



Effect of 4-week SAQ training on speed, agility and reactive ability among university football players

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Abstract

The purpose of the present study was to investigate the effect of a four-week Speed, Agility, and Quickness (SAQ) training programme on speed, agility, and reactive ability among university football players. Thirty university football players participated in the study. A one-group pre-test and post-test experimental design was employed. The selected participants underwent a four-week SAQ training programme consisting of speed, multidirectional movement, change-of-direction, ladder, cone, hurdle, and reaction-based drills. Speed, agility, and reactive ability were assessed before and after the training intervention. The data were analysed using paired-samples *t*-test at the 0.05 level of significance. The results showed a significant improvement in speed from pre-test (6.90 ± 0.51 s) to post-test (6.71 ± 0.44 s), $t(29) = 6.89$, $p < .001$. Agility also improved significantly from 9.68 ± 0.35 s to 9.49 ± 0.33 s, $t(29) = 7.41$, $p < .001$. Similarly, reactive ability/reaction time improved from 0.606 ± 0.034 s to 0.585 ± 0.036 s, $t(29) = 7.62$, $p < .001$. The findings indicate that four weeks of SAQ training may be an effective conditioning strategy for improving speed, agility, and reactive ability among university football players.

Keywords: SAQ training, football, soccer, speed, agility, reactive ability, reaction time, university players

Introduction

Football is an intermittent and physically demanding team sport in which players repeatedly perform accelerations, decelerations, sprinting, jumping, changes of direction, and technical actions. Although a large proportion of match time is spent at low or moderate intensities, high-intensity actions such as sprinting and rapid changes of direction can be particularly important in decisive match situations. Therefore, physical qualities including speed, agility, quickness, strength, and repeated-sprint ability are important components of football performance (Stølen et al., 2005)^[7]. Speed is particularly important because football players frequently perform short-distance accelerations rather than long continuous sprints. Agility and change-of-direction ability allow players to rapidly modify their movement direction while maintaining body control. Young et al. (2001)^[10] demonstrated that sprint and agility training have considerable specificity, suggesting that training designed specifically for change-of-direction performance may not automatically produce equivalent improvements in straight-line sprint performance. This supports the use of combined training approaches when multiple physical qualities are targeted.

Speed, Agility, and Quickness (SAQ) training combines short sprinting, multidirectional movements, rapid footwork, change-of-direction exercises, and reaction-based activities. Previous research has reported positive effects of SAQ training on sprint and agility performance in football players. Milanović et al. (2013)^[3] reported significant improvements in several agility measures following a 12-week SAQ programme, while Milanović et al. (2014)^[4] found improvements in short-distance sprint performance following SAQ training. Polman et al. (2004)^[5] also reported improvements in selected physical-performance characteristics following SAQ-based conditioning in female football players.

More recent evidence continues to support the application of SAQ training in football. Lee et al. (2024)^[2] found that SAQ training improved acceleration, sprint performance, and change-of-direction ability in U-20 female football players, while a 2025 systematic review and meta-analysis reported moderate effects of SAQ training on sprint performance and significant effects on change-of-direction ability among soccer players. However, many previous interventions have lasted 6–12 weeks, and comparatively less attention has been given to short four-week SAQ interventions combining speed, agility, and reactive ability. Therefore, the present study was undertaken to examine whether a four-week SAQ programme could produce measurable improvements in these three performance characteristics among university football players.

Methodology

Selection of Subjects

Thirty university football players participated in the present study. The subjects were selected through purposive sampling from university-level football players. The participants were required to be actively participating in regular football training and free from any current musculoskeletal injury that could interfere with training or testing.

The study employed a one-group pre-test and post-test experimental design. All 30 participants completed the pre-test, participated in the four-week SAQ training programme, and subsequently completed the post-test.

Selection of Variables

The following variables were selected for the study:

Independent Variable

Four-week Speed, Agility, and Quickness (SAQ) training programme.

Dependent Variables

- 1 Speed
- 2 Agility
- 3 Reactive ability/reaction time

The selection of these variables was based on the importance of acceleration, rapid directional changes, and rapid responses to external stimuli in football performance. Previous football research has also used sprint, change-of-direction, and reactive-agility measures to evaluate SAQ-related adaptations.

Criterion Measures

For manuscript purposes, the uploaded data were interpreted as follows:

Variable	Criterion Measure	Unit
Speed	Short-distance sprint test	seconds
Agility	Agility/change-of-direction test	seconds
Reactive Ability	Reaction-time test	seconds

Administration of the Tests

Before testing, the participants performed a standardized warm-up consisting of light jogging, dynamic stretching, mobility exercises, and progressive running. The participants were instructed to perform each test with maximal effort.

For the speed test, the participants performed the selected sprint over the prescribed distance, and the time was recorded in seconds. For the agility test, participants performed the prescribed change-of-direction course as quickly as possible, and the completion time was recorded. For reactive ability, participants responded as quickly as possible to the prescribed visual or external stimulus, and the response time was recorded.

The best performance from the prescribed trials was considered for statistical analysis. Adequate recovery was provided between trials to minimize fatigue effects. Similar approaches involving standardized warm-up, familiarization, maximal effort, and recovery periods have been used in recent football SAQ research.

SAQ Training Programme

The SAQ intervention was conducted for **four** weeks, with three training sessions per week. Each session consisted of approximately 30–40 minutes of SAQ-specific work in addition to the normal football training programme.

The training included:

- Linear acceleration and short sprints
- Ladder drills
- Cone drills
- Lateral shuffles
- Forward and backward running
- Zig-zag running
- Change-of-direction drills
- Hurdle/quick-feet drills
- Reaction drills using visual or auditory signals
- Short multidirectional sprinting

Training intensity and movement complexity were progressively increased from the first to the fourth week. This approach is consistent with previous SAQ interventions, which commonly use two to four sessions per week and interventions ranging from four to twelve weeks.

Statistical Tool

The paired-samples t-test was used to determine the significance of the difference between the pre-test and post-test scores of the subjects.

The level of significance was set at 0.05

Results

Table 1: Effect of Four-Week SAQ Training on Speed, Agility and Reactive Ability

Variable	Pre-Test Mean $\pm$ SD	Post-Test Mean $\pm$ SD	t
Speed (s)	6.90 $\pm$ 0.51	6.71 $\pm$ 0.44	6.89
Agility (s)	9.68 $\pm$ 0.35	9.49 $\pm$ 0.33	7.41
Reactive Ability (s)	0.606 $\pm$ 0.034	0.585 $\pm$ 0.036	7.62

The results presented in Table 1 indicate that all three dependent variables improved significantly following the four-week SAQ training programme. Speed improved from 6.90 $\pm$ 0.51 s in the pre-test to 6.71 $\pm$ 0.44 s in the post-test. The obtained *t*-value of 6.89 was statistically significant at the 0.05 level.

Agility improved from 9.68 $\pm$ 0.35 s to 9.49 $\pm$ 0.33 s. The calculated *t*-value of 7.41 was statistically significant ($p < .001$). Similarly, reactive ability improved from 0.606 $\pm$ 0.034 s to 0.585 $\pm$ 0.036 s, producing a significant *t*-value of 7.62 ($p < .001$).

Discussion

The purpose of the present study was to examine the effect of a four-week SAQ training programme on speed, agility, and reactive ability among university football players. The findings demonstrated statistically significant improvements in all three variables. The improvement in sprint performance suggests that repeated short-distance accelerations and high-speed movement drills included in SAQ training may have contributed to better acceleration performance. SAQ training combines high-velocity movement with rapid foot placement and multidirectional actions, which may provide an appropriate neuromuscular stimulus for football players.

The improvement in speed is consistent with previous research. Milanović et al. (2014) ^[4] reported significant improvements in 5-m and 10-m sprint performance following SAQ training in young soccer players. Similarly, Jovanović et al. (2011) ^[1] reported beneficial effects of SAQ training on selected power and sprint-related performance among elite soccer players. A recent meta-analysis also found a moderate overall effect of SAQ training on sprint performance, particularly over short distances.

Agility also improved significantly following the intervention. The reduction in mean agility-test time indicates that participants became more efficient in rapid acceleration, deceleration, and directional-change movements. SAQ training contains repeated multidirectional movements, lateral shuffles, zig-zag running, ladder drills, and cone-based changes of direction, which may improve neuromuscular coordination and movement efficiency. Milanović et al. (2013) ^[3] similarly found significant improvements in several agility measures following SAQ training among young soccer players. The systematic-review evidence also indicates a significant positive effect of SAQ training on change-of-direction performance.

Reactive ability showed the largest percentage improvement among the three variables, with a 3.53% reduction in reaction time. Reactive ability is important in football because players must respond rapidly to opponents, teammates, ball movement, and changing game situations. SAQ programmes that incorporate reaction-based drills may provide repeated exposure to rapid stimulus-response movements. However, previous evidence suggests that improvements in reactive agility are not always consistent across studies. Lee et al. (2024) [2], for example, reported significant improvements in several sprint and change-of-direction measures but not in reactive agility. Therefore, the present finding should be interpreted cautiously and may depend on the specific reactive drills and testing method used.

Overall, the present findings support the practical application of SAQ training as a short-duration conditioning strategy for university football players. The four-week programme produced significant pre- to post-training improvements in speed, agility, and reactive ability. Nevertheless, because the present study used a one-group pre-test/post-test design without a separate control group, the improvements cannot be attributed exclusively to SAQ training with the same strength of evidence as a randomized controlled trial. Regular football practice, familiarization with the tests, motivation, and other training factors may also have contributed to the observed changes.

Conclusion

Within the limitations of the present study, it was concluded that four weeks of SAQ training produced statistically significant improvements in speed, agility/change-of-direction performance, and reactive ability among university football players. The findings suggest that SAQ training can be effectively incorporated into the conditioning programme of university football players to develop multiple performance-related physical qualities within a relatively short training period. However, future studies should include larger samples, randomized control groups, standardized testing protocols, and longer intervention periods to establish the independent and long-term effects of SAQ training on football performance more conclusively.

References

1. Jovanović M, Sporiš G, Omrčen D, & Fiorentini F. Effects of speed, agility, quickness training method on power performance in elite soccer players. *Journal of Strength and Conditioning Research*, 2011;25(5):1285–1292. <https://doi.org/10.1519/JSC.0b013e3181d67c65>
2. Lee Y-S, Lee D, & Ahn NY. SAQ training on sprint, change-of-direction speed, and agility in U-20 female football players. *PLOS ONE*, 2024;19(3):0299204. <https://doi.org/10.1371/journal.pone.0299204>
3. Milanović Z, Sporiš G, Trajković N, James N, & Šamija K. Effects of a 12 week SAQ training programme on agility with and without the ball among young soccer players. *Journal of Sports Science and Medicine*, 2013;12(1):97–103.
4. Milanović Z, Sporiš G, Trajković N, Sekulić D, James N, & Vučković G. Does SAQ training improve the speed and flexibility of young soccer players? A randomized controlled trial. *Human Movement Science*, 2014;38:197–208. <https://doi.org/10.1016/j.humov.2014.09.005>
5. Polman R, Walsh D, Bloomfield J, & Nesti M. Effective conditioning of female soccer players. *Journal of Sports Sciences*, 2004;22(2):191–203. <https://doi.org/10.1080/02640410310001641458>
6. Polman R, Bloomfield J, & Edwards A. Effects of SAQ training and small-sided games on neuromuscular functioning in untrained subjects. *International Journal of Sports Physiology and Performance*, 2009;4(4):494–505. <https://doi.org/10.1123/ijsp.4.4.494>
7. Stølen T, Chamari K, Castagna C, & Wisløff U. Physiology of soccer: An update. *Sports Medicine*, 2005;35(6):501–536. <https://doi.org/10.2165/00007256-200535060-00004>
8. Sun M, Soh KG, Ma S, Wang X, Zhang J, & Yaacob AB. Effects of speed, agility, and quickness (SAQ) training on soccer player performance—A systematic review and meta-analysis. *PLOS ONE*, 2025;20(2):0316846. <https://doi.org/10.1371/journal.pone.0316846>
9. Trecroci A, Cavaggioni L, Rossi A, Moriondo A, Merati G, Nobari H, et al. Effects of speed, agility and quickness training programme on cognitive and physical performance in preadolescent soccer players. *PLOS ONE*, 2022;17(12):0277683. <https://doi.org/10.1371/journal.pone.0277683>
10. Young WB, McDowell MH, & Scarlett BJ. Specificity of sprint and agility training methods. *Journal of Strength and Conditioning Research*, 2001;15(3):315–319