



Comparative Analysis of Training Methods for Improving Football Performance

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ABSTRACT

Football is a fast paced and dynamic sport that requires a combination of strength, speed, agility and explosive power. To enhance performance and skill efficiency various scientific training methods are applied such as plyometric training, resistance training and speed, agility and quickness (SAQ) training. The purpose of this study was to find out the effects of different training methods on skill related variables of school level football players. The research was carried out on sixty (N = 60) sub junior school students. Pre-tests were conducted for all subjects on the selected variables. The subjects were divided randomly into three experimental groups of twenty each (n = 20) plyometric training, resistance training and SAQ training. The training programme was performed for sixty minutes per day, five days per week, for a period of twelve weeks. Dribbling and kicking were assessed by the Sir Bobby Charlton Soccer School of Australia Test. After twelve weeks of training post-tests were conducted for all selected variables. The paired (dependent) 't' test was used to find the within group improvement, analysis of covariance and Scheffé's post hoc test was used to compare the three groups. The results indicated that all three groups showed significant improvement in the selected variables SAQ training was most effective for dribbling and resistance training was most effective for kicking. Plyometric, Resistance and SAQ training programmes appear to

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be effective ways of improving the skill performance variables of school level football players. Coaches and physical education teachers as well as others involved in coaching football can make use of this information when planning their training programmes.

Introduction

Football is unarguably the worlds most popular sport. Success in the game depends on teamwork that complements individual skill and players must repeatedly perform techniques such as dribbling, passing and kicking under pressure and fatigue (Stølen *et al.*, 2005 and Reilly *et al.*, 2000). Plyometric training enhances the explosive power needed for sprinting, jumping and kicking by improving the stretch shortening cycle of muscles (Chu & Myer, 2013 and Markovic & Mikulic, 2010) and short plyometric programmes have improved the leg power, jump and sprint performance of soccer players (Chelly *et al.*, 2010 and Meylan & Malatesta, 2009). Resistance training builds muscular strength and endurance which support powerful kicking, stability and ball shielding during duels (Faigenbaum *et al.*, 2009 and Lloyd *et al.*, 2014) and low volume strength programmes have improved performance in young and college soccer players (Brito *et al.*, 2014 and Jullien *et al.*, 2008). SAQ training develops quick footwork, coordination and reaction speed which are vital for changing direction and dribbling with the ball (Brown & Ferrigno, 2014 and Sheppard & Young, 2006). 12-week SAQ programme improved agility with and without the ball in young soccer players (Milanović *et al.*, 2013) and agility is widely assessed as a component of soccer fitness (Sporiš *et al.*, 2010). Integrating these training methods improves both physical fitness and football specific skills and may reduce injury risk, so each method plays a crucial role in developing a well rounded, efficient and competitive football player (Bompa & Buzzichelli, 2018).

Hypotheses

It was hypothesized that plyometric, resistance and SAQ training would significantly improve the dribbling and kicking skills of football players.

Table – 1: Characteristics of the Training Groups (n = 20 each) at Pre-Training (Mean)

Variable	Plyometric Training	Resistance Training	SAQ Training
Age (Years)	14-16	14-16	14-16
Height (CM)	148.30	154.20	152.70
Weight (KG)	50	47	49



Methods

Sixty physically active school level football players aged 14 to 17 years were randomly selected as subjects. They were randomly assigned to three experimental groups of twenty subjects each plyometric training group (PLYTG), resistance training group (RSTG) and SAQ training group (SAQTG). The selected criterion variables were dribbling, measured in seconds and kicking measured in points both were assessed by the Sir Bobby Charlton Soccer School of Australia Test. Pre-tests were taken before and post-tests after the training period. Each group underwent its experimental treatment for twelve weeks, five days per week with one session of 60 minutes per day.

Training Programme

The training programme lasted 60 minutes per day, five days per week for a period of twelve weeks. A session comprised a 10-minute warm-up, 40 minutes of the assigned training method plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) and a 10-minute cool-down. The intensity of the training load was increased by 5% every two weeks, progressing from 65% to 80% of the workload. The volume of training was prescribed according to the number of sets and repetitions. Training days and timings were fixed from Monday to Friday.

Table – 2: Plyometric Training (PLYT) Schedule for Football Players

	1 to 2 Week	3 to 4 Week	5 to 6 Week	7 to 8 Week
Plyometric Training	Jump Squats, Standing Broad Jump, Lateral Jumps (side to side), Skipping with high knees, Core: Plank hold	Box Jumps (medium height), Split Lunge Jumps, Lateral Cone Hops, Tuck Jumps, Medicine Ball Chest Pass	Depth Jumps, Single-Leg Hops, Bounding (10–15 m), Lateral Bound to Vertical Jump, Overhead Medicine Ball Slam – 3×10	Depth Jump + Sprint Combo, Lateral Hurdle Hops, Approach Jumps (simulate heading), Reactive Side Jumps (with partner or cone cue), Medicine Ball Overhead Throw
Repetitions	5 - 6	6 - 7	7 - 8	6 - 7
Sets	4	5	6	5
Rest Between	90 Seconds	90 Seconds	90 Seconds	90 Seconds



Sets				
Rest Between Exercises	45 Seconds	45 Seconds	45 Seconds	45 Seconds
Total	60 Minutes	60 Minutes	60 Minutes	60 Minutes

Table – 3: Resistance Training (RST) Schedule for Football Players

	1 to 2 Week	3 to 4 Week	5 to 6 Week	7 to 8 Week
Resistance Training	Bodyweight Squats, Push-ups, Dumbbell Lunges, Seated Row or Resistance Band Row, Plank Hold	Barbell Back Squat, Bench Press, Romanian Deadlift, Standing Shoulder Press, Core: Russian Twists	Front Squat, Power Clean (or Jump Squat if no barbell), Pull-ups or Lat Pulldown, Dumbbell Step-ups, Medicine Ball Overhead Throw	Deadlift, Push Press, Weighted Jump Squats, Cable or Resistance Band Rotation (for kicking motion), Core Circuit: Plank + Side Plank + Leg Raise
Repetitions	5 - 6	6 - 7	7 - 8	6 - 7
Sets	4	5	6	5
Rest Between Sets	90 Seconds	90 Seconds	90 Seconds	90 Seconds
Rest Between Exercises	45 Seconds	45 Seconds	45 Seconds	45 Seconds
Total	60 Minutes	60 Minutes	60 Minutes	60 Minutes

Table – 4: SAQ Training (SAQT) Schedule for Football Players

Q Training	1 to 2 Week	3 to 4 Week	5 to 6 Week	7 to 8 Week
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	Ladder Drills, Cone Zig-Zag Run, Side Shuffle with Low Stance, Forward – Backward Sprint, Reaction Drill	T-Drill, 5-10-5 Shuttle Run, Lateral Cone Shuffle, Ladder Drill (In-Out + Lateral Step), Reaction Ball Catch or Partner Cue Drill	10 m Sprint Starts, Sprint with Direction Change (45° turns), Ladder Hopscotch Drill, Lateral Acceleration Sprint, Reactive Mirror Drill (with partner)	Sprint & Slide-Tackle Simulation, Lateral Shuffle + Header Jump Combo, Backpedal to Sprint Drill, Reactive Cone Touch Drill, Random Cue Movement Drill
Repetitions	5 - 6	6 - 7	7 - 8	6 - 7
Sets	4	5	6	5
Rest Between Sets	90 Seconds	90 Seconds	90 Seconds	90 Seconds
Rest Between Exercises	45 Seconds	45 Seconds	45 Seconds	45 Seconds
Total	60 Minutes	60 Minutes	60 Minutes	60 Minutes

Statistical analysis

The collected data were analyzed using the paired (dependent) t-test to compare pre-test and post-test scores within each group, analysis of covariance and Scheffé's post hoc test. The level of statistical significance was set at 0.05.

Table – 5: Computation of Paired (Dependent) ‘t’ Ratio on Dribbling of Experimental Groups

Groups	Pre-Test Mean	Pre-Test S.D (±)	Post-Test Mean	Post-Test S.D (±)	‘t’ ratio
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Plyometric Training (PLYT)	27.85	1.13	26.78	1.11	7.87*
Resistance Training (RST)	27.24	1.30	26.94	1.28	7.20*
SAQ Training (SAQT)	27.57	1.03	26.35	1.08	10.28*

* Significant at 0.05 level for the degrees of freedom 19 (table value 2.09)

Table 5 shows that the paired 't' ratios on dribbling of the plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) groups were 7.87, 7.20 and 10.28 respectively. Since these values were higher than the required table value of 2.09 for 19 degrees of freedom they were statistically significant at the 0.05 level of confidence. It was inferred that all three training protocols produced a significant improvement (reduction in time) in the dribbling of football players.

Table – 6: Analysis of Covariance on Pre, Post and Adjusted Post-Test Means on Dribbling of Experimental Groups

Test	Plyometric Training	Resistance Training	SAQ Training	Source of Variance	df	Sum of Square	Mean Square	F - ratio
Pre-Test Mean	27.85	27.24	27.57	Between Sets	2	4.55	2.27	1.68
				Within Sets	57	77.09	1.35	
Post-Test Mean	26.78	26.94	26.35	Between Sets	2	77.16	6.02	4.45*
				Within Sets	57	89.21	1.35	
Adjusted Post-Test Mean	26.77	26.93	26.63	Between Sets	2	2.41	1.20	9.83*
				Within Sets	56	17.63	0.31	

* Significant at 0.05 level for the degrees of freedom (2, 57) and (2, 56), 3.16

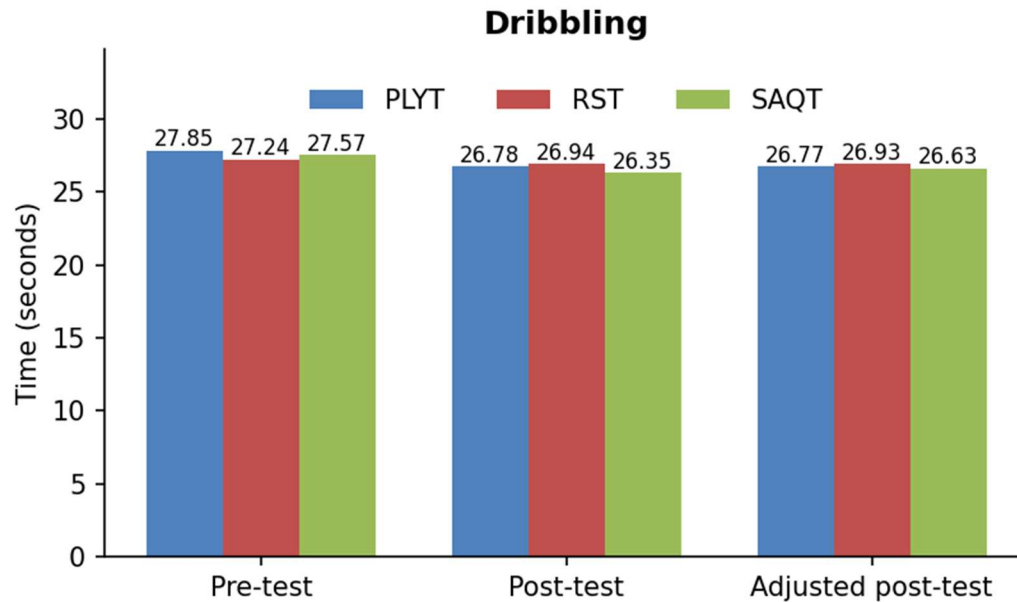
Table 6 reveals the computation of 'F' ratios on pre-test, post-test and adjusted post-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on dribbling. The obtained 'F' ratio for the pre-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on dribbling was 1.68. Since, the 'F' value was less than the required table value of 3.16 for the degrees of freedom 2 and 57 it was found to be not significant at 0.05 level of confidence. Further, the 'F' ratio for post-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on dribbling was 4.45. Since, the 'F' value was higher than the required table value of 3.16 for the degrees of freedom 2 and 57 hence it was found to be statistically significant at 0.05 level of confidence. The obtained 'F' ratio for the adjusted post-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on dribbling was 9.83. Since, the 'F' value was higher than the required table value of 3.16 for the degrees of freedom 2 and 56 it was found to be statistically significant at 0.05 level of confidence. The results revealed that there was a significant difference in post-test means among plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) in dribbling of football players.

Table – 7: Scheffe's Post Hoc Test for the Differences Between the Paired Adjusted Post-Test Means of Dribbling

Plyometric Training	Resistance Training	SAQ Training	Mean Difference	Confidence Interval Value
26.77	26.93	-	0.16*	0.12
26.77	-	26.63	0.14*	
-	26.93	26.63	0.30*	

* Significant at 0.05 level

Table 7 reveals the mean differences between the paired adjusted post-test means of all groups. The mean difference between PLYT and RST, PLYT and SAQT, RST and SAQT were 0.16, 0.14 and 0.30 respectively. The value of mean difference of adjusted post means were higher than the required confidence interval value of 0.12 and it was found to be significant at 0.05 level of confidence. From these results it was inferred that twelve weeks of SAQT produced significant improvement in dribbling of football players than PLYT and RST group.



(Fig – 1) Bar Diagram Showing Pre, Post and Adjusted Post-Test Means of Plyometric Training Group, Resistance Training Group and SAQ Training Group on Dribbling)

Table – 8: Computation of Paired (Dependent) ‘t’ Ratio on Kicking of Experimental Groups

Groups	Pre-Test Mean	Pre-Test S.D (±)	Post-Test Mean	Post-Test S.D (±)	‘t’ ratio
Plyometric Training (PLYT)	21.70	1.34	24.25	1.48	13.61*
Resistance Training (RST)	22.05	1.57	26.65	1.18	16.15*
SAQ Training (SAQT)	21.95	1.57	25.40	1.31	14.69*

* Significant at 0.05 level for the degrees of freedom 19 (table value 2.09)

Table 8 shows that the paired ‘t’ ratios on kicking of the plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) groups were 13.61, 16.15 and 14.69 respectively. Since these values were higher than the required table value of 2.09 for 19 degrees of freedom, they were statistically significant at the 0.05 level of confidence. It was inferred that all three training protocols produced a significant improvement (increase in points) in the kicking of football players.

Table – 9: Analysis of Covariance on Pre, Post and Adjusted Post-Test Means on Kicking of Experimental Groups

Test	Plyometric Training	Resistance Training	SAQ Training	Source of Variance	df	Sum of Square	Mean Square	F - ratio
Pre-Test Mean	21.70	22.05	21.95	Between Sets	2	1.30	0.65	0.28
				Within Sets	57	128.10	2.24	
Post-Test Mean	24.25	26.65	25.40	Between Sets	2	57.63	28.81	16.24*
				Within Sets	57	101.10	1.77	
Adjusted Post-Test Mean	24.38	26.55	25.36	Between Sets	2	46.77	23.38	28.66*
				Within Sets	56	45.69	0.81	

* Significant at 0.05 level for the degrees of freedom (2, 57) and (2, 56), 3.16

Table 9 reveals the computation of ‘F’ ratios on pre-test, post-test and adjusted post-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on kicking. The obtained ‘F’ ratio for the pre-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on kicking was 0.28. Since, the ‘F’ value was less than the required table value of 3.16 for the degrees of freedom 2 and 57, it was found to be not significant at 0.05 level of confidence. Further, the ‘F’ ratio for post-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on kicking was 16.24. Since, the ‘F’ value was higher than the required table value of 3.16 for the degrees of freedom 2 and 57, hence it was found to be statistically significant at 0.05 level of confidence. The obtained ‘F’ ratio for the adjusted post-test means of plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) on kicking was 28.66. Since, the ‘F’ value was higher than the required table value of 3.16 for the degrees of freedom 2 and 56, it was found to be statistically significant at 0.05

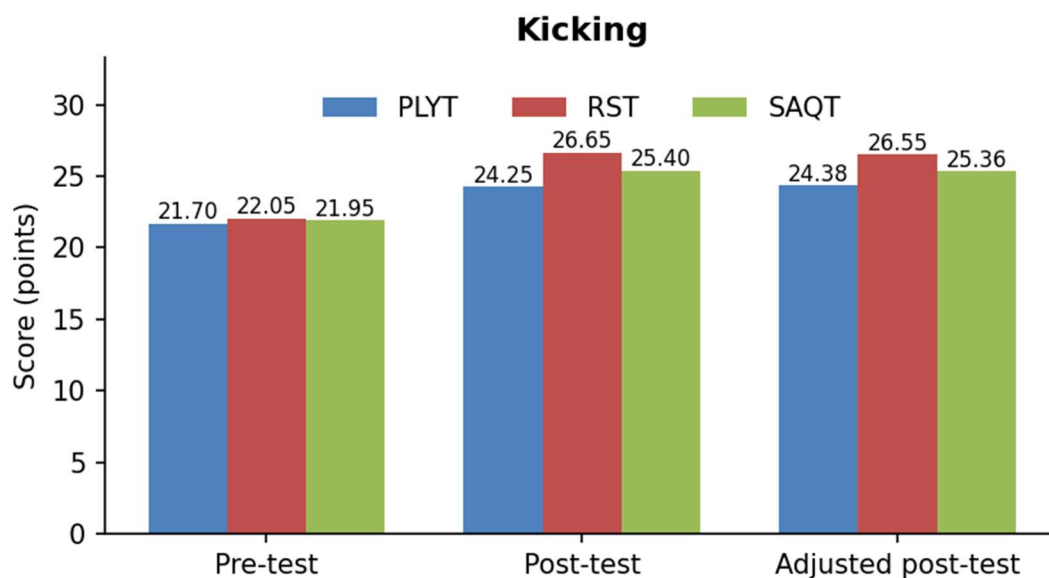
level of confidence. The results revealed that there was a significant difference in post-test means among plyometric training (PLYT), resistance training (RST) and SAQ training (SAQT) in kicking of football players.

Table – 10: Scheffe’s Post Hoc Test for the Differences Between the Paired Adjusted Post-Test Means of Kicking

Plyometric Training	Resistance Training	SAQ Training	Mean Difference	Confidence Interval Value
24.38	-	25.36	0.98*	0.50
24.38	26.55	-	2.17*	
-	26.55	25.36	1.19*	

* Significant at 0.05 level

Table 10 reveals the mean differences between the paired adjusted post-test means of all groups. The mean differences between PLYT and SAQT, PLYT and RST, and SAQT and RST were 0.98, 2.17 and 1.19 respectively. All the mean differences were higher than the required confidence interval value of 0.50 and were therefore significant at the 0.05 level of confidence. From these results it was inferred that twelve weeks of RST produced significantly greater improvement in kicking of football players than PLYT and SAQT.



(Fig – 2) Bar Diagram Showing Pre, Post and Adjusted Post-Test Means of Plyometric Training Group, Resistance Training Group and SAQ Training Group on Kicking)

Discussion on Findings

The present study compared the effects of twelve weeks of plyometric, resistance and SAQ (speed, agility and quickness) training on the dribbling and kicking of school level football players. All three methods produced significant within-group improvements and the groups differed significantly after adjusting for the pre-test scores.

Plyometric exercises, particularly those involving vertical and horizontal jumps and bounds, improve the effectiveness of the stretch shortening cycle (SSC), enabling faster and more forceful muscle contractions that are critical during explosive actions such as kicking (Markovic & Mikulic, 2010). Plyometric training also improves strength performance (Sáez de Villarreal *et al.*, 2010), and inseason programmes have improved the explosive actions of young soccer players (Meylan & Malatesta, 2009 and Chelly *et al.*, 2010). These gains are underpinned by neural and muscular adaptations that increase the rate of force development (Cormie *et al.*, 2011). Complex training that combines resistance and plyometric exercises has likewise improved explosive strength in adolescent athletes (Santos & Janeira, 2008). In the present study the plyometric group improved significantly in dribbling and kicking, but its gains in kicking were smaller than those of the resistance and SAQ groups.

Resistance training improves the strength joint stability and neuromuscular activation of the legs, hips and core which are essential for kicking with power and for controlling the ball under pressure (Newton & Kraemer, 1994 and Kraemer *et al.*, 2002). Biomechanically stronger stabilizing muscles in the trunk and hip enhance postural alignment and energy transfer allowing more forceful and accurate kicks (Baechle & Earle, 2008). The resistance group showed the greatest improvement in kicking which agrees with reports that low-volume strength training improved the performance of college soccer players (Brito *et al.*, 2014) and that strength training improved shooting speed in adolescent football players (Kaya *et al.*, 2025). Compared with plyometric or SAQ training which mainly target reactive and change of direction qualities, resistance training produced larger gains in force production and in kicking performance. Properly supervised youth resistance programmes are also safe and effective (Lloyd *et al.*, 2014).

The SAQ programme emphasized rapid foot movements, change of direction and explosive acceleration all of which are critical when players dribble past opponents or adjust their position to receive and control the ball. Physiologically, SAQ training enhances neuromuscular coordination, reaction time and



motor control (Sheppard & Young, 2006) and agility has been shown to improve after structured training in young and recreational athletes (Miller *et al.*, 2006 and Thomas *et al.*, 2009). Better footwork and balance allow faster body positioning and smoother energy transfer so players keep stability and control of the ball. Unlike plyometric training which mainly develops vertical power or resistance training which builds maximal strength, SAQ training directly enhances dynamic agility and movement precision which are essential for dribbling the ball through a course. This may explain why the SAQ group improved most in dribbling and it agrees with Milanović *et al.* (2013) who found that 12 weeks of SAQ training improved agility with and without the ball in young soccer players. A limitation of the study is that no control group was included. Part of the improvement may therefore reflect maturation, learning effects and regular football practice and future studies should include a control group and report effect sizes.

Conclusion

1. Within the limitations of the study and based on the findings it was evident that twelve weeks of Plyometric, Resistance and SAQ training brought about significant improvements in the selected skill performance variables of football players.
2. SAQ Training (SAQT) demonstrated superior effects in enhancing dribbling ability when compared to Plyometric Training (PLYT) and Resistance Training (RST).
3. Resistance Training (RST) on the other hand, produced the most notable improvements in kicking performance compared to PLYT and SAQT.
4. Overall, the combined influence of Plyometric, Resistance and SAQ training contributed to marked enhancements in speed, power, agility, movement efficiency and sport specific skill execution. These improvements collectively support better on field performance and functional capacity of football players.
5. Therefore, it is concluded that integrating Plyometric, Resistance, and SAQ training into regular training protocols is essential for optimizing physical conditioning, improving sport specific skills and elevating the overall performance level of athletes participating in team sports.

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