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Review Article

The Impact of Skill Fitness Training on Agility and Speed Development in Competitive Tennis Players

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Abstract:

The game of tennis requires a unique combination of technical, tactical, physiological, and psychological skills. Among these, the physiological attributes of agility and speed have become increasingly critical for competitive success, particularly in modern tennis characterised by rapid baseline rallies and frequent directional changes. Skill fitness training, specifically designed to target sports specific movements, has emerged as an effective intervention for enhancing these physical attribute. This research aimed to assess the impact of skill fitness training on agility and speed development in competitive tennis players. The study involved four competitive tennis players, chosen through purposive sampling, who underwent a structured skill fitness training program over eight weeks. To establish baseline metrics, participants completed pre screening performance assessments, including the tests such as 10 meter sprint, 30meter sprint, T drill, and t Three cone drill. These tests were selected due to their validity and reliability in assessing components of linear speed, velocity and multidirectional agility, fundamental for tennis performance. The hypothesis proposed that structured skill fitness training would significantly improve both agility and speed in competitive tennis players. Throughout the training phase, exercises were carefully selected to replicate tennis specific movements, focusing on multidirectional accelerations, decelerations, change of direction, balance, and coordination. Upon completing the intervention, post test assessment were administered using the same set of tests. Statistical analysis, including paired sample t-tests, was conducted to evaluate differences between pre test and post test results.

The findings of this study clearly demonstrate that skill fitness training has a significant positive impact on both agility and speed development in competitive tennis players. The results from various performance tests including the 10 meter sprint, revealed a statistically significant improvement in acceleration following the intervention, time decreased from 2.50 seconds in the pre-test (SD = 0.07) to 2.46 seconds in the post-test (SD = 0.09). The computed t-value of 8.66 indicates that the improvement was statistically significant.

30 meter sprint, the mean sprint time decreased from 5.95 seconds in the pre test (SD = 0.45) to 5.77 seconds in the post test (SD = 0.09). The computed t value of 11.66 indicates that the improvement was statistically significant. Three cone drill, the mean multidirectional sprint time decreased from 10.95 seconds in the pre test (SD = 0.48) to 10.35 seconds in the post test (SD = 0.33). The computed t value of 12.50 indicates that the improvement was statistically significant and T drill, the mean time decreased from 6.78 seconds in the pre test (SD = 3.93) to 6.37 seconds in the post test (SD = 4.09). The computed t value of 6.37 indicates that the improvement was statistically significant.

These improvements indicate enhanced sprint velocity, acceleration, and directional change ability, all of which are critical for competitive tennis performance. The consistent reduction in sprint times across different test formats confirms that structured, skill based fitness training can effectively enhance key physical attributes necessary for high level tennis play. Ultimately, the findings underscore the critical role of targeted skill fitness training in optimising the athletic profiles of tennis players.

Key Words: skill fitness training; agility; speed; tennis players; performance enhancement; multidirectional movement

Introduction

Tennis is a highly demanding sports that requires athletes to execute rapid, explosive, and multidirectional movements over sustained periods. At competitive levels, physical attributes such as speed and agility often differentiate winners from runners up. Over the past decade, sports

scientists and coaches have increasingly turned their attention to tailored physical preparation methods, with skill fitness training emerging as an effective intervention to optimise sports specific physical capacities.

Skill fitness training encompasses exercise protocols designed to enhance athletic attributes through movements that mimic the demands of specific sports. For tennis this typically involves drills and activities that incorporate accelerations, decelerations, directional changes, explosive starts, and lateral footwork, all critical elements in a match scenario.

The relationship between agility, speed and tennis performance is well established. Agility defined as a rapid whole body movement with change of velocity or direction in response to a stimulus is essential for returning wide shots, approaching the net, and maintaining court coverage. Speed encompassing both accretion and maximum velocity is equally critical, allowing players to reach shots early, maintain offensive positions and execute quick transitions between offence and defence. Despite the recognised importance of agility and speed in tennis, limited research has focused on systematically evaluating the impact of skill fitness training on these specific attributes in tennis players. Much of the literature on tennis conditioning emphasises general strength or endurance, with comparatively fewer studies dedicated to agility and speed enhancement through tennis specific skill training.
This research was conducted to address this gap, focussing on the following research questions:

1. Does a structured skill fitness training program lead to significant improvements in agility among competitive tennis players ?
2. Does the same program produce measurable gains in speed over short distance relevant to tennis performance ?

Hypothesis

The hypothesis posited that structured, tennis specific skill fitness training would significantly improve both agility and speed metrics in competitive tennis players.

Review of literature

The role of agility and speed in tennis

According to Behm and Chaouachi (2011), agility integrates physical qualities such as strength, power, and balance with cognitive processes like anticipation and decision making. Tennis, being a sports of open skill, requires athletes to frequently respond to unpredictable stimuli opponent's shot placement, ball speed, and spin which places a premium on perceptual cognitive agility as well as physical movement agility.

Gabbett et al. (2008) emphasised that agility training should not only target physical mechanics but also incorporate perceptual cues, particularly in sports like tennis where decision making speed is crucial. The integration of sport specific stimuli in agility drills has been found to lead to superior transfer effects to on court performance.

Speed development in tennis

By Kovacs (2009) demonstrated that short bursts of linear acceleration typically between 3 to 6 meters are central to high level tennis. Explosive first steps allow players to reach shots early, giving them tactical advantages. Additionally, recovery speed after shot execution enables players to regain optimal court positions efficiently. Training programs aiming to improve speed in tennis should therefore emphasise short-distance acceleration, focusing on mechanics such as body lean, ground reaction force application and stride frequency optimisation.

Skill fitness training as an intervention

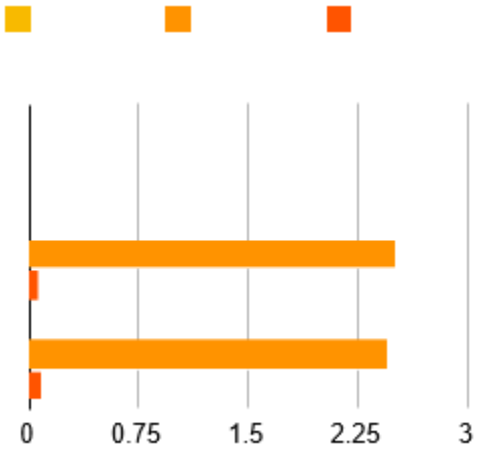
According to Faigenbaum et al. (2009), incorporating sports specific elements into training programs lead to greater motivation and improved compliance, especially in youth and adolescent athletes. More importantly, specificity in training produces superior adaptations aligned with the actual performance environment.

Studies by young et al. (2001) and Brughelli et al. (2008) further confirmed that agility and speed improvements are maximised when training incorporates neuromuscular adaptations alongside technique refinement. Despite these findings, the existing literature on tennis specific agility and speed interventions remain relatively sparse. Most strength and conditioning studies in tennis emphasise general athletic development with relatively few focusing exclusively on agility and speed improvements through tailored skill fitness interventions. The present study contributes to filling this research gap, providing empirical evidence on the outcomes of such an approach.

Methodology

In this experimental design, the study involved four competitive tennis players (N = 4), all actively competing at the state level in Australia. Players were selected using purposive sampling based on availability, training commitment, and competitive level, before training conduct pre-testing of this group and recorded data and started eight week skill fitness training. After training, conducted post test and analysed the data which is shown below:

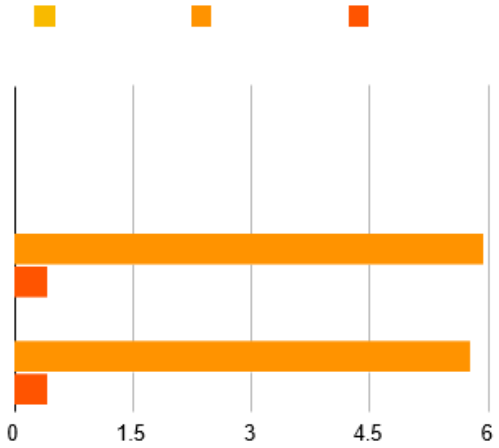
10 meter sprint test



	Mean	S.D.	t-value
Pre test	2.50	0.07	
Post test	2.46	0.09	
			8.66

Findings

The results of the 10 meter sprint test revealed a statistically significant improvement in sprint performance following the intervention. The mean sprint time decreased from 2.50 seconds in the pre-test (SD = 0.07) to 2.46 seconds in the post-test (SD = 0.09). The computed t-value of 8.66 indicates that the improvement was statistically significant and hypothesis accepted. Suggesting that the training program effectively enhanced short-distance sprinting ability among the participants.

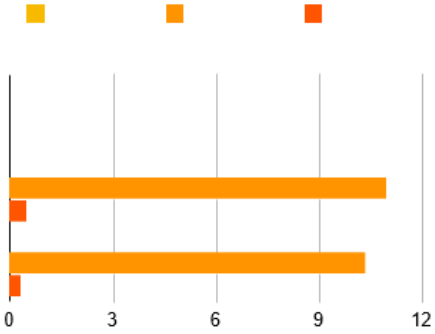


30 meter sprint test

	Mean	S.D.	t-value
Pre test	5.95	0.45	
Post test	5.77	0.45	
			11.66

Findings

The results of the 30 meters sprints test revealed significant improvement in sprint performance following the intervention. The mean sprint time decreased from 5.95 seconds in the pre test (SD = 0.45) to 5.77 seconds in the post test (SD = 0.09). The computed t value of 11.66 indicates that the improvement was statistically significant and hypothesis accepted. Suggesting that the training program effectively enhanced sprint velocity ability in tennis players.



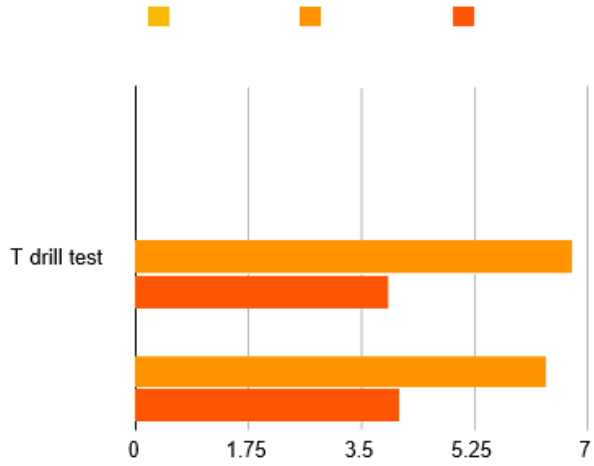
Three cone drill

	Mean	S.D.	t-value
Pre test	10.95	0.48	
Post test	10.35	0.33	
			12.50

Findings

The results of the three cone drill test revealed a statically significant improvement in multidirectional sprint performance following the intervention. The mean multidirectional sprint time decreased from 10.95 seconds in the pre test (SD = 0.48) to 10.35 seconds in the post test (SD = 0.33). The computed t value of 12.50 indicates that the improvement was statistically significant and hypothesis accepted. The training program effectively enhanced multidirectional sprint velocity ability in tennis players.

T drill test



	Mean	S.D.	t-value
Pre test	6.78	3.93	
Post test	6.37	4.09	
			7.58

Findings

The results of the T drill test revealed significant improvement in performance following the intervention. The mean time decreased from 6.78 seconds in the pre test (SD = 3.93) to 6.37 seconds in the post test (SD = 4.09). The computed t value of 7.58 indicates that the improvement was statistically significant and hypothesis accepted. The training program effectively enhanced multidirectional sprint ability in tennis players.

Conclusion

The findings of this study clearly demonstrate that skill fitness training has a significant positive impact on both agility and speed development in competitive tennis players. The results from various performance tests including the 10 meter sprint, 30 meter sprint and the three cone drill consistently showed statistically significant improvements in linear and multidirectional sprint times following the training intervention. So this study hypothesis accepted. These improvements indicate enhanced speed and velocity, acceleration, and directional change ability, all of which are critical for competitive tennis performance. The consistent reduction in sprint times across different test formats confirms that structured, skill based fitness training can effectively enhance key physical attributes necessary for high level tennis play. Therefore, integrating agility and speed focused fitness programs into regular tennis training regimens is strongly recommended for improving on-court movement efficiency and overall performance.

Discussion

The results of this study indicated that skill fitness training positively influences both agility and speed development in competitive tennis players. Improvements, which are very significant across tests highlight the potential for relatively short term interventions to produce meaningful performance gains. This study provides empirical evidence that structured skill fitness training can significantly improve agility and speed in competitive tennis players. The positive results supported the hypothesis that targeted training interventions tailored to the demands of tennis lead to measurable enhancements in athletic performance parameters for tennis coaches, sports scientists, and strength and conditioning professionals. This research reinforces the value of integrating tennis specific agility and speed drills into regular training cycles.

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