太极拳对大学生正念水平影响的剂量效应研究：一项 8 周的随机对照试验

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摘要：研究目的：当代大学生心理健康问题日益凸显，《2022 年中国国民心理健康报告》显示，大学生抑郁和焦虑风险检出率分别达 21.48%和 45.28%，亟需有效干预手段。研究表明，正念是有效的，并提供了一种永久解决不良心理健康状况的方法，如抑郁症、创伤后应激障碍（PTSD）、产后疾病和物质滥用。不同的心理健康干预分支都接纳了正念实践，以促进幸福感。教育部《全面加强和改进新时代学生心理健康工作专项行动计划（2023—2025 年）》也明确要求高校构建多元化心理健康服务体系，而传统体育干预恰为重要路径。《“健康中国 2030”规划纲要》提出扶持推广太极拳等传统运动，国家体育总局为了更好地宣传、推广太极拳文化，弘扬中华优秀传统体育文化，在现有 24 式太极拳的基础上，提取各式太极拳中最具共性的、核心的“八法五步”技术（即掤、捋、挤、按、採、挒、肘、靠八种“劲法”以及进、退、顾、盼、定五种“步法”），进行系统的提炼和整理，编创了太极八法五步。以其简易性和普及性，成为校园推广的理想选择。同时世界卫生组织（World Health Organization，WHO）推荐成年人每周应至少进行 150–300min 的中等强度有氧活动。WHO 还指出，太极拳通过呼吸与动作协调调节心理状态，可缓解焦虑、提升身心觉察能力。太极拳中的“练身、练气、练意”特性与正念训练高度契合。因此本研究采用两套太极八法五步方案（不同运动频率和单次运动时长）对大学生进行 8 周干预，探索改善心理健康、提升正念水平的创新路径。同时，为采用太极拳促进大学生心理健康提供科学的运动剂量，进一步为太极拳运动处方的个性化和精准化研究做出贡献。**研究方法：**本研究采用随机对照实验，使用 G*Power 软件进行了样本量估计，估算出需要总样本量为 96 名。考虑到数据收集与质量情况，以及干预研究的实验设计，最终招募并筛选出在校大学生 120 名。并将其随机均分入太极 A 组、太极 B 组、健步走组、空白对照组，进行为期八周的实验。具体干预方案：（1）太极 A 组：50min/次，3 次/周的太极（八法五步）；（2）太极 B 组：30min/次，5 次/周的太极（八法五步）；（3）健步走组：50min/次，3

次/周的健步走运动；（4）空白对照组保持原有生活。所有运动组强度均通过 Polar Team 心率表检测，确保控制在中等强度即（220-年龄）×（60%~69%）最大心率。在 8 周干预前、后使用了国际上广泛使用的五因素正念问卷（Five Facet Mindfulness Questionnaire，FFMQ）对每一名被试进行测试。中文版 FFMQ 由五个维度（观察、描述、觉知、不判断和不反应）构成，提供了可靠的人格意识衡量，并表明正念实践对我们有多有效具有良好的信效度（Cronbach's α=0.757）。采用 SPSS 27 软件进行 2×4×5（时间×组别×维度）的三因素重复测量方差分析，若三重交互显著则进行简单效应和简单简单效应分析。**研究结果**：在 FFMQ 问卷各维度平均得分上，时间×组别×维度的三重交互作用显著（F=2.424,p=0.005<0.01,$partial\eta^2$=0.068），维度主效应显著（F=16.563,p<0.001, $partial\eta^2$=0.143）,时间主效应、组别主效应、时间×组别与组别×维度均不显著（ps>0.05）。进一步简单效应分析，发现“观察”维度上时间×组别交互作用显著（F=3.803, p=0.013<0.05）；“描述”维度上时间×组别交互作用边缘显著（F=2.205,p=0.092）；结果显示太极 A 组在“观察”维度得分显著下降(p=0.005<0.05），太极 B 组也有轻微下降(p=0.138)；太极 B 组在描述维度上有提升趋势，空白对照组在“描述”维度有显著下降(p=0.049<0.05），太极 B 组非显著提升趋势；健步走组在“不反应”维度得分显著提升(p=0.028<0.05）。**研究结论**：不同运动干预方案对大学生正念能力有显著的改善。8 周太极八法五步干预对正念能力的各维度有着特异性作用，且其差异化影响存在剂量效应。两个太极组在五因素中的三项核心维度（觉知、描述、和不判断）保持高度稳定或提升。（1）太极组在“描述”这一维度评分维持着高水平,而对照组显著下降，反映了太极八法五步可以缓解自然状态下正念能力的退化。短时间高频次太极拳方案长在“描述”维度的优势好于长时间低频次的太极拳方案。（2）两个太极拳方案在“观察”维度是得分均有下降，且长时间低频次的太极拳方案组下降幅度更大。结合过往神经影像学研究显示，太极拳练习者后岛叶激活增强（内感受加工区），可能的解释为单次长时间太极拳方案诱导联系着重塑注意了分配模式，使其注意重心从外部转向内部身体感受，即从“观察”维度转向“觉知”和“描述”维度。（3）健步走组在“不反应”维度的改善上具有独特优势，支持有氧运动对冲动控制的益处。未来研究将力求扩大样本量，追踪干预效应的持续性，并结合神经影像学技术综合脑网络指标进行佐证，为精准化整年干预提供重要实证依据。

关键词：太极（八法五步）；正念；运动剂量；心理健康；随机对照实验

The dose-effect of Tai Chi (Bafa Wubu) on mindfulness levels in college students: an 8-week randomized controlled trial

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Abstract: Against a backdrop of rising mental health concerns (depression risk: 21.48%; anxiety risk: 45.28%), and aligning with WHO recommendations and the mind-body principles of Tai Chi, 120 students were randomly assigned to: Tai Chi A (Bafa Wubu: 50min/session, 3 sessions/week), Tai Chi B (Bafa Wubu: 30min/session, 5sessions/week), Brisk Walking (50min/session, 3sessions/week), or Control. Exercise intensity was monitored (Polar Team, 60-69% HRmax). Mindfulness was assessed pre- and post-8-week intervention using the Five Facet Mindfulness Questionnaire (FFMQ; Chinese version, Cronbach's α=0.757), measuring Observing, Describing, Acting with Awareness, Non-Judging, and Non-Reactivity. A significant Time × Group × Facet interaction emerged (F=2.424, p=0.005, *partial*η^2=0.068), alongside a Facet main effect (F=16.563, p<0.001, *partial* η^2=0.143). Simple effects analysis revealed: (1) Significant Time × Group interaction for Observing (F=3.803, p=0.013), with significant decrease in Tai Chi A (p=0.005) and non-significant decrease in Tai Chi B (p=0.138); (2) Marginal Time × Group interaction for Describing (F=2.205, p=0.092), where Control significantly declined (p=0.049) while Tai Chi B showed a non-significant increase; Tai Chi A maintained high levels; (3) Brisk Walking significantly improved Non-Reactivity (p=0.028). Both Tai Chi groups maintained or improved in Acting with Awareness, Describing, and Non-Judging. Bafa Wubu of Tai Chi exerts facet-specific effects on mindfulness, demonstrating a dose-response pattern. It mitigates natural decline in Describing (potentially enhanced by higher frequency), while decreases in Observing (greater with longer sessions) may reflect attentional shift towards interoception. Brisk walking uniquely benefits Non-Reactivity. Findings inform optimized Tai Chi prescriptions for student mental health. **Research Purpose:** Contemporary college students face increasingly prominent mental health issues. The *China National Mental Health Development Report (2022)* revealed depression and anxiety risk detection rates among college students reaching 21.48% and 45.28% respectively, highlighting an urgent need for effective interventions. Research indicates that mindfulness is an effective approach and offers a

sustainable solution for adverse mental health conditions such as depression, post-traumatic stress disorder (PTSD), postpartum disorders, and substance abuse. Various branches of mental health interventions have incorporated mindfulness practices to promote well-being. The Ministry of Education's *Special Action Plan for Comprehensively Strengthening and Improving Student Mental Health Work in the New Era (2023–2025)* explicitly requires universities to build a diversified mental health service system, where traditional physical exercise interventions serve as an important pathway. The "Healthy China 2030" Plan Outline proposes supporting and promoting traditional exercises like Tai Chi. To better disseminate and promote Tai Chi culture and carry forward China's outstanding traditional sports culture, the General Administration of Sport of China, based on the existing 24-form Tai Chi, systematically extracted and compiled the most common and core "Bafa Wubu" techniques (namely, the eight "Jin Fa" – Peng, Lv, Ji, An, Cai, Lie, Zhou, Kao – and the five "Bu Fa" – Jin, Tui, Gu, Pan, Ding), creating the standardized Bafa Wubu of Tai Chi. Due to its simplicity and accessibility, it has become an ideal choice for campus promotion. Concurrently, the World Health Organization (WHO) recommends that adults engage in at least 150-300 minutes of moderate-intensity aerobic activity per week. WHO also notes that Tai Chi, by coordinating breath with movement to regulate psychological state, can alleviate anxiety and enhance mind-body awareness. The characteristics of "training the body, training the breath (Qi), and training the mind (Yi)" in Tai Chi are highly congruent with mindfulness training. Therefore, this study employed two Bafa Wubu of Tai Chi protocols (differing in exercise frequency and single-session duration) for an 8-week intervention among college students to explore innovative pathways for improving mental health and enhancing mindfulness levels. Simultaneously, it aims to provide scientific exercise dosage recommendations for using Tai Chi to promote college students' mental health, further contributing to research on the personalization and precision of Tai Chi exercise prescriptions. **Research Methods:** This study adopted a randomized controlled trial design. Sample size estimation was performed using G*Power software, indicating a required total sample size of 96 participants. Considering data collection, quality, and the experimental design of an intervention study, 120 college students were ultimately recruited and screened. They were randomly and equally assigned to Tai Chi Group A, Tai Chi Group B, Brisk Walking Group, and Blank Control Group for an eight-week experiment. The specific intervention protocols were: (1) Tai Chi Group A: Bafa Wubu of Tai Chi, 50 min/session, 3 sessions/week; (2) Tai Chi Group B: Bafa Wubu of Tai Chi, 30 min/session, 5 sessions/week; (3) Brisk Walking Group: Brisk walking, 50

min/session, 3 sessions/week; (4) Blank Control Group: Maintained their original lifestyle. Exercise intensity for all active groups was monitored using Polar Team heart rate monitors to ensure it was controlled at moderate intensity, defined as 60-69% of maximum heart rate (HRmax). The internationally validated Five Facet Mindfulness Questionnaire (FFMQ) was administered to each participant before and after the 8-week intervention. The Chinese version of the FFMQ consists of five facets: Observing, Describing, Acting with Awareness, Non-Judging, and Non-Reactivity. It provides a reliable measure of dispositional mindfulness and has demonstrated good reliability and validity for assessing the effectiveness of mindfulness practice (Cronbach's α = 0.757). Data analysis was performed using SPSS 27 software, conducting a 2×4×5 (Time × Group × Facet) three-way repeated measures analysis of variance (ANOVA). If the triple interaction was significant, simple effects and simple simple effects analyses were conducted. **Research Results:** Regarding the mean scores on each facet of the FFMQ, the Time × Group × Facet triple interaction effect was significant (F=2.424, p=0.005<0.01, $partial\eta^2$=0.068), the main effect for Facet was significant (F=16.563, p<0.001, $partial\eta^2$=0.143). The main effects for Time and Group, as well as the Time × Group and Group × Facet interactions, were not significant (ps>0.05). Further simple effects analysis revealed: A significant Time × Group interaction effect for the Observing facet (F=3.803,p=0.013<0.05); A marginally significant Time × Group interaction effect for the Describing facet (F=2.205,p=0.092); Results showed that Tai Chi Group A had a significant decrease in Observing facet scores (p=0.005<0.05), while Tai Chi Group B also showed a slight decrease (p=0.138); Tai Chi Group B exhibited a trend towards improvement in the Describing facet. The Blank Control Group showed a significant decrease in Describing facet scores (p=0.049<0.05), while Tai Chi Group B showed a non-significant increasing trend. The Brisk Walking Group showed a significant improvement in Non-Reactivity facet scores (p=0.028<0.05). **Research Conclusion:** Different exercise intervention protocols significantly influenced specific facets of mindfulness in college students. The 8-week Bafa Wubu of Tai Chi intervention exerted facet-specific effects, demonstrating a differential dose-response pattern. Both Tai Chi groups maintained high stability or showed improvement in the core facets of Acting with Awareness, Describing, and Non-Judging. (1) The Tai Chi groups maintained high levels on the Describing facet, while the Control Group significantly declined. This indicates that Bafa Wubu of Tai Chi can mitigate the natural degradation of mindfulness abilities. The shorter-duration, higher-frequency Tai Chi protocol (Group B: 30min × 5/week) demonstrated a relative advantage over the longer-duration,

lower-frequency protocol (Group A: 50min×3/week) in preserving the Describing facet. (2) Both Tai Chi protocols showed decreased scores on the Observing facet, with a significantly larger decrease observed in the longer-duration, lower-frequency group (Group A). Integrating this finding with previous neuroimaging research showing enhanced activation in the posterior insula (a key region for interoceptive processing) in Tai Chi practitioners, a plausible explanation is that the single longer-duration Tai Chi session induced a reallocation of attentional focus. This shift moved the attentional center from external environmental stimuli towards internal bodily sensations, effectively transitioning focus from the Observing facet towards the Acting with Awareness and Describing facets. (3) The Brisk Walking Group demonstrated a unique and significant advantage in improving the Non-Reactivity facet, providing empirical support for the established benefits of sustained aerobic exercise in enhancing impulse control.

Keywords: Tai Chi (Bafa Wubu); Mindfulness; Exercise Dose; Mental Health; Randomized Controlled Trial