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Recreational Exercises as an Element of Preventive Medicine in Professional Taekwondo Training

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ABSTRACT

Contact with nature can influence our thoughts, feelings and actions in a positive way, allowing us to function more effectively as a form of preventive medicine. People are often inspired by nature for example, in biomimetic inventions, nature and natural systems are used as a resource to create new products or solutions, studies have shown that different forms of contact with nature are beneficial to us in different ways. The aim was to knowledge about the impact of outdoor recreational activity on the stress level and mental toughness of taekwondo athletes and their performance in the competition phase. The methods used were the Survey questionnaire (Sport Mental Toughness Questionnaire, Depression, Anxiety Stress Scales) and Gas Discharge Visualization (GDV) Technique (Stress level) and the Vienna test. It was revealed that the assessment of the impact of 'physical activity in nature' before the competition is the basis for further research on a group of high-skilled athletes and the effect will be activities related to the optimal level and reduction of negative such as pre-competition, i.e. 'pre-competition fever and apathy', improvement of such parameters as the state of full concentration and stress reduction during the competition. Additionally, it was noted that in the process of diagnosing sports training, in the psychological aspect, factors should be sought as selected elements of preventive medicine that can contribute to changing the current psychosocial state so that the results achieved in sports competition in the future are as good as possible.

Keywords: Combat sport, Sport results, Recovery

INTRODUCTION

Green exercise involves physical activity in urban green spaces like parks and campuses with minimal human intervention (MacKay & Neill, 2010). Studies show that exposure to nature improves mental health by reducing anxiety, depression, and stress (Boobani et al., 2023; Boobani et al., 2024). Engaging in green exercise provides combined health benefits and initiates stress recovery. It also serves social, recreational, and leisure purposes, enhancing both physical and mental well-being.

Research indicates that even brief walking sessions in areas with at least 40% visible greenery positively impact mood and attention. These findings support two key theories: Stress Reduction Theory (SRT) and Attention

Restoration Theory (ART). SRT highlights nature's role in emotional and physiological stress recovery, while ART emphasizes how nature restores attention by offering a break from mental demands through its captivating qualities (Kaplan & Kaplan, 1989; Ulrich & Parsons, 1992). Taekwondo, an Olympic combat sport, is known for its swift, high, and forceful kicks. The dynamic nature of taekwondo competitions leads to rapid shifts in athletes' emotional and mental states as they must attack, defend, and conceal their strategies simultaneously. Research on combat sports reveals that goal profiles and mental toughness significantly impact athletes' performance. Studies on "neo-gladiators," controversially labeled as athletes, show that professional athletes score higher on the Sports Mental Toughness Questionnaire (SMTQ) in confidence, positive cognition, and determination compared to semi-professional and amateur groups (Chen & Cheesman, 2013).

Taekwondo, an indoor sport, highlights the growing focus on nature's impact on adolescents. Research shows reduced connection with nature among youth due to increased indoor activities. Mental toughness, crucial for athletic performance, contributes significantly to success, accounting for over 50% of athletes' results. Most Latvian taekwondo athletes exhibit low to moderate mental toughness (Boobani et al., 2024). Despite its importance, studies on stress and mental toughness in taekwondo athletes remain limited. This case study aims to explore how green exercise as a recovery strategy influences stress levels, mental toughness, and junior taekwondo athletes' performance during competitions.

MATERIALS AND METHODS

Participants

Three Latvian national taekwondo athletes who qualified for the International Taekwondo Competition were selected. Each had over ten years of taekwondo experience: Athlete A (78 kg male), Athlete B (63 kg female), Athlete C (63 kg female).

DASS: The Latvian version of the Depression and Anxiety Stress Scale (DASS) was used to measure depression, anxiety, and stress. The stress scale evaluates difficulty relaxing, irritability, impatience, and nervous arousal (Ozoliņa et al., 2015).

Vienna Determination Test: This computerized test measures stress tolerance and reaction time through adaptive visual and auditory stimuli, analyzed by Percentile Ranks (PR) from below average (0–24) to above average (76–100).

SMTQ: The Latvian version of the Sports Mental Toughness Questionnaire (SMTQ) assessed Confidence, Constancy, and Control on a 4-point Likert scale, emphasizing traits like perseverance, self-belief, and emotional regulation (Astaficevs et al., 2020).

The four-week study included three phases: tool introduction (DASS, Vienna Determination Test, SMTQ), 'pre-test' assessments, and an intervention combining taekwondo training and green exercise (40 minutes

walk). The final phase involved 'post-test' evaluations and competition performance analysis.

Statistical Analysis

Data were analyzed using Excel and JASP 0.18.3, including Shapiro-Wilk, paired t-tests, and Wilcoxon signed-rank (W).

Ethical Approval

Approved by the Ethical Committee of the Latvian Academy of Sport Education (Nr. 51813) following the Declaration of Helsinki.

RESULTS

Stress levels (DASS) dropped from severe (M = 29.66) to moderate (M = 19.33), with increased variability post-test (SD: ±1.52 to ±4.16). Vienna Determination Test scores rose from M = 35.00 to M = 67.00, showing consistent variability (SD: ±4.35 to ±4.58). Confidence decreased (M = 16.00 to 14.66; SD: ±2.64 to ±4.04), while Constancy slightly increased (M = 13.33 to 13.66; SD: ±1.52 to ±0.57). Control improved (M = 12.33 to 13.33; SD: ±1.52 to ±2.08). All athletes experienced reduced DASS stress levels, with athlete A (75%) and athlete C (66.6%) showing the greatest improvements (Figure 1). Vienna Determination Test results improved by 41.1% to 54.9%, with athlete C achieving the highest progress. Confidence decreased for athletes A (−21.4%) and B (−18.1%) but rose for athlete C (+5.2%). Constancy improved for athlete C (+14.2%), remained stable for athlete B (0%), and slightly declined for athlete A (−7.1%). Control increased for athletes B (+26.6%) and C (+14.2%) but dropped for athlete A (−27.2%).

The Shapiro-Wilk test showed non-normality for DASS but normality for other variables. Wilcoxon test for DASS found no significant change (W = 6.0, p = 0.17). Paired t-test for Vienna Determination Test showed a significant difference (t(2) = −9.11, p = 0.01). No significant changes were found for SMTQ variables: Confidence (t(2) = 1.1, p = 0.38), Constancy (t(2) = −0.37, p = 0.74), and Control (t(2) = −0.48, p = 0.67).

Table 1: The difference in variables in taekwondo athletes (n = 3) in pre-test and post-test.

Tool	Variable	W	t	df	p
DASS	Stress	6.0			0.17
Vienna Test			−9.11	2	0.01*
SMTQ	Confidence		1.10	2	0.38
	Constancy		−0.37	2	0.74
	Control		−0.48	2	0.67

DASS Depression and Anxiety Stress Scale; SMTQ Sports Mental Toughness Questionnaire; W Wilcoxon signed-rank test; t statistics; df degrees of freedom; p significance level, probability; *significant p <0.05.

DISCUSSION

This study examined green exercise's impact on stress, mental toughness, and taekwondo performance. Significant stress reduction was observed in the Vienna Determination Test, but changes in DASS and mental toughness (Confidence, Constancy, Control) were inconsistent. Findings support nature's positive effect on stress levels during physical activity, highlighting individual variations. Kaplan and Kaplan's ART suggests that purposeful interactions with nature enhance recovery and well-being. Nature-based experiences in outdoor education emphasize direct interaction with nature using various sensory modalities (Cornell, 1979). Taekwondo, being an indoor sport, limits athletes' exposure to such experiences. Indoor air pollution, up to 100 times worse than outdoor air, can cause dizziness and respiratory issues, while fresh air improves breathing, crucial for performance (Boobani & Līcis, 2019; Solovjova et al., 2023; Jakubovskis et al., 2024). Additionally, natural scents enhance alpha wave activity in the temporal lobe, reducing stress and improving mood due to olfaction's link to emotion (Hines et al., 1993). Additionally, age and gender may influence mental toughness. The participants in this study were 17 years old and had ten years of experience. Generally, older athletes tend to demonstrate greater mental toughness than their younger counterparts. As athletes age, they often develop advanced psychological skills and emotional maturity, which can enhance their mental toughness (Drees & Mack, 2012).

A fundamental principle of exercise training is recovery, and optimal strategies to maximize it are essential for the training-adaptation cycle with the goal of homeostasis restoration. In addition to sports trainers, personal trainers also have such competences and qualifications (Litwiniuk et al., 2020; Kruszewski & Litwiniuk, 2021).

CONCLUSION

Green exercise improved stress levels in the Determination Test but not in the DASS or mental toughness metrics. Individual outcomes varied, highlighting its potential in competitive contexts. Athletes performed excellently in the competition. Future studies should include diverse athlete groups and explore more predictive assessment tools.

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