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Effects of an 8-week mini tennis coaching intervention on children's groundstroke performance

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ABSTRACT

Evidence suggests that modified versions of tennis (e.g. LTA mini tennis) positively influence children's technical and tactical development. However, Fitzpatrick, Davids and Stone (2017) highlighted that mini tennis may not afford children as many opportunities to develop the backhand, as it does the forehand, potentially leading to a skill imbalance. Here, we investigated effects of an 8-week coaching intervention, designed to alleviate the asymmetry between forehand and backhand performance, on children's match-play and skills test performance (Fitzpatrick, Davids & Stone 2018). After the intervention, the experimental group performed a higher percentage of backhands than the control group during match-play. The experimental group also demonstrated superior improvements in forehand and backhand technical proficiency compared to the control group and in their ability to maintain a rally with a coach. Findings suggested the modifications applied during our intervention may enhance children's skill development and afford more opportunities to develop the backhand.

Key words: Constraints-based coaching, mini tennis; intervention, task constraints, backhand
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INTRODUCTION

Modified versions of tennis, such as mini tennis and tennis play and stay, have been designed to enhance children's skill development and to reduce the speed of the game, such that children's behaviours closely reflect those needed in standard (i.e. adult) tennis (Buszard et al., 2016). Despite considerable evidence to suggest that these modified versions of tennis do indeed facilitate children's technical and tactical development (e.g. Larson & Guggenheimer, 2013; Timmerman et al., 2015), claims that they enable children's performance behaviours to closely resemble those of standard tennis have been largely speculative. Fitzpatrick et al. (2017) investigated this concept within mini tennis (MT); although MT elicited longer rallies and fewer errors than standard tennis, analysis revealed that MT players performed considerably more forehands than backhands during match-play (i.e. 2:1 ratio). In contrast, the ratio of forehands to backhands performed in standard tennis is closer to 1:1 (Reid, Morgan & Whiteside, 2016). Crucially, the asymmetry between groundstrokes observed in MT match-play may be even greater within children's coaching sessions, where Farrow and Reid (2010) reported a ratio of approximately 6:1 in favour of the forehand. It has been highlighted that such asymmetry between forehand and backhand performance may lead to a skill imbalance over time, possibly to the detriment of children's performance development (Fitzpatrick et al., 2017). For example, if MT players are not afforded sufficient opportunity to perform backhands, the stroke may not

adequately develop, potentially allowing weaknesses to emerge; weaknesses that can be exploited by opponents. Here, we implemented an 8-week MT Red coaching intervention, designed to enhance children's skill development, while simultaneously alleviating the asymmetry between forehand and backhand performance.

METHOD

Participants

Sixteen children were randomly assigned to one of two groups; control (n = 8, age 7.2 ± 0.6 years, tennis playing experience 1.9 ± 0.6 years) and experimental (n = 8, age 7.4 ± 0.4 years, tennis playing experience 2.1 ± 0.6 years). All children were right-handed, with two-handed backhands.

Procedure

Pre- and post-testing comprised two elements: match-play and tennis-specific skills testing (TSST).

Pre-test: match-play

Each player was filmed completing three standard MT Red matches of 'first to 10 points' (LTA, 2017), against three randomly assigned opponents.

Pre-test: TSST

Players attempted to maintain three rallies for as long as possible with the coach. The mean rally length of the three attempts produced a 'rally performance score'. Additionally, two LTA Level 3 coaches qualitatively assessed four aspects of players' stroke production for forehands and backhands, respectively: movement to the ball, backswing, ball impact/follow-through, and recovery, using a 7-point scale (Farrow & Reid, 2010). The four scores were summed for players' forehand and backhand, respectively, producing a maximum achievable 'technical proficiency score' of 28 points per stroke.

Intervention

Both groups attended an 8-week MT coaching programme (1-hour per week). Both groups were taught by the same coach and performed the same activities throughout, but the experimental group's learning environment was modified (see Figure 1).

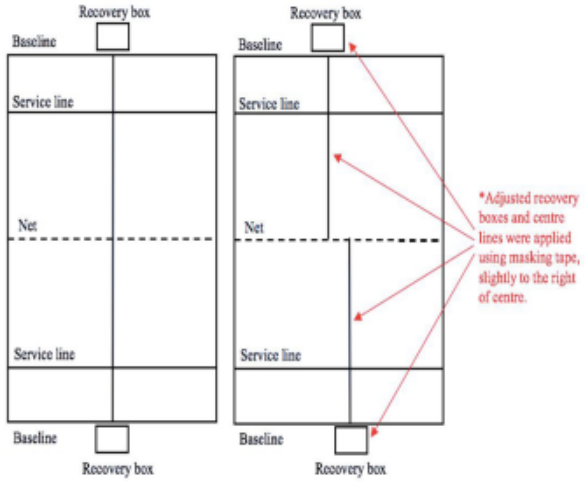

Figure 1. Recovery box and centre line locations for the control (left) and experimental group (right).

Experimental group players were asked to attempt to play a backhand if the ball landed to the left of the adjusted centre line (Hopper, 2011), and to return to the recovery box after each shot (Bryant, 2012). Additionally, during the experimental group's points-based activities, the coach awarded bonus points (i.e. added incentive) if a player put their opponent under pressure using their backhand (Hopper, 2011).

Post-test

Each player was filmed completing three MT Red matches, against the same three opponents as pre-testing, and repeated the TSST.

Data Analysis

Match-play video data were coded using a custom-notational analysis system (inter-rater reliability k = 0.95). The match-play variables in Table 1 were subsequently calculated (for full list see Fitzpatrick et al., 2018); TSST technical proficiency scores and rally performance scores were reduced to mean values.

Dependent variable	Equation
Forehand %	(number of forehands/total shots played after the serve) x 100
Backhand %	(number of backhands/total shots played after the serve) x 100

Table 1. Match-play variables.

Two-way, mixed design analyses of variance (ANOVAs) (practice condition x time) were performed, to investigate intervention effects. No statistical difference was detected between the total number of shots performed by each group during the intervention, so intervention effects were not attributable to differences in frequency of actions practised.

RESULTS

Key findings are presented here (for all reported results, see Fitzpatrick et al., 2018).

Match-play shot type

Figure 2 shows that the percentage of backhands played by the experimental group increased by 17.0% after the intervention; the percentage played by the control group decreased by 1.8%. The percentage of forehands played by the experimental group decreased by 17.3% after the intervention; the percentage played by the control group did not change.

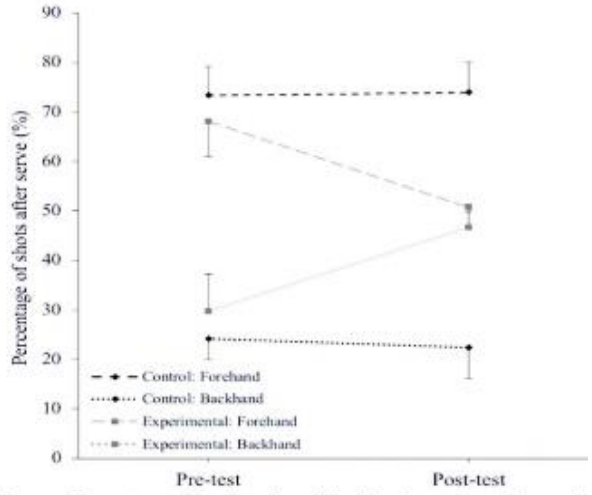

Figure 2. Percentage of forehands and backhands performed by each group.

TSST technical proficiency and rally performance score

Figure 3 shows that the experimental group's forehand and backhand technical proficiency scores improved by 3.3 points and 4.0 points, respectively, after the intervention; the control group's improved less, by 1.5 points (forehand) and 0.8 points (backhand). Additionally, the experimental group's rally performance score increased by 7.6 shots after the intervention (from 16.2 to 23.8 shots); the control group's increased by 2.9 shots (from 14.3 to 17.2 shots).

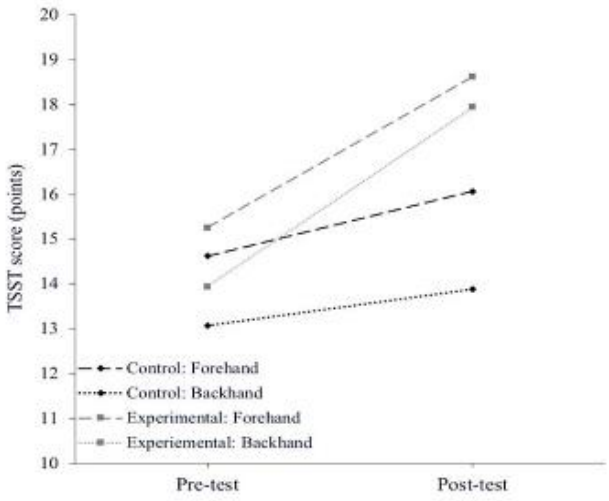

Figure 3. TSST technical proficiency scores.

DISCUSSION

Pre-test match-play data replicated the asymmetry found by Fitzpatrick et al. (2017), with both groups performing a disproportionately high number of forehands compared to backhands. During post-testing, the experimental group demonstrated greater symmetry (46.7% backhands, 50.8% forehands), compared to the control group's continued asymmetry (74.0% forehands, 22.4% backhands). The experimental group's post-test values corresponded closely to the forehand-tobackhand ratios observed in standard tennis (close to 1:1). The ratios observed in standard tennis demonstrate that it is crucial for learners to develop both groundstrokes if they are to successfully transition through the stages of tennis.

The standard MT Red environment affords players sufficient time to move around the ball to perform a forehand, when a backhand may be more appropriate (Fitzpatrick et al., 2017). However, this is an inefficient movement (using more time and energy), unlikely to elicit optimal technique (Hodgkinson, 2015), and detrimental to players' recovery movements (Hughes & Moore, 1998). Positioning the experimental group's recovery box slightly towards the forehand side of the court increased the distance players were required to move, to position themselves to the left of the ball and play a forehand, making this behaviour less likely to emerge. Instead, our modifications encouraged players to adapt and explore different solutions (i.e. playing a backhand), which may facilitate more functional technique.

Accordingly, the experimental group's backhand technical proficiency improved more than the control group's. Interestingly however, the experimental group's forehand technical proficiency also improved more than the control group's, despite hitting fewer forehands during match-play. This suggests that after the intervention, the experimental group elected to play each respective shot only when it was appropriate, and therefore exhibited more functional technique. In contrast, the control group continued to attempt to move around the ball and perform a forehand, when a backhand may have been more appropriate; so, although the control group performed more forehands, the technique elicited was often poor. Notably, the scoring system incorporated movement to the ball and recovery movement, so it is possible that the intervention improved the experimental group's movement around the court as well as their swing technique.

The experimental group's rally performance score (i.e. rallying with a coach) also improved more than the control group's, however both groups demonstrated similar improvements in match-play rally length (i.e. rallying with fellow players) (see Fitzpatrick et al., 2018). Rallying with a coach, who can control the direction and pace of each shot, is easier for children. Accordingly, it appears the intervention enhanced the experimental group's rally ability enough to elicit longer rallies with a coach, but not enough to replicate this during match-play with fellow players.

CONCLUSION

Results suggested that our intervention effectively alleviated the asymmetry found between forehand and backhand performance during children's match-play. Simultaneously, the experimental group demonstrated improved rally ability when rallying with a coach, and enhanced technical proficiency, offering strong support for the modifications applied here. Coaches may wish to implement similar modifications during coaching sessions, to enhance children's skill development and reduce the disparity between the percentages of forehands and backhands typically played.

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