoga) on Heart Rate Variability Parameters and Perceived Stress: A Systematic Review with Meta-Analysis of Randomized Controlled Trials. *Journal of Clinical Medicine*. 2018, **7**(11), 404. https://doi.org/10.3390/jcm7110404

ZOU, P., et al. Associations between negative life events and anxiety, depressive, and stress symptoms: A cross-sectional study among Chinese male senior college students. *Psychiatry Research.* 2018, **270**, 26-33. https://doi.org/10.1016/j.psychres.2018.09.019

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