

EFFECTS OF DIFFERENT TENNIS SHOES ON THE PERFORMANCE OF RECREATIONAL TENNIS PLAYERS

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The purpose of this study was to evaluate the effects of different tennis shoes on the performance of recreational tennis players. Twenty male recreational tennis players participated in the study. Four different tennis shoes were employed and the sequence was randomized for each subject. Three on-court performances (groundstroke, service, and shuttle-run) were chosen and one-way ANOVA with repeated measures ($P < 0.05$) was adopted. The results showed that there was no significant difference in the performances meaning that: (a) different tennis shoes did not have significant effect on the on-court performance of the recreational tennis players; and (b) the recreational tennis players and the shoe manufacturers might overestimate the contribution of the shoe to the on-court performance.

KEY WORDS: groundstroke, service, shuttle-run, tennis, shoe, performance.

INTRODUCTION: Tennis is by far the most popular of all the racquet sports. It was estimated that the playing population in tennis over the world was more than 50 million people of all ages and gender in 2005. Over the last 20 years, the number of players has grown significantly – in the United States, an estimated 2 million people played tennis on a recreational basis each year, and the growing numbers participated in a more competitive way (Bylak & Hutchinson, 1998). The growth of tennis participation could be partially reflected by the increased sales of tennis shoes. Luethi, Frederick, Hawes & Nigg (1986) stated that one of the major factors that influenced the execution of forward, backward and side-to-side movements of tennis were the shoes. It was expected that shoe construction had a significant influence on the kinematics of the foot and the ultimate performance of players would be affected. Therefore, the purpose of this study was to evaluate the effects of different tennis shoes on the performance of the recreational tennis players.

METHOD:

Subjects: Twenty male tennis players participated in the study. Their mean age, weight, and height were 30 ± 12 years old, 70 ± 13 kg and 172.5 ± 7.5 cm, respectively. They were all right-handed intermediate baseliners and ranked from National Tennis Rating Programme (NTRP) 2.5 to 3.5. The mean years in competition and tennis-playing, as well as the mean hours of practice per week of the subjects were 1.3 years, 4.3 years, and 2.75 hrs/week correspondingly. At the time of the study, all subjects were injury free. Prior to their participation, all subjects signed an informed consent form. On the testing day, subjects were asked if they were physically fit to complete the whole test which lasted 70 minutes, and no medication was taken before. All subjects had a shoe size about EUR41, EUR42, or EUR43 and were fitted with the tennis shoes. We examined manually by palpation to ensure that the shoes were fit enough for the subjects.

Tennis Shoe: Four tennis shoes were used for the present study and their information is shown in Figure 1. During the test, the sequence of tennis shoes is randomized for each individual subject.



Reebok (Club Smash II)



Li-Ning A (TM07-1)



Li-Ning B (2TM5357-1)



Nike (Air Max Breath Free II)

Figure 1: Four tennis shoes used for the present study

Procedure:

All subjects were asked to finish the following performance tests, and evaluated one pair of tennis shoes at a time. The protocol was repeated for each pair of tennis shoes.

Groundstroke

All subjects executed 20 groundstrokes at the baseline randomly fed by an instructor. The feeding pattern was a simulation of a match-play situation. Subjects were required to move around at the mid-court and the back-court, so that they could perceive the characteristics of each pair of tennis shoes in a dynamic manner. The groundstroke performance was evaluated by the sum of successful forehand and backhand groundstrokes and presented as groundstroke-in percentage.

Service

All subjects served 10 services at deuce court first, and then 10 services at advantage court accordingly. The service performance was examined separately from each side and successful services were presented as service-in percentage.

Shuttle-run

All subjects performed shuttle-run on the tennis court for 70 meters (Figure 2). All subjects were required to hold a tennis racquet with their right hand, and touch each cone with their left hand. At first, they started at the center cone marked with "0". Then, they used sidesteps to move sideward and touch the first cone marked with "1". After that, they returned to the center cone sideward, and touched it; this pattern was repeated for the rest of the cones. The time required for the shuttle-run performance was recorded by a stopwatch and presented in second with 2 decimal places.

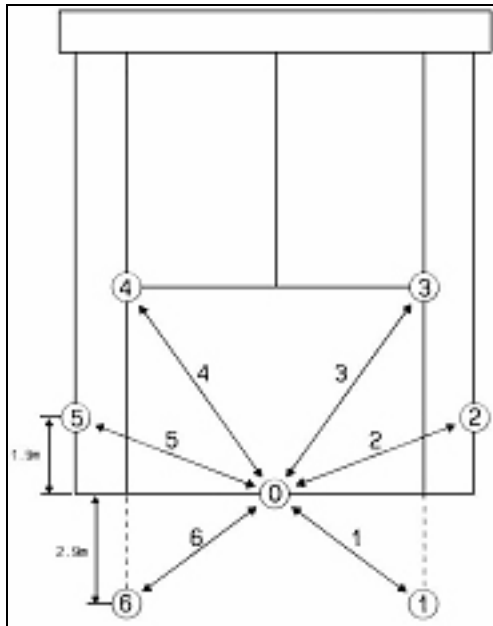


Figure 2: Pattern of the Shuttle-run

Data Analysis: The successful groundstroke percentage, the successful deuce court service percentage, the successful advantage court service percentage, and the time spent on the shuttle-run were analyzed. The software package SPSS 12.0 was employed in the data analysis. The level of significance was set at the alpha level of 0.05. One-way ANOVA with repeated measures was employed to examine the performance discrepancies among the four tennis shoes. In addition, pairwise comparison with Bonferroni adjustment was adopted when there was a demonstrated significant difference in one-way ANOVA (Bland & Altman, 1995).

RESULTS: The mean and standard deviation of the successful groundstroke percentage, the successful deuce court service percentage, the successful advantage court service percentage, and the time spent on the shuttle-run were shown in Table 1. One-way ANOVA revealed that there was no significant difference in the performances among the four tennis shoes ($P > 0.05$).

Table 1 Mean and Standard Deviation of the Performances

	Reebok	Li-Ning A	Li-Ning B	Nike	Sig.
Groundstroke (%)	73.5 ± 12.9	75.5 ± 11.0	76.0 ± 14.1	73.8 ± 15.5	0.737
Deuce court service (%)	52.5 ± 19.4	52.5 ± 21.0	49.5 ± 22.6	55.0 ± 21.2	0.774
Advantage court service (%)	52.0 ± 25.7	58.0 ± 22.6	52.5 ± 21.7	63.0 ± 15.9	0.112
Shuttle-run (s)	29.22 ± 2.78	28.85 ± 2.78	29.17 ± 3.06	28.99 ± 2.89	0.733

DISCUSSION: The results showed that there was no significant difference in the performances (groundstroke, service, and shuttle-run) among the four tennis shoes. However, the recreational tennis players usually emphasized the effect of tennis shoes on their on-court performance. In addition, they also believed that too hard or too soft mid-sole would impair their recovery. This was possible as Luethi & Nigg (1985) demonstrated that for a soft and flexible shoe, tennis players might not be able to stabilize the foot internally, the result could be too much rotational movement in the subtalar joint. Furthermore, Luethi & Nigg (1985) reported that for a hard and stiff shoe, tennis player might encounter greater limits on rotation at the subtalar joint, and the result could be greater forces transmitted to the joints. Therefore, additional efforts of the muscles from lower leg and foot might be required for these shoes.

The results of the present study suggested that: (a) different tennis shoes did not have significant effects on the on-court performance of the recreational tennis players; and (b) recreational tennis players and the shoe manufacturers might overestimate the contribution of the shoe to the on-court performance.

Further researches were suggested: (a) to conduct a comprehensive mechanical test of the tennis shoes to determine their differences in property prior to the on-court performance test; (b) to increase the sample size so that higher generalizability would be achieved; and (c) to study tennis players of other skill levels, like elite, adolescent, and child players.

CONCLUSION: The results of the present study showed that there was no significant difference on the selected on-court performances (groundstroke, service, and shuttle-run) among the four tennis shoes. However, the results of the present study should be interpreted carefully since only 20 subjects were recruited and no mechanical test of the shoes was conducted.

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