International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

# The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students

**Xie Xiaoyu[1*], Wisute Tongdecharoen[2] and Nopporn Tasnaina[3]**
Faculty of Sports Science and Technology, Bangkokthonburi University, Thailand
[1]E-mail: 2254607953@qq.com, ORCID ID: https://orcid.org/0009-0003-3857-5600
[2]E-mail: wisute.ton@bkkthon.ac.th, ORCID ID: https://orcid.org/0009-0008-5233-7533
[3]E-mail: aipia2489@gmail.com, ORCID ID: https://orcid.org/0009-0001-6086-0657

Received 07/09/2024 Revised 09/09/2024 Accepted 09/10/2024

**Abstract**

**Background and Aim:** Sand surface training improves physical fitness and skills in various sports, while other studies indicate that Taekwondo training specifically enhances cardiopulmonary and muscle endurance but no other fitness factors. This research objective was to develop the sand surface training program to improve physical fitness and taekwondo skills and to compare the mean effects of the sand surface training program between the control and experimental groups. And to compare mean effects with the experimental group, pretest, mid-test, and posttest.

**Materials and Methods:** This study used a quasi-experimental research design with forty participants, 20 of whom were randomly selected and divided into experimental and control groups. A pretest was then given to evaluate the subjects' characteristics, taekwondo abilities, and physical fitness. After that, they had eight weeks of sand surface floor training and 60 minutes of tree day/week (M-W-F). In another way, a traditional program was conducted in the control group and a post-training test with a mid-test and post-test. Data analysis methods comprised mean and standard deviation, independent t-tests, within the experimental group by one-way ANOVA repeated measurement, and Bonferroni post hoc pairwise comparisons (*p<.05).

**Results:** The result found that: 1) The mean comparison showed a significant difference (*p<.05) between experimental and control groups in taekwondo skills (front kick, round kick, and push kick) and physical fitness (reaction time, Y balance test, T-test, standing long jump, sit up 30 sec, and sit and reach). And 2) Mean comparison within experimental groups, taekwondo skills, and physical fitness pairwise were significant differences (*p<.05).

**Conclusion:** The study found that sand surface training can considerably improve novice taekwondo practitioners' physical fitness and abilities. The unique challenges given by sand's unstable and resistive nature resulted in gains in numerous fitness components such as strength, power, balance, flexibility, and reaction time. Furthermore, the training resulted in improved execution of taekwondo-specific abilities such as front, round, and push kicks. The good findings in this study significantly encourage the use of sand surface training in taekwondo programs, particularly for rookie students, to enhance their overall growth and performance.

**Keywords**: Sand Surface Floor Training; Physical Fitness; Skills; Novice Taekwondo Students

## Introduction

Highlights a concerning trend regarding the physical fitness of novice Taekwondo students in China. The research indicates that a significant portion of these students exhibit suboptimal levels of physical fitness, which can hinder their progress and overall experience in Taekwondo training. The studies cited in the review, such as those by Wang (2019) and Yu (2019), emphasize that the weak physical foundation of many students poses challenges for Taekwondo instructors and can even negatively impact students' interest and motivation in the sport. The specific physical fitness deficiencies observed in novice Taekwondo students were not explicitly detailed in the provided text. However, the literature underscores the importance of addressing this issue to ensure the effective implementation of Taekwondo programs and promote the holistic development of students. Poor physical condition among beginner Taekwondo students in China is a problem that impedes the proper growth of Taekwondo programs. To address this issue, consider the options listed below. Implement Comprehensive Physical Fitness Training: Physical fitness is the cornerstone of Taekwondo. Incorporate activities that promote flexibility, muscular endurance, cardiovascular endurance, balance, coordination, core strength, agility, and response time into your training regimen. Utilize Training on Sand Surfaces Sand surfaces' unique qualities, such as increased resistance and instability, can improve a variety of Taekwondo fitness components. To increase strength, power,



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

agility, balance, and coordination, use sand-based workouts such as sprints, jumps, squats, lunges, ladder drills, and plyometrics. Periodize Training: Divide the training program into stages with a variable emphasis on various. (Chin et al, 2022, Wang (2019., Yu, 2019).

The utilization of sand surface training in Taekwondo, particularly for novice students, presents a multitude of advantages that can significantly enhance their overall training experience and performance outcomes. The distinct biomechanical properties of sand, characterized by its instability and resistance, create a challenging yet rewarding training environment that fosters adaptations beyond those achievable on traditional hard surfaces. Enhanced Physical Fitness, Strength and Power were increased resistance offered by sand necessitates greater muscular effort during movements, leading to improved strength and power development in the lower body and core muscles, crucial for executing powerful kicks and maintaining stability during dynamic movements. (Impellizzeri et al., 2008; Pereira et al., 2021; Fernandez-Fernandez et al., 2023; Villarreal et al., 2023). Balance and Coordination was the unstable nature of sand that challenged the body's proprioceptive system, forcing continuous adjustments and refinements in balance and coordination. This translates to improved agility and stability on the court, crucial for executing complex kicks and maintaining control during rapid movements. (Phomsoupha and Laffaye, 2015). Cardiovascular Endurance were increased energy expenditure required for movement on sand elevates heart rate and oxygen consumption, providing a cardiovascular training stimulus that enhances aerobic and anaerobic capacities. This translates to improved stamina and the ability to sustain high-intensity efforts throughout training and competitions. (Binnie et al., 2014; Ratamess et al., 2009). Reduced Injury Risk, Impact Dampening was the soft and yielding nature of sand that absorbs impact forces, reducing stress on joints and ligaments compared to hard surfaces. This can be particularly beneficial for novice practitioners who may be more susceptible to overuse injuries. (Lejeune et al., 1998; Emery and Meeuwisse, 2001). Skill Enhancement and proprioceptive Refinement were the constant adjustments required for balance and stability on the sand to enhance proprioceptive awareness, leading to improved motor control and precision in executing Taekwondo techniques. (Lees, 2003). Neuromuscular Activation were increased resistance and instability of sand stimulate greater neuromuscular activation, potentially leading to improved muscle recruitment patterns and enhanced power generation in kicks. (Binnie et al., 2013).Psychological Benefits were enjoyment and motivation which training in a natural and dynamic environment like a sand court can enhance enjoyment and motivation, particularly for novice students. The novelty and challenge of sand training can foster a positive training experience and encourage continued participation.

In summation sand surface training, while primarily perceived as a modality to enhance skills and muscle strength, also emerges as a potent tool for cardiovascular enhancement. By integrating sand court sessions into their training regimens, the taekwondo students could potentially achieve holistic development, harmonizing skill with stamina and technique with tenacity. As the benefits of sand surface training on sports performance are referred to above, and taekwondo was a sport that needed ability of foot movement and good fitness ability as volleyball, badminton, and soccer, so the research aimed to study the effect of sand surface training on novice taekwondo students, whether it could gain better on decrease injury, increase physical fitness, and skills in taekwondo of students or not.

**Objectives**

This study's objective was to follow this.

1. To develop the sand surface training program to improve the physical fitness and taekwondo skills of novice taekwondo students

2. To compare the mean effects of the sand surface training program between the control and experimental groups.

3. To compare the mean effects of the sand surface training program within the experimental group, pre-test, mid-test, and post-test.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

## Literature review

The literature review of this study highlights the positive impact of high-intensity and multi-component training programs on physical fitness and Taekwondo performance. It also emphasizes the effectiveness of sand surface training in improving physical and sport-specific skills, often surpassing the benefits of hard surface training.

### The relationship between physical fitness and Taekwondo skills

The relationship between physical fitness and Taekwondo skills is a critical area of research, as physical fitness can significantly impact an athlete's performance in this martial art. This synthesis examines the effects of various training regimens on the physical fitness and performance of Taekwondo athletes. Key Insights were high-intensity training and physical fitness improvements, High-intensity intermittent Taekwondo training significantly improves body composition, flexibility, muscle strength, power, agility, and $VO_2$ max in athletes ( Mathunjwa et al, 2016; Liu & Jia, 2023; Zeng & Kanchanathaweekul, 2023). Technique-specific high-intensity interval training (HIIT) shows no significant differences in fitness and body composition compared to traditional Taekwondo training, although individual responses vary (Ojeda-Aravena et al, 2021). Multi-Component Training Benefits, a multi-component training program, which includes strength, endurance, speed, agility, and flexibility training, enhances long jump performance, abdominal crunches, and speed-agility tests in young athletes (Herrera-Valenzuela et al, 2016). Adding small combat games to regular Taekwondo training improves VO2 max and agility, with smaller area sizes eliciting higher metabolic demands (Ouergui et al, 2021). Specific Physical Fitness Factors, Taekwondo training improves cardiopulmonary endurance, muscle endurance, and power, particularly in elementary students (Nam & Lim, 2019). Competitive Taekwondo training enhances aerobic fitness and psychological well-being, but may not significantly improve explosive force or flexibility in a short period (Wang et al, 2016). Strength training and reaction speed, core strength training significantly improves the reaction speed of Taekwondo athletes, particularly in rapid strength and specific kicking techniques (He & Wan, 2022).

Psychological and Physical Fitness Correlation, there are significant correlations between psychological skills and fitness levels, indicating that mental toughness and emotional intelligence are linked to better anaerobic and aerobic performance in elite athletes (Nabilpour et al (2023).

Overall, various forms of high-intensity and multi-component training programs are effective in enhancing the physical fitness and performance of Taekwondo athletes. These improvements include better body composition, increased flexibility, muscle strength, power, agility, and aerobic capacity. Additionally, psychological factors play a crucial role in the physical performance of elite athletes. Therefore, integrating diverse training regimens and considering psychological aspects can lead to optimal performance in Taekwondo.

### Sand surfaces training

Training on different surfaces, such as sand and hard surfaces, has been explored to understand its impact on physical fitness and sports skills. This synthesis examines the effects of sand surface training on various physical and technical performance metrics across different sports. Key insights of general physical performance improvements, training on sand surfaces can improve jump and sprint performance similarly to hard surfaces (Pereira et al, 2023; Pereira et al, 2021; Ahmadi et al, 2021; Hammami et al, 2020). Both sand and hard surface training enhance physical fitness components like vertical jump, sprint speed, and dynamic balance (Fernandez-Fernandez et al, 2024). Sport-Specific Performance, Sand training can lead to greater improvements in specific athletic performance measures, such as jump throw velocity in beach handball players, compared to regular training (Villarreal et al, 2023). In soccer, sand training is more physically demanding but less technically specific compared to artificial turf, suggesting it is better for enhancing lower limb muscle strength rather than achieving maximal speed (Rago et al, 2018). Training load and muscle soreness that sand training tends to cause higher perceived training loads and muscle soreness compared to hard surfaces, indicating a need for adequate familiarization periods (Fernandez-Fernandez et al, 2024). Adaptations in different sports such As volleyball, and sand-based plyometric



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

training showed specific adaptations in jump-related biomechanical variables and physical fitness, with some measures favoring sand over hard surfaces (Ahmadi et al, 2021; ). For handball players, sand training improved sprint speed, change of direction, and dynamic balance more than hard surface training (Hammami et al, 2020). For youth and schoolchildren, plyometric training on both firm and sand surfaces significantly improved physical fitness in schoolchildren, with no significant differences between surface types (Marzouki et al (2022).

Training on sand surfaces is effective in improving various physical fitness and sport-specific skills, often comparable to or even surpassing hard surface training in certain aspects. However, sand training is more physically demanding and may require a period of adaptation. Coaches and trainers can utilize sand training to enhance lower limb strength and dynamic balance while considering the specific needs and goals of their athletes.

## Conceptual Framework

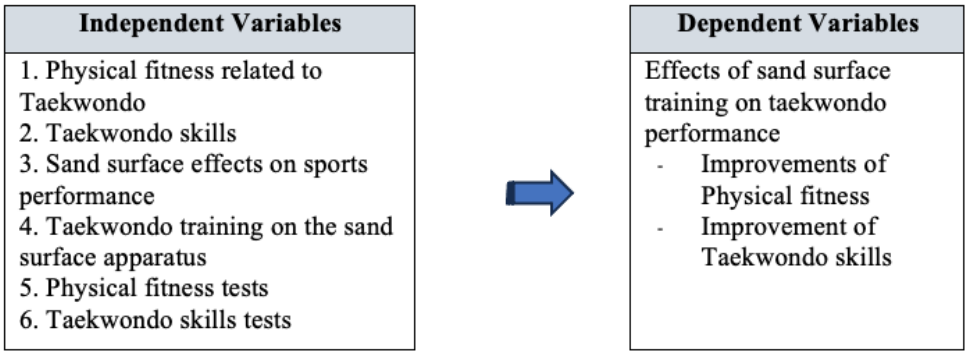


**Figure 1** Conceptual Framework

## Methodology

This research is a research and development that used both survey technique and experimental technique as a process of research This research was approved as a research ethic in humans by the Research Ethics Committee, Bangkokthonburi University, as no 83/2567, date 1 May 2024- 30 April 2025.

**Population:** The population was primary school students in Guangzhou province, China which scope in grade 5th, academic year 2024.

In this study, the sample was 40 students, grade 5, selected by simple random sampling from 2 classes out of 4 classes, then tested the physical fitness and taekwondo skills, ranked the score, and divided into two groups by systematic sampling technique. 20 students each, and drew to be the experimental group and control group.

Inclusion criteria participation in research projects

1. The participants were primary school students in Guangzhou province, China which scope on grade 5, academic year 2024.
2. Those who do not have any injuries that hinder training must get the approval of the doctor.
3. Those who have passed the Physical Activity Readiness Questionnaire for Everyone, PAR-Q+ 2023 assessment.
4. Be a person who voluntarily agrees to participate in the program and signs the consent document.

Exclusion criteria participants in research projects

1. There was less time to participate in the experiment during 80% of the eight-week training period.
2. Participants in the test were not completed by the date and time specified by the researcher.
3. Be sick or injured and unable to participate in further training.
4. They wanted to leave the research project.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

**Research design:** This study was Quasi-experimental research with a control and experimental group.

| | | | | | |
|---|---|---|---|---|---|
| Control | $O_1$ | $T_1$ | $O_3$ | $T_1$ | $O_5$ |
| Experimental | $O_2$ | $T_2$ | $O_4$ | $T_2$ | $O_6$ |

Note: $O_1$, $O_3$, and $O_5$ were the pretest, mid-test, and posttest of the control group, and $O_2$, $O_4$, and $O_6$ were the pretest, mid-test, and posttest of the experimental group. The control group's training program was $T_1$, and the experimental group's training program was $T_2$.

Research instrument: the instruments in this study were

1. Taekwondo training program developed through the researcher that uses a sand surface area for teaching taekwondo and a traditional floor mat to improve fitness, body composition, flexibility, strength muscle, power, agility, balance, and anaerobic capacity, with an 8-week training period, three days per week, and 60-minute sessions.

Content validity was assessed with three experts in sports science, physical education, and taekwondo coaching, and the index of item-objective congruence (IOC) was 96. The program was then tested with five samples and found to be appropriate in terms of exercise drills, training load, and recovery durations.

The examination, training activities, training volume, and recovery period were conducted and the adjustments were made by trying out the training program with 5 and 9 students who were not subjects and found that the training activities, training volume, and recovery period were appropriate and could be used for training.

2. Physical fitness test (flexibility, strength and endurance muscle, power, agility and reaction time)
3. Taekwondo skill tests (Front Kick, Round Kick and Push Kick)

**Data collection**

1. content validity with interviewing of 3 experts collected by interview and concluded in interviewing form. Quality of program collection with an index of Items Objective Congruence (IOC).
2. Before the experiment, subjects' characteristics data, and pre-test collection on taekwondo skills and physical fitness were examined.
3. subjects were conducted a training program and mid-test after week 4 and post-test after week 8
4. Gather the test results and prepare them for future statistical analysis.

**Data Analysis**

1. An analysis of the validity of the training program was conducted with index items objective congruence (IOC)
2. Compare the pretest and posttest between the experimental group and the control group by using an independent t-test.
3. Comparisons among the pre-test, mid-test, and post-test within the experiment group were conducted with one-way ANOVA repeated measurement and post-hoc analysis with Bonferroni, the criteria were at the.05 level of significance.

## Results

The researcher prepared the data and then carried out the statistical analysis. Analyze the results of the analysis, presenting them as a table to accompany the essay as follows: research hypothesis that physical fitness and taekwondo skills of the post-training experimental group were better than control group.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

**Table 1** Mean comparison between the experiment and control groups with the pretest of the Taekwondo skills test, by t-test independent

| Variables | Exper. G | Cont. G | 95% Confidence Interval of the Difference | | t | p |
|---|---|---|---|---|---|---|
| | M± SD | M± SD | lower | Upper | | |
| Front Kick (score) | 5.00±1.62 | 4.45±1.39 | -.42 | 1.52 | 1.15 | .26 |
| Round Kick (score) | 5.05±1.32 | 4.55±0.94 | -.23 | 1.23 | 1.38 | .18 |
| Push Kick (score) | 5.00±1.17 | 4.40± 0.82 | -.05 | 1.25 | 1.88 | .07 |

*P<.05

Table 1 showed that all of the taekwondo skills pairwise were not significantly different.

**Table 2** Mean comparison between the experimental and control groups with the posttest of the Taekwondo skills test, using a t-test independent.

| Variables | Exper. G | Cont. G | 95% Confidence Interval of the Difference | | t | p |
|---|---|---|---|---|---|---|
| | M± SD | M± SD | lower | Upper | | |
| Front Kick (score) | 7.75±1.33 | 5.45±1.39 | 1.43 | 3.17 | 5.33 | .01* |
| Round Kick (score) | 7.55±1.19 | 5.55±1.19 | 1.24 | 2.76 | 5.31 | .01* |
| Push Kick (score) | 7.60±1.27 | 5.70±1.13 | 1.13 | 2.67 | 4.99 | .01* |

*P<.05

Table 2 showed that all taekwondo skills pairwise were significantly different (*p<.05) on front kick, round kick, and push kick.

**Table 3** The mean compares the experimental and control groups with the pretest of the physical fitness test using a t-test independent.

| Variables | Experimental G. | Control G. | 95% Confidence Interval of the Difference | | t | p |
|---|---|---|---|---|---|---|
| | M± SD | M± SD | lower | Upper | | |
| Sit Up for 30 sec | 20.30±3.01 | 19.10±2.81 | -0.66 | 3.06 | 1.30 | .20 |
| Standing Long Jump | 124.00±6.03 | 124.25±4.52 | -3.66 | 3.16 | -0.15 | .88 |
| T-test | 8.80±0.49 | 9.06±0.48 | -0.57 | 0.06 | -1.66 | .11 |
| Reaction time | 0.46±0.05 | 0.48+0.05 | -0.05 | 0.2 | -0.94 | .35 |
| Y balance test | 63.99±3.69 | 61.73±3.65 | -0.8 | 4.62 | 1.96 | .06 |
| Sit and Reach | 13.75±3.02 | 12.40±2.70 | -0.49 | 3.19 | 1.48 | .58 |

*P<.05

Table 3 shows that all of the physical fitness tests pairwise were not significantly different.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

**Table 4** The mean comparison between the experimental and control groups with the posttest of the physical fitness test using a t-test independent.

| Variables | Experimental G. | Control G. | 95% Confidence Interval of the Difference | | t | p |
|---|---|---|---|---|---|---|
| | M± SD | M± SD | lower | Upper | | |
| Sit Up for 30 sec | 25.90±3.09 | 20.05±2.74 | 3.98 | 7.72 | 6.33 | .01* |
| Standing Long Jump | 144.35±9.35 | 128.30±4.51 | 11.35 | 20.75 | 6.91 | .01* |
| T-test | 7.76±0.43 | 8.86±0.48 | -1.39 | -0.80 | -7.61 | .01* |
| Reaction time | 0.40±0.05 | 0.47±0.05 | -0.10 | -0.04 | -4.78 | .01* |
| Y balance test | 70.53±4.31 | 62.48±3.67 | 5.49 | 10.61 | 6.37 | .01* |
| Sit and Reach | 20.50±3.20 | 14.40± 2.70 | 4.20 | 8.00 | 6.51 | .01* |

*P<.05

Table 4 showed that all the physical fitness pairwise were significant differences (*p<.05).

**Table 5** Mean comparison of Taekwondo skills tests within the experimental group by using one-way. ANOVA repeated measurement and Bonferroni post hoc.

| Dependent variables | Test | | Bonferroni | | | M±SD | F | p |
|---|---|---|---|---|---|---|---|---|
| | | | Mean Difference | Std. Error | p | | | |
| Front Kick (score) | Pre-test | Mid test | -1.20 | 0.09 | .01* | 4.80±1.44 | 506.85 | .05* |
| | | Post-test | -2.95 | 0.09 | .01* | | | |
| | Mid test | Pre-test | 1.20 | 0.09 | .01* | 6.00±1.62 | | |
| | | Post-test | -1.75 | 0.10 | .01* | | | |
| | Post-test | Pre-test | 2.95 | 0.09 | .01* | 7.75±1.33 | | |
| | | Mid test | 1.75 | 0.10 | .01* | | | |
| Round Kick (score) | Pre-test | Mid test | -1.45 | 0.11 | .01* | 5.05±1.32 | 278.52 | .05* |
| | | Post-test | -2.50 | 0.12 | .01* | | | |
| | Mid test | Pre-test | 1.45 | 0.11 | .01* | 6.50±1.32 | | |
| | | Post-test | -1.05 | 0.09 | .01* | | | |
| | Post-test | Pre-test | 2.50 | 0.12 | .01* | 7.55±1.19 | | |
| | | Mid test | 1.05 | 0.09 | .01* | | | |
| Push Kick (score) | Pre-test | Mid test | -1.50 | 0.12 | .01* | 5.00±1.17 | 334.79 | .05* |
| | | Post-test | -2.60 | 0.11 | .01* | | | |
| | Mid test | Pre-test | 1.50 | 0.12 | .01* | 6.50±1.32 | | |
| | | Post-test | -1.10 | 0.07 | .01* | | | |
| | Post-test | Pre-test | 2.60 | 0.11 | .01* | 7.60±1.27 | | |
| | | Mid test | 1.10 | 0.07 | .01* | | | |

*P<.05

Table 5 shows that all taekwondo skills in the experimental group had a significant difference (*p<.05) between the pretest-mid-test, pretest-posttest, and mid-test-posttest.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

International Journal of Sociologies and Anthropologies Science Reviews
Volume 5 Issue 2: March-April 2025: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

**Table 6** Mean comparison of physical fitness within the experimental group by using one-way ANOVA repeated measurement and Bonferroni post hoc.

| Dependent variables | Test | | Bonferroni | | | M±SD | F | p |
|---|---|---|---|---|---|---|---|---|
| | | | Mean Difference | Std. Error | p | | | |
| Reaction time (sec) | Pre-test | Mid test | 0.03 | 0.002 | .01* | 0.46±0.05 | 488.91 | .05* |
| | | Post-test | 0.07 | 0.003 | .01* | | | |
| | Mid test | Pre-test | -0.03 | 0.002 | .01* | 0.43±0.05 | | |
| | | Post-test | 0.03 | 0.002 | .01* | | | |
| | Post-test | Pre-test | -0.07 | 0.003 | .01* | 0.40±0.05 | | |
| | | Mid test | -0.03 | 0.002 | .01* | | | |
| Y balance test (cm) | Pre-test | Mid test | -2.83 | 0.079 | .01* | 63.99±3.69 | 1859.64 | .05* |
| | | Post-test | -6.53 | 0.149 | .01* | | | |
| | Mid test | Pre-test | 2.83 | 0.079 | .01* | 66.82±3.99 | | |
| | | Post-test | -3.71 | 0.079 | .01* | | | |
| | Post-test | Pre-test | 6.53 | 0.149 | .01* | 70.53±4.31 | | |
| | | Mid test | 3.71 | 0.079 | .01* | | | |
| T-test (sec) | Pre-test | Mid test | .530 | 0.019 | .01* | 8.80±0.49 | 1317.50 | .05* |
| | | Post-test | 1.048 | 0.026 | .01* | | | |
| | Mid test | Pre-test | -0.53 | 0.019 | .01* | 8.27±0.44 | | |
| | | Post-test | 0.51 | 0.014 | .01* | | | |
| | Post-test | Pre-test | -1.04 | 0.026 | .01* | 7.76±0.43 | | |
| | | Mid test | -0.51 | 0.014 | .01* | | | |
| Standing Long Jump test (cm) | Pre-test | Mid test | -10.05 | 0.505 | .01* | 124.00±6.03 | 534.44 | .05* |
| | | Post-test | -20.35 | 0.847 | .01* | | | |
| | Mid test | Pre-test | 10.05 | 0.505 | .01* | 134.05±7.80 | | |
| | | Post-test | -10.30 | 0.436 | .01* | | | |
| | Post-test | Pre-test | 20.35 | 0.847 | .01* | 144.35±9.35 | | |
| | | Mid test | 10.30 | 0.436 | .01* | | | |
| Sit up 30 sec (times) | Pre-test | Mid test | -2.50 | 0.115 | .01* | 20.30±3.01 | 1150.23 | .05* |
| | | Post-test | -5.60 | 0.134 | .01* | | | |
| | Mid test | Pre-test | 2.50 | 0.115 | .01* | 22.80±2.95 | | |
| | | Post-test | -3.10 | 0.100 | .01* | | | |
| | Post-test | Pre-test | 5.60 | 0.134 | .01* | 25.90±3.09 | | |
| | | Mid test | 3.10 | 0.100 | .01* | | | |
| Sit and reach (cm) | Pre-test | Mid test | -3.10 | 0.124 | .01* | 13.75±3.02 | 1294.93 | .05* |
| | | Post-test | -6.75 | 0.143 | .01* | | | |
| | Mid test | Pre-test | 3.10 | 0.124 | .01* | 16.85±3.22 | | |
| | | Post-test | -3.65 | 0.131 | .01* | | | |
| | Post-test | Pre-test | 6.75 | 0.143 | .01* | 20.50±3.20 | | |
| | | Mid test | 3.65 | 0.131 | .01* | | | |

*P<.05

Table 6 shows that all taekwondo skills in the experimental group had a significant difference (*p<.05) between the pre-test & mid-test, pre-test & post-test, and mid-test & post-test.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

## Discussion

In this case, taekwondo skills (front kick, round kick, and push kick) were created with the sand surface training, and the experimental group was better than the control group because the training program was appropriate, such as training factors, exercise drills, training Vollum, training intensity, and recovery times. Periodization and block periodization in sports, when combined with appropriate programming, can produce superior athletic enhancement compared to non-periodized training methods (Stone et al, 2021). The sand surface profits advantage was increased training load more than the normal surface. Training on sand surfaces is effective at improving jump and sprint capacities in team-sport players, with similar gains observed when compared to hard surface training (Pereira et al, 2021; Fernandez-Fernandez et al, 2024; Villarreal et al, 2023)

The performance of Taekwondo skills such as the front kick, round kick, and push kick is closely related to specific physical fitness attributes. Key factors include anthropometric measurements, core strength, muscle strength, flexibility, balance, coordination, and endurance. Training programs that incorporate strength training, dynamic lactic exercises, and high-intensity interval training can significantly enhance these physical fitness components, thereby improving the execution of Taekwondo kicks (He & Wan, 2022; Ojeda-Aravena et al, 2021). Such as taekwondo players' technical fitness improves with speed-power abilities and intermuscular coordination, while flexibility is crucial at the beginning of basic training (Pashkov & Pyrozhenko, 2023). This study found that physical fitness (reaction speed, YBT, T-test, standing long jump, sit up 30 sec, and sit and reach) was increased after training in the experimental group. This was consistent with the training results, this study found that physical fitness (reaction speed, YBT, T-test, standing long jump, sit up 30 sec, and sit and reach) increased after training in the experimental group.

## Conclusion

The study found that sand surface training can considerably improve novice taekwondo practitioners' physical fitness and abilities. The unique challenges given by sand's unstable and resistive nature resulted in gains in numerous fitness components such as strength, power, balance, flexibility, and reaction time. Furthermore, the training resulted in improved execution of taekwondo-specific abilities such as front, round, and push kicks. The good findings in this study significantly encourage the use of sand surface training in taekwondo programs, particularly for rookie students, to enhance their overall growth and performance.

## Recommendation

In this study

1. Investigate Long-Term Effects: Conduct a follow-up study to assess the long-term retention of the improvements observed in taekwondo skills and physical fitness after the sand surface training program.
2. Explore Different Skill Levels: Extend the research to include taekwondo practitioners of varying skill levels to determine if the training effects are consistent across different levels of expertise.
3. Examine Psychological Factors: Incorporate measures of psychological factors to understand how the sand surface training program may influence these aspects in novice taekwondo practitioners.

In Future Study

1. Compare Different Training Surfaces: Conduct a study comparing the effects of sand surface training on other training surfaces to determine the optimal surface for enhancing taekwondo performance.
2. Analyze Biomechanical Changes: Utilize biomechanical analysis to examine the specific kinematic and kinetic changes that occur in taekwondo techniques and physical movements as a result of sand surface training.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

**References**

Ahmadi, M., Nobari, H., Ramirez-Campillo, R., Pérez-Gómez, J., Ribeiro, A., & Martínez-Rodríguez, A. (2021). Effects of Plyometric Jump Training in Sand or Rigid Surface on Jump-Related Biomechanical Variables and Physical Fitness in Female Volleyball Players. *International Journal of Environmental Research and Public Health,* 18. https://doi.org/10.3390/ijerph182413093.

Binnie, M. J., Dawson, B., Pennington, H., Landers, G., & Peeling, P. (2013). Effect of sand versus grass training surfaces during an 8-week pre-season conditioning program in team sport athletes. *Journal of Sports Sciences*, 31(11), 1161–1172.

Binnie, M. J., Dawson, B., Pennington, H., Landers, G., & Peeling, P. (2014). Sand training: A review of current research and practical applications. *Journal of Sports Sciences*, 32(1), 15–18. https://doi.org/10.1080/02640414.2013.805239.

Chin, S.-T., Su, M., Hong, C., Yu, J., Ye, Q., Rahman, M., Aziz, H., Li, K., & Liew, K. (2022). Research on Taekwondo teaching reform in colleges and universities based on nonlinear data prediction and analysis. Mathematical Problems in Engineering, 2022, Article 1464692. https://doi.org/10.1155/2022/1464692

Emery, C. A., & Meeuwisse, W. H. (2001). Proprioception and injury in sport. *Sports Medicine,* 31(10), 789-800.

Fernandez-Fernandez, J., Nakamura, F. Y., Boullosa, D., Santos-Rosa, F. J., Herrero-Molleda, A., Granacher, U., & Sanz-Rivas, D. (2024). The Effects of Neuromuscular Training on Sand Versus Hard Surfaces on Physical Fitness in Young Male Tennis Players. *International Journal of Sports Physiology and Performance*, *19*(1), 71-79. from https://doi.org/10.1123/ijspp.2023-0162

Hammami, M., Bragazzi, N., Hermassi, S., Gaamouri, N., Aouadi, R., Shephard, R., & Chelly, M. (2020). The effect of a sand surface on physical performance responses of junior male handball players to plyometric training. *BMC Sports Science, Medicine and Rehabilitation*, 12 (26). https://doi.org/10.1186/s13102-020-00176-x.

He, B., & Wan, Y. (2022). The Influence of Strength Training on Taekwondo Athletes' Reaction Speed. *Revista Brasileira de Medicina do Esporte.* 28(2), 137-140. https://doi.org/10.1590/1517-869202202802202l_0468.

Herrera-Valenzuela, T., Valdés-Badilla, P., Franchini, E., Santos, J., Ramirez-Campillo, R., García-Hermoso, A., Durán-Aguero, S., & Castaneda-Gomez, J. (2016). Effects of multi-component training on the physical fitness of young taekwondo athletes. Ido Movement for Culture. *Journal of Martial Arts Anthropology*, 16, 31-37. https://doi.org/10.14589/IDO.16.4.5.

Impellizzeri, F. M., Rampinini, E., Castagna, C., Martino, F., Fiorini, S., & Wisløff, U. (2008). Effect of plyometric training on sand versus grass on muscle soreness and jumping and sprinting ability in soccer players. *British Journal of Sports Medicine*, 42(1), 42–46. https://doi.org/10.1136/bjsm.2007.038497.

Lees, A. (2003). Technique analysis in sports: A critical review. *Journal of Sports Sciences*, 21(10), 705-728.

Lejeune, T. M., Willems, P. A., & Vescovi, J. D. (1998). Load and displacement history of the human body during running on sand. *Journal of Experimental Biology,* 201(14), 2071-2080.

Liu, F., & Jia, H. (2023). Influence Of High-Intensity Training on The Taekwondo Athletes' Performance. Revista Brasileira de Medicina do Esporte. https://doi.org/10.1590/1517-8692202329012022_0395.

Marzouki et al (2022). Effects of Surface-Type Plyometric Training on Physical Fitness in Schoolchildren of Both Sexes: A Randomized Controlled Intervention. *Biology,* 11. https://doi.org/10.3390/biology11071035.

Mathunjwa, M., Mugandani, S., Kappo, A., Ivanov, S., & Djarova-Daniels, T. (2016). Effect Of 4 Weeks High-Intensity Intermittent Taekwondo Training on Body Composition and Physical Fitness in Zulu Descent, South African Taekwondo Athletes. *British Journal of Sports Medicine*, 50, e4 - e4. https://doi.org/10.1136/bjsports-2016-096952.22



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

Nabilpour et al (2023). An investigation into the associations between psychological skills, anaerobic fitness, and aerobic fitness in elite Iranian taekwondo athletes. *PLOS ONE*, 18(7), e0288227. Doi: 10.1371/journal.pone.0288227

Nam, S., & Lim, K. (2019). Effects of Taekwondo training on physical fitness factors in Korean elementary students: A systematic review and meta-analysis. Journal of Exercise Nutrition & Biochemistry, 23, 36 - 47. https://doi.org/10.20463/jenb.2019.0006.

Ojeda-Aravena, A., Herrera-Valenzuela, T., Valdés-Badilla, P., Cancino-López, J., Zapata-Bastías, J., & García-García, J. (2021). Effects of 4 Weeks of a Technique-Specific Protocol with High-Intensity Intervals on General and Specific Physical Fitness in Taekwondo Athletes: An Inter-Individual Analysis. *International Journal of Environmental Research and Public Health*, 18(7), 3643. doi: 10.3390/ijerph18073643.

Ouergui, I., Franchini, E., Messaoudi, H., Chtourou, H., Bouassida, A., Bouhlel, E., & Ardigò, L. (2021). Effects of Adding Small Combat Games to Regular Taekwondo Training on Physiological and Performance Outcomes in Male Young Athletes. Frontiers in Physiology, 12, 646666. doi: 10.3389/fphys.2021.646666

Pashkov, I., & Pyrozhenko, O. (2023). The structure of technical fitness of taekwondo athletes at the initial stage of training. *Journal of Physical Education and Sport*, 23(3), 1344-1350.

Pereira, L., Freitas, T., Marín-Cascales, E., Bishop, C., McGuigan, M., & Loturco, I. (2021). Effects of plyometric training performed on sand vs. hard surfaces on physical fitness in team-sport players: A systematic review with meta-analysis. *Journal of Strength and Conditioning Research*, 35(10), 2891-2904.

Pereira, L., Freitas, T., Zabaloy, S., Ferreira, R., Silva, M., Azevedo, P., & Loturco, I. (2023). Sprint and Jump Training on Sand vs. Grass Surfaces: Effects on the Physical Performance of Young Soccer Players. *Journal of Strength and Conditioning Research*, 37, 1828 - 1833. https://doi.org/10.1519/JSC.0000000000004472.

Phomsoupha, M., & Laffaye, G. (2015). Neuromuscular and proprioceptive characteristics of foot placement during landing on a rigid surface after drop jumping from various heights. *Journal of Electromyography and Kinesiology*, 25(3), 473-480.

Rago, V., Rebelo, A., Pizzuto, F., & Barreira, D. (2018). Small-sided soccer games on the sand are more physically demanding but less technically specific compared to games on artificial turf. *The Journal of sports medicine and physical fitness*, 58 4, 385-391. https://doi.org/10.23736/S0022-4707.16.06708-6.

Ratamess, N. A., Alvar, B. A., Evetoch, T. K., Housh, T. J., Kibler, W. B., Kraemer, W. J., & Triplett, N. T. (2009). Progression models in resistance training for healthy adults. *Medicine and Science in Sports and Exercise*, 41(3), 687-708.

Stone, M.H., Hornsby, W.G., Haff, G.G., Fry, A.C., Suarez, D.G., Liu, J., Gonzalez-Rave, J.M., Pierce, K.C. Periodization and Block Periodization in Sports: Emphasis on Strength-Power Training-A Provocative and Challenging Narrative. *J Strength Cond Res.* 35(8), 2351-2371. doi: 10.1519/JSC.0000000000004050.

Villarreal, E., Rascón, P., Ortega-Becerra, M., Calleja-González, J., Alcaraz, P., Feito-Blanco, J., & Ramirez-Campillo, R. (2023). Effects of 8-week sand-based plyometric-jump training combined with endurance running performed on outdoor or treadmill surfaces on physical fitness in young adult males. *International Journal of Environmental Research and Public Health*, 20(13), 1-14.

Wang, B., Shi, Y., Lo, K., & Li, C. (2016). Effect Of Competitive Taekwondo Training on Physical Fitness and Psychological Well-being Among College Students. *Medicine & Science in Sports & Exercise.* https://doi.org/10.1249/01.mss.0000485840.96344.2d.

Wang, X. (2019). Research on the current situation of Taekwondo teaching in junior high schools and Countermeasures for its development. *Sports World (Academic Edition)*, (4), 84-85.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: https://doi.org/10.60027/ijsasr.2025.5646

Yu, D. (2019). Research on the training of Taekwondo in ordinary primary and secondary schools. *Journal of Liaoning Institute of Physical Education*, 21(2), 81-83.

Yu, D. (2019). Research on the training of Taekwondo in ordinary primary and secondary schools. Sports World (Academic Edition), (9), 84-85.

Zeng, J., & Kanchanathaweekul, T. (2023). Selected Physical Fitness Tests for Evaluating Teakwando in Elective Class in University. *International Journal of Sociologies and Anthropologies Science Reviews*, 3(3), 115–122. https://doi.org/10.14456/jsasr.2023.39.

Zhang, W., Liu, Y., & Zhang, W. (2017). The effect of physical training on the special quality of badminton players. *Revista Brasileira de Medicina do Esporte*, 23(6), 1073-1076.



Citation
Xie, X., Tongdecharoen, W., & Tasnaina, N. (2025). The Effects of Sand Surface Floor Training on the Physical Fitness and Skills of Novice Taekwondo Students. International Journal of Sociologies and Anthropologies Science Reviews, 5 (2), 749-760; DOI: **https://doi.org/10.60027/ijsasr.2025.5646**