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Effect of Six Weeks' Isometric Strength Training Compared to Traditional Strength Training on Gains in Strength, Power, and Speed in Male Academy Soccer Players

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ABSTRACT

Purpose: Elevated sport-specific physical demands and congested fixture schedules leave little recovery time and augment fatigue levels in soccer players. Compared to traditional strength training (TST), isometric strength training (IST) may elicit comparative improvements in strength and performance-related parameters in soccer players, while reducing fatigue during periods of elevated competitive loading. **Methods:** This study compared the effects of 6-weeks' IST and TST on gains in strength, power, and speed in male academy soccer players. Eighteen athletes from a Football Association League 2 club's academy (age: 17.2 ± 0.6 years, height: 1.79 ± 0.06 m, body mass: 71.6 ± 3.4 kg) were randomly assigned to either the IST ($n = 9$) or TST ($n = 9$) group. Baseline and post-training testing included trap bar squat one-repetition maximum (1-RM), isometric mid-thigh pull (IMTP), bilateral vertical countermovement jump (CMJ), and 10 m and 40 m linear sprints. Each group completed 12 training intervention sessions over six weeks, which comprised either an isometric or dynamic variation of a mid-thigh (clean) pull, split squat, and hip thrust. **Results:** Results indicated no group × time interaction effect on trap bar squat 1-RM ($p = .171$, $\eta_p^2 = 0.107$), IMTP peak force ($p = .478$, $\eta_p^2 = 0.039$), CMJ jump height (JH; $p = .463$, $\eta_p^2 = 0.028$), CMJ peak power (PP; $p = .868$, $\eta_p^2 = 0.001$), 10 m acceleration ($p = .074$, $\eta_p^2 = 0.186$), or sprint velocity ($p = .348$, $\eta_p^2 = 0.058$). However, there were main effects of time on trap bar squat 1-RM ($p < .001$, $\eta_p^2 = 0.634$), CMJ JH ($p = .031$, $\eta_p^2 = 0.255$) and sprint velocity ($p = .012$, $\eta_p^2 = 0.324$). **Conclusion:** In conclusion, IST is just as effective as TST in improving (or maintaining) strength, power, and speed during fixture-congested schedules in men's academy soccer.

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Countermovement jump; dynamic strength; maximum velocity; peak force

Dynamic strength training, also referred to as traditional strength training (TST), is one of the most utilized resistance training modalities in sport due to a well-established research base that indicates improvements in strength and dynamic sports performance (Suchomel et al., 2018). However, one training modality that is often overlooked, probably due to little understanding of its relevance (Lum & Barbosa, 2019), is isometric strength training (IST). Research has found positive effects of IST interventions, including improved dynamic strength (Behm & Sale, 1993; Fletcher et al., 2008), jump performance (Kubo et al., 2006, 2017), and sport-related dynamic performances, such as running (Fletcher et al., 2008) and soccer-related skills (Bimson et al., 2017). Furthermore, IST has been shown to have positive effects on injury pain management (Fisher et al., 1991; Marks, 1993), and changes in tendon properties (Burgess et al., 2007; Kubo et al., 2009). However, one limitation of IST is that it produces length-specific adaptations, with significant strength gains predominantly at the specific joint angle used in the training (Folland et al., 2005) and less transfer to other muscle lengths (Kitai & Sale, 1989; Weir et al., 1995). In contrast, TST generally results in smaller strength increases but these occur throughout the full range of motion (Graves et al., 1989).

Only a few studies have compared the effects of IST versus TST on changes in strength, power, and speed (Lum et al., 2023; Lum, Barbosa, & Balasekaran, 2021). Lum et al. (Lum 2023), reported that that the inclusion of IST resulted in greater improvements in sprint performance and CMJ height than TST following a 24-week training intervention in floorball athletes. Similarly, including just six weeks' IST in the training of sprint kayakers improved 200 m time trial and strength more than the equivalent period of TST (Lum, Barbosa, & Balasekaran, 2021). Comparing the effects of TST and IST on gains in strength, power and speed in different athlete populations is important, especially considering that IST causes less fatigue than TST (Krüger et al., 2018; Lum & Barbosa, 2019; Lum & Howatson, 2025), a known risk factor for injury incidence in soccer (Ekstrand et al., 2011; Hawkins & Fuller, 1999). This lower fatigue response is probably because isometric contractions require less energy (Beltman et al., 2004; Newham et al., 1995; Ryschon et al., 1997), due to less cross-bridge cycling and ATP hydrolysis (Altenburg et al., 2009; Connelly et al., 1999; Del Valle & Thomas, 2005; Elder et al., 2006; Fukunaga et al., 1997; Howell et al., 1995; Hunter et al., 2005; Huxley, 1965; Tax et al., 1989), compared to concentric contractions.

This lower energy demand and fatigue response of IST may allow for a greater training frequency/intensity to be performed within a limited time frame (Coratella, 2022), thus increasing physical performance more than when TST is incorporated into a training program. This may be particularly relevant when athletes are undergoing regular

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competition and other forms of training. For example, professional soccer teams can compete in 50–80 matches during a 40-week competitive season (Page et al., 2023), which commonly involves congested fixture schedules, whereby athletes may compete in multiple matches within a weekly microcycle (Carling et al., 2016; Julian et al., 2021). This can limit the musculoskeletal system's ability to fully recover following training sessions and matches within a mesocycle (e.g. 4–6 weeks), which can cause cumulative fatigue (Clemente et al., 2021) and increase athletes' susceptibility to injury (Howle et al., 2020). Therefore, IST could be a more effective alternative to TST for maintaining or improving physical performance during the competitive soccer season, although this has yet to be investigated.

The main objective of this study was therefore to compare the effects of a 6-week IST versus TST intervention on gains in strength, power, and speed in male academy soccer players during the competitive season. It was hypothesized that both interventions would lead to improvements in strength, power, and speed, but that greater improvements would be observed in the IST group.

Methods

Experimental approach to the problem

The present study utilized a repeated measures, between groups design. Participants attended a baseline testing session to measure parameters of speed, using 10 m and 40 m sprint tests; power, using countermovement jump (CMJ) tests; and maximal strength, using an isometric mid-thigh pull (IMTP) and a dynamic trap bar squat one-repetition maximum (1-RM). Subsequently, a 6-week resistance training (RT) intervention was completed toward the end of the competitive season, with participants randomly assigned to either the isometric (IST) group or traditional (TST) strength training group. Post-intervention testing was completed 2–4 days after the last RT session following the 6-week intervention period.

Subjects

Eighteen male academy soccer players (age: 17.2 ± 0.6 years, height: 1.79 ± 0.06 m, body mass: 71.6 ± 3.4 kg, BMI: 22.4 ± 1.6 kg/m^2) from a Football Association League Two soccer club academy participated in the study after written informed consent was obtained from participants and from participants' parents/guardians (if participants were <18 years-old). All participants were resistance trained and participated in soccer training full-time. Their weekly training schedule included four days on the pitch (plus one match day) and four days in the gym. Pitch sessions typically lasted 90 min and gym sessions 45 min. Participants were excluded if they were recovering from injury or if they were in ill health (determined using a physical activity readiness questionnaire). The study was approved by the Research Ethics Committee of Liverpool John Moores University (approval number: M23_SPS_3224).

Procedures

Acceleration and maximum velocity

Participants completed three linear 10 m sprints on a 4 G artificial grass surface, with 60 s recovery between each sprint. For each 10 m acceleration, time was measured using timing gates (Brower TCi Timing System, Utah, USA), which were positioned at 0 m and 10 m following measurement using a trundle wheel. Following a 2-min rest period, participants performed three 40 m sprints, with 60 s recovery between each sprint. Sprint times over 30–40 m were measured using the same timing gates which were positioned at 30 m and 40 m. Participants started the 10 m and 40 m acceleration/sprint assessments from a line 1 m behind the first set of timing gates (at 0 m) to prevent the infrared beam from being broken prior to the start of the assessment. Participants wore the same t-shirt, shorts and football boots for both the pre- and post-intervention tests. Maximum velocity was calculated using the following equation:

$$30-40\text{m maximum velocity}\left(\text{m}\cdot\text{s}^{-1}\right)=10(\text{m})/30-40\text{m sprint time}(\text{s}).$$

Countermovement jump

With 60 s recovery between each jump, participants performed three bilateral, vertical CMJs on force platforms (ForceDecks, VALD Performance, Australia), which were placed on a flat concrete surface. For each CMJ, participants started in an upright standing position with their arms akimbo (i.e., without arm swing); they were then instructed to quickly flex their knees to ~ 90° and jump as high as possible in the ensuing concentric phase. Participants were instructed to wear the same footwear during both baseline and post-intervention testing. The ForceDecks were connected to an iPad (Apple Inc., Cupertino, California) and the corresponding software (ForceDecks software, version 1.8.7) calculated jump height (JH). CMJ peak power (PP) was subsequently calculated using the following equation (Sayers et al., 1999):

$$\text{PP(W)}=60.7\times\ \text{JH(cm)}+45.3\times\ \text{body mass(kg)}-2055.$$

Isometric mid-thigh pull

Participants performed three maximal IMTP repetitions whilst standing on force platforms (ForceDecks, VALD Performance, Australia). Each IMTP repetition was sustained for 5 s and was followed by 60 s recovery. Before each IMTP, participants were instructed to "pull as hard as possible" to ensure that maximal force would be achieved as quickly as possible. Knee (135–140°) and hip (135–145°) angles during the IMTP were measured using a goniometer, and these angles were similar to previous studies (Haff et al., 2013) and those during the second pull of a power clean (Dos'santos et al., 2018). To minimize the influence of grip strength (Comfort et al., 2019), participants were strapped to the bar with standard weightlifting wrist straps using an overhand grip, which was consistent across and between testing sessions. The force plates were connected to an iPad (Apple Inc., Cupertino, California) and the corresponding software (ForceDecks software, version 1.8.7) was used to calculate peak force (N).

Trap bar squat 1-RM

After a 5-min rest period following the IMTP, participants performed a trap bar squat 1-RM test, using an Olympic Hex Trap bar (length: 1.83 m; handle height: 11 cm; sleeve length: 41 cm; Perform Better, Southam, UK). Participants completed three specific warm-up sets of the trap bar squat, with 60 s rest between each set: one set of 10 repetitions at 50% of their estimated 1-RM, one set of five repetitions at 65% of their estimated 1-RM, and one set of three repetitions at 80% of their estimated 1-RM (Miller et al., 2022). A 3-min rest period was provided before each 1-RM attempt. The 1-RM was deemed as the greatest load lifted with correct technique, as judged by the lead researcher, who holds an MSc in Strength and Conditioning. Correct technique was considered as lifting the load from the floor to an erect torso position and subsequently lowering the weight in a controlled manner, whilst maintaining a neutral spine throughout (Hales et al., 2009).

Resistance training interventions

The resistance training interventions included either dynamic (traditional) or isometric variations of a mid-thigh pull, split squat, and hip thrust. The TST intervention followed recommendations by Sheppard and Triplett (Sheppard & Triplett, 2016), whereby exercises were performed twice per week, loaded at 85% 1-RM for 3 sets of 6 repetitions, with a 2-min rest period between each set. The IST intervention comprised 3 sets of 6 maximal, 5 s sustained contractions, as recommended by Lum and Barbosa (2019), with a 2-min rest period between each set. For IST contractions, participants were instructed to pull as hard and fast as they could for 5 s. Furthermore, participants performed the isometric hip thrusts against an immovable bar, which was placed across the proximal end of the femur. Participants were seated with their upper backs on a bench (approximately 16 cm off the ground), in accordance with Contreras et al. (2015). Shins were perpendicular to the ground and feet were flat on the floor throughout the exercise. Hips and knees were flexed at 150–160 degrees and 120–130 degrees, respectively. Split squat knee and hip angles were both set at 90 degrees.

Statistical analyses

The statistical analyses were performed using IBM Statistical Package for the Social Sciences version 28 (SPSS; IBM Corp., Armonk, New York). Values were reported as mean ± standard deviation. Values were tested for a Gaussian distribution, via the Shapiro-Wilk test. All non-normally distributed data were $\log_{10}$ transformed. Subsequently, two-way mixed analysis of variance (ANOVA) was performed for all dependent variables. This was to detect main effects of group (IST vs. TST) and time (pre- to post-intervention), and group × time interaction effects, on measures of strength, power, and speed. Significant interactions or main effects were followed up via *post-hoc* statistical tests, with Bonferroni correction applied for pairwise comparisons. Furthermore, partial eta squared (η_p^2) for ANOVA effects were reported as effect size estimates for each corresponding statistical model. The thresholds for η_p^2 are categorized as small ($\eta_p^2 = 0.01$), medium ($\eta_p^2 = 0.06$), and large ($\eta_p^2 = 0.14$) effect sizes (Cohen, 2013). Statistical significance was accepted at $p \leq .05$.

Results

Table 1 shows the mean and associated standard deviation for the parameters of strength, power, and speed during pre- and post-intervention testing for IST and TST.

Strength

Trap bar squat 1-RM

There was no group × time interaction effect on trap bar squat 1-RM ($F_{1.00,\ 16.00} = 2.05$, $p = .171$, $\eta_p^2 = 0.107$). However, there was a main effect of time ($F_{1.00,\ 16.00} = 26.45$, $p < .001$, $\eta_p^2 = 0.634$), with significant increases in trap bar squat 1-RM from pre- to post-intervention for both training groups (Figure 1). Specifically, the IST group improved by 2.88 ± 3.09% ($F_{1.00,\ 16.00} = 6.88$, $p = .018$), whilst the TST group improved by 5.15 ± 3.56%, ($F_{1.00,\ 16.00} = 21.62$, $p < .001$). There was no main effect of group ($p = .841$, $\eta_p^2 = 0.001$).

Isometric mid-thigh pull peak force

As shown in Figure 1, there was no group × time interaction effect on IMTP peak force ($F_{1.00,\ 16.00} = 0.53$, $p = .478$, $\eta_p^2 = 0.039$), and no main effects of time ($F_{1.00,\ 16.00} = 0.43$, $p = .521$, $\eta_p^2 = 0.025$) or group ($p = .401$, $\eta_p^2 = 0.043$).

Table 1. Strength, power, and speed measurement data (mean ± SD).

	Traditional Strength Training Group			Isometric Strength Training Group		
Variable	Baseline	Post-Intervention	% Change	Baseline	Post-Intervention	% Change
Trap Bar Squat 1-RM (kg)	137 ± 16	143 ± 13	5.15 ± 3.56**	139 ± 11	143 ± 10	2.88 ± 3.09*
IMTP Peak Force (N)	2571 ± 303	2508 ± 297	−2.06 ± 8.60	2654 ± 301	2662 ± 345	0.27 ± 5.49
CMJ Jump Height (cm)	33.8 ± 5.1	35.5 ± 4.0	5.97 ± 9.39*	35.5 ± 3.3	36.4 ± 2.2	3.02 ± 6.15
CMJ Peak Power (W)	3919 ± 314	3960 ± 313	1.13 ± 3.49	3824 ± 246	3873 ± 222	1.32 ± 2.01
10 m Acceleration Time	1.70 ± 0.04	1.69 ± 0.05	−1.10 ± 1.73	1.66 ± 0.04	1.67 ± 0.03	0.63 ± 2.10
Maximum Sprint Velocity (m·s^{-1})	8.82 ± 0.24	8.90 ± 0.28	0.91 ± 1.54	8.71 ± 0.33	8.86 ± 0.22	1.87 ± 2.51*

Note. 1-RM, one-repetition maximum; IMTP, isometric mid-thigh pull; CMJ, countermovement jump; *$p < .05$, **$p < .001$.

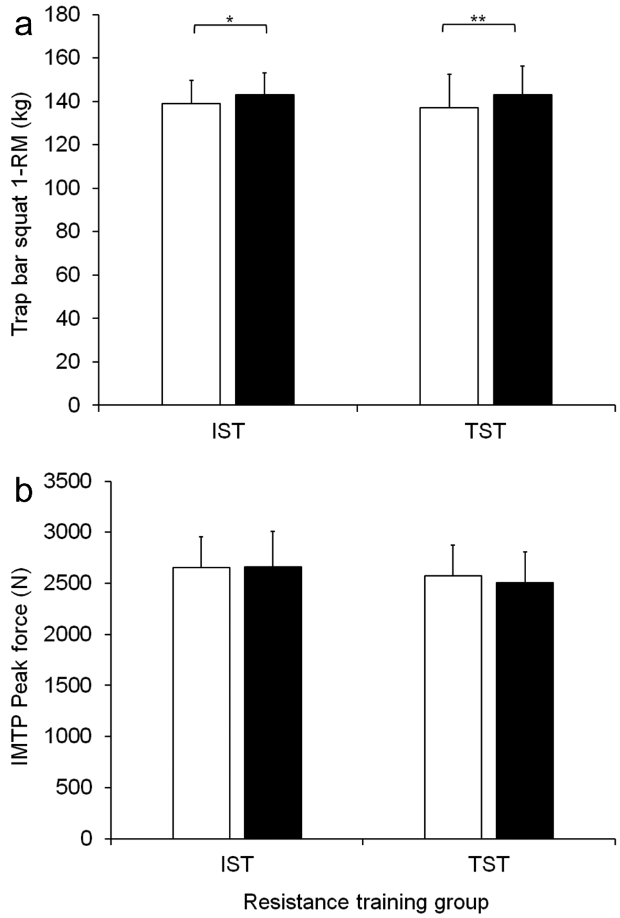

Figure 1. The pre- (white bars) and post-intervention (black bars) strength testing values for the isometric strength training (IST) and traditional strength training (TST) groups during the trap bar squat 1-RM (A) and IMTP (B). *1-RM*, one-repetition maximum; IMTP, isometric mid-thigh pull; *$p < .05$, **$p < .001$ different from pre-intervention.

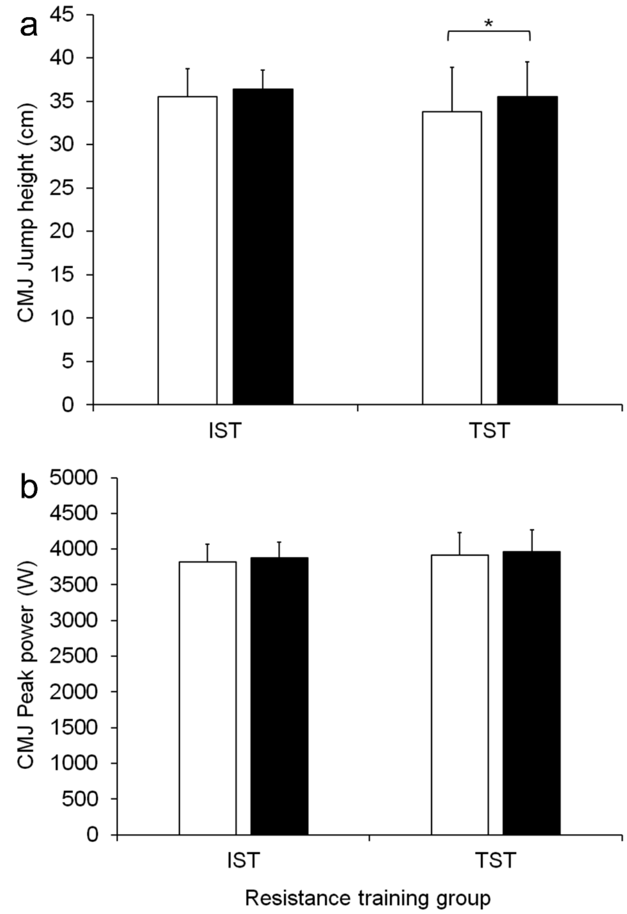

Figure 2. The pre- (white bars) and post-intervention (black bars) power testing values for CMJ jump height (A) and CMJ peak power (B), generated by the isometric (IST) and traditional (TST) strength training groups. *CMJ*, countermovement jump. *$p < .05$.

Power

Countermovement jump height

There was no group × time interaction effect on CMJ JH ($F_{1.00,\ 16.00} = 0.57$, $p = .463$, $\eta_p{}^2 = 0.028$), and no main effect of group ($p = .419$, $\eta_p{}^2 = 0.035$). However, there was a main effect of time ($F_{1.00,\ 16.00} = 5.62$, $p = .031$, $\eta_p{}^2 = 0.255$), and *post-hoc* tests revealed that TST improved by 5.97 ± 9.39% ($F_{1.00,\ 16.00} = 4.87$, $p = .042$), whilst the 3.02 ± 6.15% change in IST was not significant ($F_{1.00,\ 16.00} = 1.31$, $p = .269$; Figure 2).

Countermovement jump peak power

There was no group × time interaction effect on CMJ peak power ($F_{1.00,\ 16.00} = 0.03$, $p = .868$, $\eta_p{}^2 = 0.001$), and no main effects of time ($F_{1.00,\ 16.00} = 3.15$, $p = .095$, $\eta_p{}^2 = 0.166$) or group ($p = .499$, $\eta_p{}^2 = 0.031$) (Figure 2).

Speed

Acceleration time

There was no group × time interaction effect on 10 m acceleration time ($F_{1.00,\ 16.00} = 3.65$, $p = .074$, $\eta_p{}^2 = 0.186$), and there were no main effects of time ($F_{1.00,\ 16.00} = 0.31$, $p = .586$, $\eta_p{}^2 = 0.021$) or group ($p = .128$, $\eta_p{}^2 = 0.140$) (Figure 3).

Maximum sprint velocity

There was no group × time interaction effect on maximum sprint velocity ($F_{1.00,\ 16.00} = 0.94$, $p = .348$, $\eta_p{}^2 = 0.058$), nor was there a main effect of group ($p = .528$, $\eta_p{}^2 = 0.026$). However, there was a main effect of time ($F_{1.00,\ 16.00} = 8.02$, $p = .012$, $\eta_p{}^2 = 0.324$), and *post-hoc* tests revealed that IST improved by 1.87 ± 2.51% ($F_{1.00,\ 16.00} = 7.21$, $p = .016$), whilst the 0.91 ± 1.54% change in TST was not significant ($F_{1.00,\ 16.00} = 1.74$, $p = .206$; Figure 3).

Discussion

The aim of the present study was to investigate the effects of six weeks' IST versus TST interventions on changes in strength, power, and speed in male academy soccer players. The principal findings of this study were the similar increases in trap bar squat 1-RM, CMJ height and maximum sprint velocity, and similar non-changes in IMTP peak force, CMJ peak power and acceleration between interventions. These findings suggest that IST could be an effective alternative training modality to TST to facilitate similar gains in strength, power, and speed parameters in congested periods of men's academy soccer.

Although these findings are in agreement with those of Folland et al. (2005), who found that IST and TST both led to similar gains in dynamic strength, they also contradict other

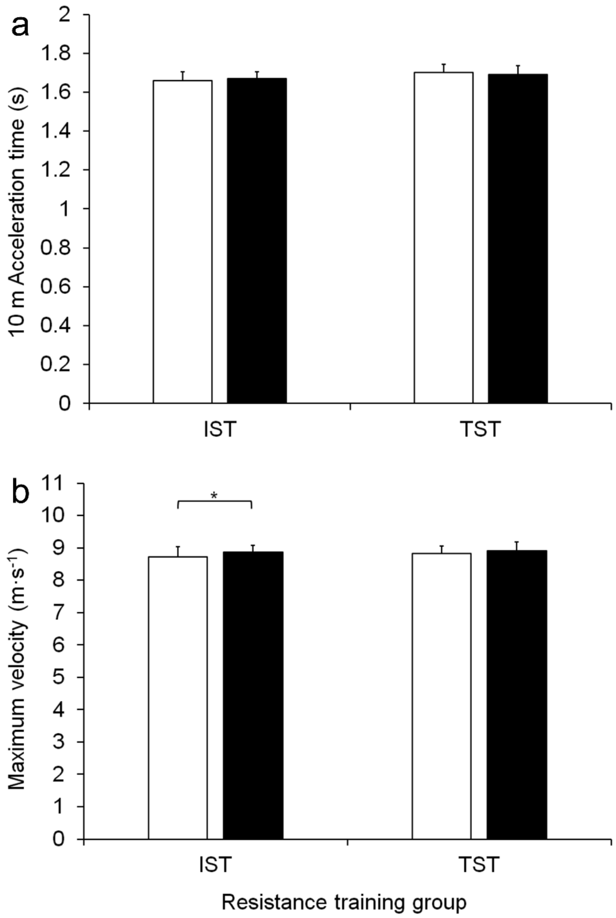

Figure 3. The pre- (white bars) and post-intervention (black bars) speed testing values for the isometric strength training (IST) and traditional strength training (TST) groups during the 10 m (A) and 40 m (B) sprints. *$p < .05$.

findings of Jones and Rutherford (Jones & Rutherford, 1987), which demonstrated that IST produced greater gains in isometric strength compared to TST. Our findings showed no improvements in isometric strength following either intervention. This may be due to angle specific increases that are typically associated with IST (Folland et al., 2005) when comparing the IST training positions with IMTP. Further, Hortobagyi et al. (Hortobagyi et al., 1996) proposed strong evidence for a contractile mode-specific effect when comparing concentric and eccentric training, which may explain the small, non-significant 2.1% decrease in isometric strength following TST. It is worth considering that the six-week training duration in the present study may have been too short to induce significant changes in IMTP force. As a result of a good-to-excellent test-retest reliability of the IMTP strength test (Grgic et al., 2022), and the proposed sensitivity of the testing procedure, it is highly plausible that the reported non-significant increase in maximal isometric force could be a result of the time-course of maximal isometric strength adaptations. A longer IST intervention, like those typically seen within real-world soccer academies, may have elicited significant improvements in maximal isometric strength, like those reported by Lum (Lum et al., 2023) over 24 weeks. In contrast, we found that both IST and TST resulted in significant gains in trap bar 1-RM, suggesting that this strength assessment is more sensitive to change, and that the neuromuscular adaptations to both interventions were sufficient to improve the greater motor control required for this dynamic strength test compared to the IMTP.

Another primary finding of this study was that the six-week IST intervention led to significant gains in dynamic strength and maximum velocity, by 2.9% and 1.9%, respectively. This reflects previous research (Folland et al., 2005; Knapik et al., 1983; Lee et al., 2018), which found that IST interventions led to increases in isokinetic strength. Additionally, Lum et al. (Lum, Barbosa, Joseph, et al., 2021) found that sustained IST resulted in a 1.3% decrease in 30-m sprint time. Maximum velocity is partly determined by the ability to apply greater force during ground contact (Weyand et al., 2000). Moreover, it has been reported that an increase in lower limb strength improves sprinting performance (Seitz et al., 2014). Consequently, the improvement in maximum velocity observed in IST may also be attributed to the improvement in dynamic strength and stiffness through the system following IST (Lum & Barbosa, 2019). The IST intervention also led to no significant difference in the changes in CMJ jump height and peak power, increasing by 3.0% and 1.3%, respectively. This reflects previous findings from McKethan and Mayhew (McKethan & Mayhew, 1974), who found a non-significant 2.2% increase in CMJ jump height following an IST intervention with individuals of similar age and training status to those in the present study. However, Lum et al (Lum et al., 2022), found significant 8.4% and 4.6% increases in CMJ jump height and peak power, respectively, following a six-week IST intervention with untrained individuals. Lum (Lum et al., 2022) attributed these increases to the use of multi-joint exercises and fast, maximal isometric contraction, which would better replicate the neuromuscular demands of dynamic actions such as CMJ. However, the disparity between the present results and those from Lum (Lum et al., 2022) may be due to differences in the study populations or training interventions. Participants within this present study were resistance-trained, whilst participants from the study of Lum et al. (Lum et al., 2022) were all endurance runners (and only one third were resistance trained), meaning for the participants in the latter study likely had a greater capacity for adaptation. Further, key factors of program prescription could be compared between TST and IST interventions. While in the present study, the number of sets, repetitions and position were matched, future work should consider the intensity/external load of the work completed (Coratella, 2022). Isometric contractions that require holding a position against resistance could match external load as recommended by Coratella (Coratella, 2022), while overcoming isometrics involve pushing against an immovable object. These two approaches could elicit distinct performance changes when compared to TST.

It is important to consider the limitations when interpreting the current results. Firstly, although the number of sets, repetitions and position were matched between IST and TST in the present study, total time under tension was not matched, which may have influenced performance outcomes (Coratella, 2022). However, matching these two distinct training modalities is challenging due to the dissimilar levels and duration of loading (Folland et al., 2005). Adaptations to IST are highly dependent on the intensity and rate of force development of each contraction (Lum & Barbosa, 2019; Tillin & Folland, 2014). Therefore, the magnitude of strength gain is dictated by each participant's compliance to perform each repetition with maximal effort. As force production was not measured throughout the IST intervention, it could not be confirmed that all participants had followed the instructions given (although all training sessions were supervised by a qualified S&C coach). Secondly, both interventions were performed concurrently with pitch-based conditioning training, which may have induced an interference effect (Hickson, 1980) and negated some of the adaptations for strength, power, and speed (Wilson et al., 2012). However, research has shown that the interference effect can be reduced with sufficient recovery time between strength and endurance sessions, the order of training, and ingestion of ergogenic aids (Panissa et al., 2022). Consequently, consideration of these factors whilst implementing IST may result in even greater improvements in dynamic performance. One further limitation of this study is that fatigue was not measured. Blood biomarkers, such as muscle-specific proteins (e.g., creatine kinase), aspartate aminotransferase, and lactate dehydrogenase, have been shown to constitute useful markers of muscle damage/fatigue in soccer (Nowakowska et al., 2019). Alternatively, cheaper and noninvasive measures of fatigue, such as a total quality recovery scale (Kenttä et al., 1998), are useful markers for monitoring fatigue and recovery of professional soccer players (Selmi et al., 2022) and, consequently, they could have provided greater insight into fatigue responses following IST and TST.

Practical applications

An IST intervention can only be considered a practical alternative to TST if the adaptations following IST resulted in the maintenance or improvement of strength, power, and speed parameters equal to or greater than those following TST (Lum & Howatson, 2025). In this study, there were no significant differences between the improvements in strength, power, and speed of the IST and TST groups, with the IST intervention leading to significant enhancements in dynamic strength and maximum velocity, and non-significant gains in power parameters. This indicates that IST could be implemented as an alternative S&C training modality during fixture-congested schedules in soccer. This should help minimize the programming difficulties caused during the competitive soccer season (Walker & Hawkins, 2018).

In conclusion, the results from this study suggest that just six weeks' IST could be an effective and alternative training modality to TST during congested fixture schedules in men's academy soccer, as it facilitated similar gains (or maintenance) in strength, power, and speed parameters observed after six weeks' TST.

Disclosure statement

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