



**30-15 Intermittent Fitness Test vs. Yo-Yo Intermittent Recovery Test Level 1: relationship and sensitivity to training**

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**30-15 Intermittent Fitness Test vs. Yo-Yo Intermittent Recovery  
Test Level 1: relationship and sensitivity to training**

**Running Head:** 30-15<sub>IFT</sub> vs. Yo-Yo<sub>IR1</sub>

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**Abstract:**

The aim of the present study was to a) examine the relationship between performance of the Yo-Yo Intermittent Recovery Test Level 1 (Yo-YoIR1) and the 30-15 Intermittent Fitness Test (30-15IFT) ~~performance~~ and b) compare the sensitivity of both tests to ~~an 8-week~~ training ~~intervention in young soccer players~~. Fourteen young soccer Players-players performed both ~~the 30-15IFT and Yo-YoIR1 tests~~ before and after ~~an eight-week~~ training intervention, which included ~~6-six~~ sessions/week: ~~2-two~~ resistance training sessions, ~~two2~~ high-intensity interval training sessions after technical training (~~4-four~~ sets of 3:30 min of generic running and small sided games (4v4) during the first and second ~~4four~~-week periods, respectively, [90-95% maximal HR], interspersed with 3 min at 60-70% maximal HR) and ~~2-two~~ tactical-only training sessions. There was a large ~~but not perfect~~ correlation between 30-15<sub>IFT</sub> and Yo-YoIR1 ( $r = 0.75$ , 90% confidence limits, CL ~~(0.57;0.86)~~). While within-test % changes suggested a greater sensitivity to training for the Yo-YoIR1 (+35%, 90%CL 24;45) compared with the 30-15<sub>IFT</sub> (+7%, 4;10), these changes were similarly rated as 'almost certain' (with chances for greater/similar/lower values after training of 100/0/0 for both tests) and moderate, i.e., standardized difference, ES = +1.2 90%CL (0.9;1.5) for Yo-YoIR1 and ES = +1.1 (0.7;1.5) for 30-15<sub>IFT</sub>. ~~There was also no substantial~~ difference in the change between both tests was clearly trivial (0/100/0, ES = -0.1, 90%CL (-0.1;-0.1)). Both tests might evaluate slightly different physical capacities, but their sensitivity to training is almost certainly similar. These results also highlight the importance of using standardized differences instead of % changes in performance to assess the actual training effect of an intervention.

**Key words:** field tests; high-intensity intermittent running performance; training response; youth soccer.

**Introduction**

Among the various fitness tests used to evaluate players' high-intensity running performance in soccer, the Yo-Yo Intermittent Recovery ~~level-Test Level~~ 1 (Yo-YoIR1) test is probably the most popular.<sup>1</sup> Yo-YoIR1 performance correlates with high-intensity running during games and is sensitive to training.<sup>1</sup>

About a decade ago,<sup>2</sup> the 30-15 Intermittent Fitness Test (30-15<sub>IFT</sub>)<sup>3,4</sup> was developed as an alternative to the Yo-YoIR1. The 30-15<sub>IFT</sub> also evaluates high-intensity intermittent running capacity, but, in contrast to the Yo-YoIR1,<sup>5</sup> the final speed reached at the end of the test ( $V_{IFT}$ ) is well suited for training prescription.<sup>3</sup>

It is however still unknown whether both tests measure similar qualities. It is also unknown whether their sensitivity to detect training effects is comparable. The purpose of the present study was to a) examine the relationship between Yo-YoIR1 and 30-15<sub>IFT</sub> performance and b) compare their sensitivity to an ~~8~~eight-week training intervention in young soccer players.

**Methods**

**Participants.** Fourteen soccer players (~~mean~~ mean ~~SD~~ SD, 15.4 ~~±~~ ± 0.5 yr, 61.8 ~~±~~ ± 5.9 kg, 173.6 ~~±~~ ± 5.6 cm and 12.4 ~~±~~ ± 3.3% body fat) from an U16 Iran premier league team participated. They trained 6 times/ week, 480 min (~~2-two~~ 60-min resistance training sessions, ~~4-four~~ outdoors technical, tactical and conditioning 90-min sessions). They provided informed consent to participate in the study, which was approved by the local research ethics committee.

**Training and testing.** The study was conducted during the pre-season phase. Players were familiarized with both tests before the study. Both tests were performed on artificial turf before and after an ~~8~~eight-week training intervention (interspersed with 72 h ~~and~~ in a randomized order), at 10:00 A.M with similar temperature (31-33 °C). The protocols of the Yo-YoIR1<sup>1</sup> and 30-15<sub>IFT</sub><sup>3</sup> tests have been detailed previously. We also reported the maximal speed reached at the Yo-YoIR1 ( $V_{Yo-YoIR1}$ ) for easier comparison with the 30-15<sub>IFT</sub>. The ~~eight~~ eight-week training protocol included 6 sessions/week: 2 resistance sessions (3 sets of 10 lower-extremities exercises with 10-12 reps at 40-60% 1RM and ~~6six-~~ eight8 reps of 60-75% 1RM during the first and second ~~4four~~-week periods, respectively), ~~2-two~~ high-intensity interval training sessions after technical training (~~4-four~~ sets of 3:30 min of generic running and small sided games (4v4) during the first and second ~~4four~~-week periods, respectively [intensity adjusted for players to reach 90-95% HR], interspersed with ~~3-three~~ min at 60-70% HRmax) and ~~2-two~~ tactical-only sessions. The training period ended with ~~5-five~~ days of reduced volume and intensity.

**Statistical analysis.** Pearson correlation coefficients were used to measure the relationships between 30-15<sub>IFT</sub> and Yo-YoIR1 performance. The magnitude of the correlations ( $r$ , ~~90%~~ confidence limits, CL) ~~was~~ was assessed ~~using~~ according to Hopkins scale.<sup>6</sup> The comparison of the sensitivity of both tests was assessed while comparing the within-test changes in performance using standardized differences or effect size (ES).<sup>6</sup> Probabilities were also calculated to establish

whether the true difference was lower, similar or higher than the smallest worthwhile difference or change (SWC, 0.2 x between-subject SD).<sup>6</sup>

## Results

Pre-training, players presented values of  $1031 \pm 257$  m,  $14.9 \pm 0.4$  km.h<sup>-1</sup> and  $17.4 \pm 1.1$  km.h<sup>-1</sup> for Yo-YoIR1 running distance,  $V_{Yo-YoIR1}$  and  $V_{IFT}$ , respectively.

There were large to very-large correlations between  $V_{IFT}$  and  $V_{Yo-YoIR1}$  (Figure 1).

Post training, there was an almost certain improvement in performance for both tests (with chances for greater/similar/lower values of 100/0/0 for both tests) (Figure 2). ~~There was however no substantial~~ The difference in the change between both tests was clearly trivial (0/100/0).

## Discussion

The correlation coefficients between the two tests ranged from 0.62 to 0.75; ~~with a the~~ shared variance was only ~50%. This suggests that although both tests evaluate high-intensity intermittent running performance, their main determinants might differ slightly. Since  $V_{IFT}$  is faster than  $V_{Yo-YoIR1}$ ,  $V_{IFT}$  ~~might is likely be~~ more related to maximal sprinting speed. ~~Additionally, because of the specific speed increments of the~~ Conversely,  $V_{Yo-YoIR1}$  performance ~~at this later test~~ might be more dependent on aerobic endurance.

The improvement observed in Yo-YoIR1 (+35%, ES: +1.2) was within the 12-54% improvements previously reported.<sup>1</sup> Similarly, the 7% change in  $V_{IFT}$  (ES: +1.1) was consistent with the 5- 10% improvements already reported.<sup>2</sup> A first examination of the percentage changes in both tests would suggest a greater sensitivity of the Yo-YoIR1 compared with the 30-15<sub>IFT</sub> (Figure 2, A), which could be related to the ~~nature of the speed increments~~ protocols of ~~the each~~ test. However, when these changes were considered with respect to the SWC, the improvements in both tests appear similar. The between-subject variability in performance (and hence, the SWC, Figure 2, A) being greater for the Yo-YoIR1, standardized improvements are in fact similar for both tests (Figure 2, B). Similarly, the difference in the changes between the 2 tests falls within the SWC, whatever the unit (% , Figure 2, C or ES, Figure 2, D).

In conclusion, ~~present results show that both tests might evaluate slightly different physical capacities, but their sensitivity to training is similar. the decision to use one test or the other is left to the practitioners, depending on the main physical quality that is meant to be evaluated (i.e., intermittent aerobic power vs. endurance). However, both tests are likely equally effective at assessing training effects. These Present~~ results also highlight the importance of using standardized differences instead of percentage changes to assess the actual training effects of an intervention.

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For Peer Review

## References

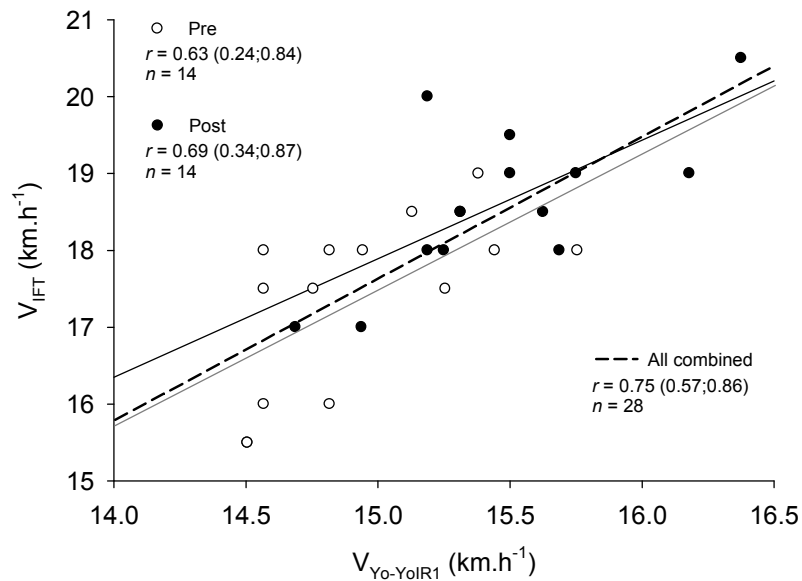
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Figure legends

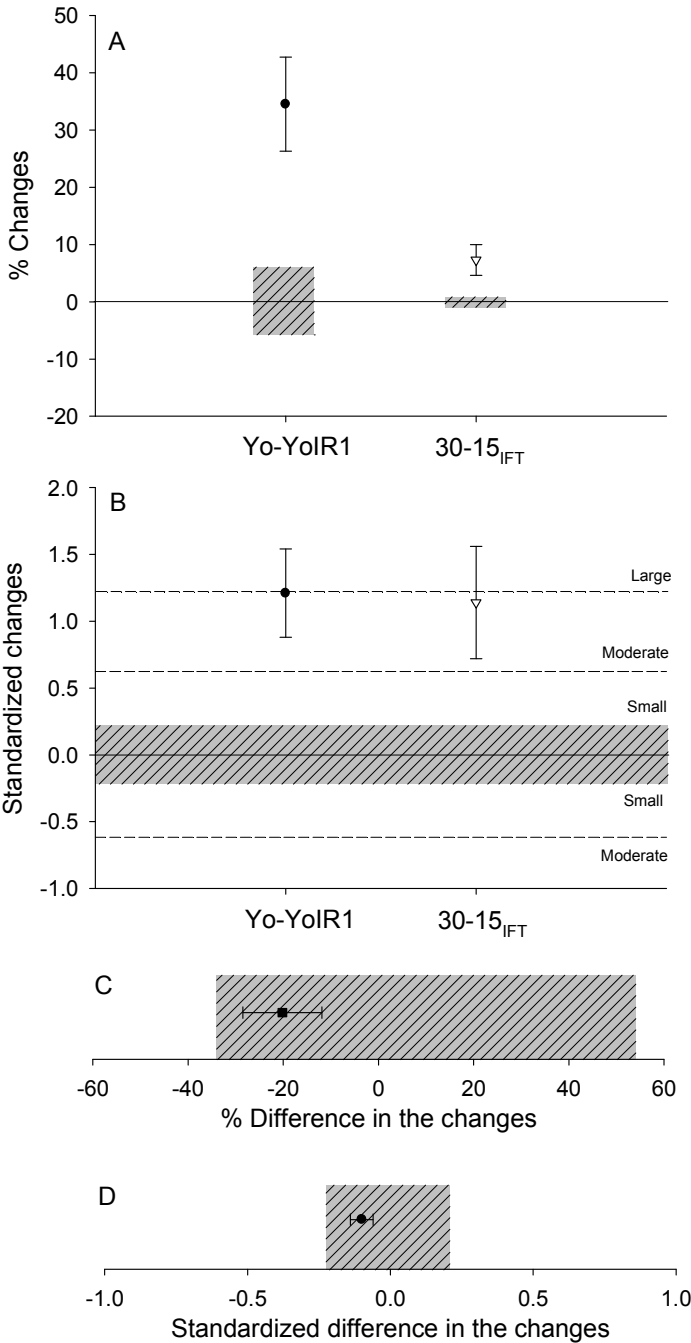
**Figure 1.** Relationship (correlation coefficient,  $r$ , 90% confidence) between the final speeds reached at the end of the Yo-Yo Intermittent ~~recovery~~ Recovery Test Level 1 test ( $V_{Yo-YoIR1}$ ) and the 30-15 Intermittent Fitness ~~tests~~ Test ( $V_{IFT}$ ).

**Figure 2.** Training-induced changes (90% confidence intervals) in performance at of the Yo-Yo Intermittent ~~recovery~~ Recovery test Test Level 1 ( $Yo-YoIR1$ ) and 30-15 Intermittent ~~fitness~~ Fitness ~~test~~ Test ( $30-15_{IFT}$ ) as expressed in percentage (panel A) or as standardized changes (panel B). Differences in the changes (90% confidence intervals) are expressed as % (panel C) or standardized differences (panel D). Shaded areas represent the range of trivial change/difference ~~smallest worthwhile change/difference~~ (see methods).





**Figure 1.** ~~Correlations-Relationship~~ (correlation coefficient,  $r$ , 90% confidence limits) between the final speeds reached at the end of the Yo-Yo Intermittent ~~recovery-Recovery Test Level 1 test~~ ( $V_{Yo-YoIR1}$ ) and ~~the~~ 30-15 Intermittent Fitness ~~tests-Test~~ ( $V_{IFT}$ ).



**Figure 2.** Training-induced changes (90% confidence intervals) in performance at-of the Yo-Yo Intermittent ~~recovery~~ Recovery test Test Level 1 (Yo-YoIR1) and 30-15 Intermittent ~~fitness~~ Fitness test-Test (30-15<sub>IFT</sub>) as expressed in percentage (panel A) or as standardized changes (panel B). Differences in the changes (90% confidence intervals) are expressed as % (panel C) or standardized differences (panel D). Shaded areas represent the range of trivial change/difference smallest worthwhile change/difference (see methods).