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Authors: Brendan R. Scott[1], Jacob A. Hodson[2], Andrew D. Govus[3] and Ben J. Dascombe[4]

Affiliations

[1] School of Psychology and Exercise Science
Murdoch University
Perth, WA 6150

[2] Applied Sports Science and Exercise Testing Laboratory
Faculty of Science and Information Technology
University of Newcastle
Ourimbah, NSW 2258

[3] Faculty of Education and Sport
Department of Sport Science and Physical Activity
University of Bedfordshire
Bedfordshire, UK LU1 3JU

[4] Department of Rehabilitation, Nutrition and Sport
La Trobe University
Bundoora, VIC 3086

Address for Correspondence:
Dr Brendan R Scott
School of Psychology and Exercise Science
Murdoch University
Perth, WA 6150
Ph: +61 8 9360 6575
Fax: +61 8 9360 7579
Email: Brendan.Scott@murdoch.edu.au

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ABSTRACT

This study determined whether a composite assessment of intermittent fitness could be used to quantify performance in several anaerobic tasks. Fifty-two male recreational athletes (age: 24.3 ± 4.4 yr; body mass: 85.1 ± 12.2 kg; height: 180.5 ± 7.0 cm) were recruited from various team sports. Participants completed a battery of field tests to assess sprinting speed (40 m sprint), acceleration ability (10 m sprint), change of direction speed (505 test), anaerobic capacity (300 m shuttle), lower body power (vertical jump) and repeated sprint ability, as well as the 30-15 Intermittent Fitness Test to determine the velocity of intermittent fitness (V_{IFT}). Relationships between anaerobic tests and V_{IFT} were quantified via Pearson product moment correlations, and a two-predictor model multiple linear regression estimated the predictive relationships between the exercise tests and the V_{IFT}. Multiple linear regression showed V_{IFT} significantly predicted 56%, 51%, 44%, 36%, 12% and 1% of the variance in the 300 m shuttle, repeated sprint, 505, 40 m sprint, vertical jump and 10 m sprint tests, respectively. The two-predictor model determined 300 m shuttle and repeated sprint performance accounted for 67% of the variance in V_{IFT}. These findings highlight that various anaerobic characteristics contribute to the intermittent fitness qualities that are quantified through V_{IFT}. More specifically, these data indicate that V_{IFT} is useful for tracking performance in tasks largely determined by anaerobic capacity, but may not be a good predictor of brief all-out sprinting and jumping efforts.

Key Words: team sport; sprinting; anaerobic capacity; change of direction.

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INTRODUCTION

Field-based team sports are characterized by relatively brief periods of high-intensity activity interspersed by lower-intensity recovery periods (23). Performance in such sports is not solely limited by maximal aerobic capacity (VO_{2max}), but also by muscular power, straight line running and change of direction (COD) speeds, and the ability to repeatedly perform brief bouts of supramaximal exercise (5,20). It therefore stands to reason that assessing the physical capacities of team sport athletes should include composite tests that target several related factors concurrently. Nevertheless, current team sport practices typically employ a battery of field tests to assess performance in individual selected physical capacities (20). These include shuttle run tests to determine aerobic fitness characteristics (2,16), jumping assessments to measure muscular power (9), and a range of sprinting and agility tasks to quantify acceleration, speed and COD abilities (11).

While field testing provides valid information relating to performance in the specific capacity being assessed (20), difficulties arise in the logistics of monitoring changes in several physiological capacities across a season. Implementing an extensive testing battery at numerous stages during a training year is often problematic owing to scheduled matches, player fatigue and time requirements. There has been a recent focus on developing composite tests that provide information relating to several physiological capacities for team sport athletes to alleviate these constraints. One such test is the 30-15 Intermittent Fitness Test (30-15_{IFT}), which was developed by Buchheit (5) to provide an overall measure of cardiorespiratory fitness for team sport athletes. The test is characterized by 30 s shuttle running bouts performed at increasing speeds over a distance of 40 m, with running efforts separated by 15 seconds bouts of active recovery. Buchheit (6) suggests that the velocity of

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intermittent fitness (V_{IFT}; velocity of the last stage successfully completed before volitional fatigue) provides an indication of multiple physiological capacities.

To illustrate, early research demonstrated that young basketball and handball players can achieve maximal heart rate during the $30\text{-}15_{IFT}$, and that V_{IFT} was well related to laboratory measures aerobic fitness such as VO_{2max} ($r = 0.68$) (5). The $30\text{-}15_{IFT}$ has also been shown to elicit similar responses in peak oxygen uptake, respiratory exchange ratio, heart rate, and ventilatory thresholds compared with a continuous (rather than shuttle-based) incremental running test in moderately trained soccer, handball and basketball players (7). These data collectively support using V_{IFT} as an indicator of cardiovascular fitness, which is an important contributing factor for team sport performance (23). In addition, strong correlations have also been reported between V_{IFT} and predominantly anaerobic tasks including 10 m sprints ($r = 0.63$) and countermovement jump (CMJ) height ($r = 0.65$) (5), as well as total sprint time in a test of repeated sprint ability ($r = 0.88$) (4). These more anaerobic tasks are often critical when a player is directly involved in play during matches, such as sprinting after an opponent or jumping to compete for possession (23). Furthermore, V_{IFT} is thought to provide information relating to the anaerobic speed reserve (difference between velocity at VO_{2max} and maximal sprint speed), though research has not yet quantified the relationships between the V_{IFT} and maximal sprinting speed. Considering the range of important physiological and performance-based measures that the $30\text{-}15_{IFT}$ is related to, V_{IFT} is potentially an important composite measure for team sport athletes.

However, it must be acknowledged that little evidence is available regarding the relationships with V_{IFT} and some other physiological capacities that are reflected within intermittent fitness such as anaerobic capacity, COD ability and maximal

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sprinting speed. Improved understanding of the relationships between V_{IFT} and field tests of these specific qualities is necessary to determine the usefulness of the $30\text{-}15_{IFT}$ as a single composite measure of various physiological qualities. Therefore, the aim of this study was to determine the appropriateness of V_{IFT} as a composite assessment of anaerobic performance, and to quantify which field tests of anaerobic qualities are best predicted by V_{IFT}.

METHODS

Experimental Approach to the Problem

Subjects completed two experimental sessions that were separated by a minimum of 72 hours to limit the influence of fatigue in the second trial. At the commencement of each testing session, subjects were verbally briefed on the requirements of each test and each subject confirmed that they understood the tasks fully. During the first session, each subject underwent a restricted anthropometric profile (standing height, body mass and Σ7 skinfold measures) by a trained kinanthropometrist. They then completed a standardized dynamic warm-up (Table 1) before completing a 40 m sprint assessment, 505 COD test, and a 300 m shuttle run. During the second testing session, each subject performed the same standardized warm-up before completing a CMJ test (for 31 participants), repeated sprint test and a $30\text{-}15_{IFT}$. All physical performance tests on each day were separated by 10 minutes of passive rest. As is typical in team sport field testing, physical tests were conducted outdoors on a grass field to provide similar conditions to typical training and match-play. Subjects were permitted to wear their normal playing footwear, and were instructed to wear the same footwear during both experimental sessions.

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INSERT TABLE 1 NEAR HERE

Subjects

Fifty-two male recreational team sports athletes (age: 24.3 ± 4.4 yr; body mass: 85.1 ± 12.2 kg; height: 180.5 ± 7.0 cm; Σ7 skinfolds: 76.2 ± 31.9 mm) were recruited from various football codes (soccer [n = 18], Australian rules football [n = 7], rugby league [n = 20] and rugby union [n = 7]). For inclusion in the study, subjects were required to: (i) be currently registered with a team sports club, (ii) have played team sports for a minimum of two competitive seasons, (iii) train at least twice per week during the season, and (iv) currently be free of any injuries or medical conditions that could be worsened by participating. Subjects were instructed to abstain from strenuous activity and caffeine for 24 h before to each experimental session. Prior to the commencement of the study, all subjects were provided with detailed information regarding the aims and requirements of the study, and provided informed consent for their participation. The current study and its procedures were approved by the Institutional Human Research Ethics Committee.

Procedures

Maximal Sprint Speed Assessment

To determine acceleration and maximal sprint speed qualities, subjects completed a 40 m sprint assessment. Performance during sprints was assessed via a wireless electronic timing light system (FusionSport, Grabba International Pty Ltd, Australia), with timing gates placed at 0 m, 10 m, 20 m and 40m. Participants were required to begin in a split stance with their non-dominant foot placed 30 cm behind the start gate (17). Once positioned at the starting line, subjects were instructed to start sprinting

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maximally when they were ready to avoid any influence or reaction times on performance outcomes. Subjects were instructed to sprint for 5 m past the last gate, and any subjects who prematurely decelerated (as judged by members of the research team) were required to complete an additional sprint. All subjects correctly completed two sprints, which were separated by 3 minutes passive recovery. The fastest 40 m sprint time was taken as each subject's best score, and this trial was used for further analysis. The 40 m sprint was broken down to 0-10 m, 0-20 m and 0-40 m sprint distance to determine maximal acceleration and sprinting speed qualities. Furthermore, a flying 20 m sprint was taken between 20 m and 40 m timing gates to examine maximal sprinting speed. For statistical modeling, the 0-10 m and flying 20 m sprint efforts were analyzed to represent acceleration and maximal sprint speed abilities, respectively.

Change of Direction (COD) Test

Each subject performed the 505 COD test to assess COD speed using the same wireless electronic timing light system. Subjects began the test at 10 m from the timing gates (15 m from the turning point) and were instructed to accelerate maximally through the timing gates before performing a 180 degree COD by pivoting with one foot required to touch the turn line, and maximally accelerating back through the gates as quickly as possible (11). All participants correctly completed two trials, which were separated by 3 minutes passive recovery. The time taken for the fastest trial performed on each subject's preferred turning leg was used for further analyses.

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Anaerobic Capacity Assessment

A 300 m shuttle run was performed to provide a practical indicator of anaerobic capacity (18). Subjects were required to perform a total of 15 maximal 20 m shuttle runs which where timed using the wireless timing gate system. To begin the test, subjects assumed a split stance position at 30 cm behind the first timing gate, and were instructed to sprint maximally for 20 m between the two gates with no rest between for 15 repeated efforts. Verbal encouragement was given during the test to ensure maximal effort and fatigue. The total time taken for the 300 m distance was recorded. This test has previously demonstrated high reliability (intraclass correlation coefficient = 0.99; technical error of measurement = 1%) and is significantly related to laboratory-bases assessment of maximally accumulated oxygen deficit (18).

Countermovement Jump Assessment

During the second visit, a sub-sample of 31 subjects completed a CMJ protocol following the standardized warm-up. Subjects were instructed to begin from an erect standing position with hands on hips before performing a downward countermovement to a self-selected depth and immediately jumping for maximal height. This technique has been noted to require minimal intervention, thereby maximizing the potential application in a practical setting where time limitations may exist (9). No shoes were worn during jumps, and a member of the research team visually determined that the points of take-off and landing were similar for all attempts to limit lateral and horizontal displacement. Jumps were performed on a Quattro Jump Portable Force Plate (Kistler Group, Switzerland) connected to a computer running software (Quattro Jump V1.1.1.4) which recorded vertical ground reaction forces at a 500 Hz and stored on a personal computer. Each subject

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performed three CMJ attempts separated by 2 minutes. Mean force for the concentric phase of each jump was calculated and the best jump with regards to mean concentric force for each subject was included in further analysis.

Repeated Sprint Ability Assessment

Each participant performed a repeated sprint test that consisted of six 40 m efforts, which commenced on a 30 s cycle (10). Participants began in a split stance at 30 cm behind the first timing gate and sprinted for 40 m through a second timing gate. Participants were to use the remaining time in the 30 s cycle to return to the gate they had just run through and prepare for another sprint. This continued until six efforts had been completed. Performance in the repeated sprint test was quantified as total sprint time (RST_{Total}), being the summed duration of the six sprinting efforts. In addition, decrements in sprinting performance were calculated as the percentage decrease from the fastest sprint from efforts 1-2 to the fastest from efforts 5-6. This repeated sprint assessment has been previously shown to exhibit acceptable test-retest reliability for quantifying total running time and the decrement in performance across the sprints (10). Following the repeated sprint test, each participant was allowed to rest for a minimum of 15 minutes prior to completing the $30\text{-}15_{IFT}$.

30-15 Intermittent Fitness Test

The $30\text{-}15_{IFT}$ has been previously described in detail (5), and has been shown to be reliable for quantifying intermittent fitness in team sport athletes (21). Briefly, this test consists of 30 s incremental shuttle runs interspersed by 15 s passive recovery periods. Velocity was set at 8 $km \cdot h^{-1}$ for the first shuttle and increased by 0.5 $km \cdot h^{-1}$ for each subsequent stage. Participants ran between two lines that were set 40 m apart

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as dictated by a prerecorded audio signal. At the conclusion of each 30 s stage (indicated by the audio signal) participants were required to walk forward to the next closest starting line (located at 0 m, 20 m and 40 m) within 15 s before beginning the next stage. Players were instructed to complete as many stages as possible until they could no longer maintain the required running speed or when they are unable to reach the 3 m buffer zone surrounding each starting line in time with the audio signal for three consecutive occasions (5). The velocity of the last stage successfully completed by a participant was recorded as their V_{IFT}.

Statistical Analyses

Statistical analyses were conducted using the *stats* package in the R statistics programme (1). First, Pearson product moment correlations were performed to ascertain the correlation between each performance variable and the V_{IFT}. Correlations coefficients (r) were interpreted using the following qualitative descriptors: *trivial* (<0.1), *small* (<0.3), *moderate* (0.3-0.5), *large* (0.5-0.7), *very large* (0.7-0.9), *nearly perfect* (>0.9), *perfect* (1.0) (15). Second, separate linear regression models were fit to establish the relationship between each physiological test (dependent variable) and the V_{IFT} (independent variable). Third, a multiple linear regression was conducted to determine the relationship between the five running-based tests [predictor variables: 10 m sprint speed (s), flying 20 m sprint speed (s), 505 COD speed, 300 m shuttle total time (s), RST_{Total} (s)] and subjects' V_{IFT} (dependent variable) using a backwards stepwise regression approach. The relative importance of each predictor variable was determined using the relaimpo package in the R statistics programme (12). For parsimony, the full (five predictor) model was refit as a reduced (two-predictor) model [300 m shuttle total time (s), RST_{Total} (s)],

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with non-significant predictor variables removed to improve both model fit and interpretability. Model effects for the linear and multiple regression models are presented as unstandardized beta regression coefficients. Statistical significance was set at $p \leq 0.05$.

RESULTS

Table 2 shows descriptive statistics of the performance data from field testing sessions. Figure 1 shows the relationship between each dependent variable and the $V_{IFT.}$ Both 300 m shuttle total time (r = -0.75, 95% CI [-0.85, -0.60]) and RST_{Total} (r = -0.72, 95% CI [-0.82, -0.55]) showed a very large, negative correlation with V_{IFT}. Large, negative correlations with the V_{IFT} existed between 505 COD speed (r = -0.66, 95% CI [-0.79, -0.47]) and flying 20 m sprint (r = -0.60, 95% CI [-0.75, -0.39]). A moderate, negative correlation (r = -0.34, 95% CI [-0.62, 0.01]) existed between CMJ mean force and athletes' V_{IFT}, while 10 m sprint speed exhibited only a trivial, negative correlation (r = -0.10, 95% CI [-0.36, 0.18]) with $V_{IFT.}$ Linear regression analysis indicated V_{IFT} significantly predicted 56%, 51%, 44%, 36%, 12% and 1% of the variance in 300 m shuttle time, RST_{Total}, 505 COD, flying 20 m sprint, CMJ mean force and 10 m sprint, respectively.

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Results of the five-variable model showed 10 m sprint performance ($p < 0.01$), 300 m shuttle performance ($p = 0.03$) and RST_{Total} ($p = 0.01$) had significant partial effects in the full model. The final model included two-predictors that collectively explained

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67% of the variance in subjects' V_{IFT} [$R^2 = 0.67$, $F(5,46) = 18.58$, $p < 0.01$]. Performance in the 300 m shuttle had significant partial effects in the two-predictor model ($p < 0.01$), although RST_{Total} did not ($p = 0.08$). The relationship between these two variables and athletes' V_{IFT} can be represented by the equation: $V_{IFT} = -0.13 \times 300$ m shuttle – $0.2 \times RST_{Total} + 34.80$ where 300 m shuttle and RST_{Total} are expressed in seconds.

DISCUSSION

This investigation demonstrates that the V_{IFT} is related to several tests of anaerobic performance and may therefore be a useful composite measure for tracking intermittent performance in team sport athletes. Specifically, V_{IFT} exhibited very large negative relationships with 300 m shuttle and RST_{Total} tasks, but only trivial negative relationships were observed between performance in 10 m sprint and CMJ assessments with V_{IFT}. These findings indicate that V_{IFT} is useful for tracking performance in tasks largely determined by anaerobic capacity, but may not be a sensitive indicator of performance for brief all-out efforts that are limited by anaerobic power.

Thorough conditioning programs should include a battery of physiological testing, which allows coaching staff to identify specific weaknesses, monitor progress and predict performance for athletes (13). For many sports however, it is often impractical to implement an extensive testing battery at several stages of a competitive season. For this reason, composite tests that provide information related to several physiological capacities are of considerable interest for conditioning coaches. The current study demonstrates that V_{IFT} is very largely related with 300 m shuttle time and RST_{Total}, as 56% and 51% of variance in these tests, respectively, was

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explained from V_{IFT} performance. Moreover, multiple regression analysis determined these two variables collectively accounted for 67% of variance in V_{IFT}. Research has shown that performance during prolonged high-intensity intermittent running (similar to the running patterns performed during team sports) is significantly correlated to anaerobic capacity and repeated sprint ability (22), indicating these are important capacities to train and monitor in team sport athletes. The strong relationship between the V_{IFT} and 300 m shuttle time and RST_{Total} is expected, since team sports are often comprised of repeated high-intensity efforts, interspersed with brief recovery periods (23). The current data therefore support the use of V_{IFT} as a multifactorial measure that may be useful for making inferences regarding an individual's anaerobic capacity and repeated sprint ability for team sports. These results may be a product of inherent similarities in the movement demands of these tests. For example, both the $30\text{-}15_{IFT}$ and the 300 m shuttle run test are comprised of frequent 180° changes of direction. Further, both the $30\text{-}15_{IFT}$ and the repeated sprint test are intermittent with brief rest periods between running bouts. Nevertheless, 44% and 49% of the variance in 300 m shuttle time and RST_{Total} were not explained by V_{IFT}, thus other factors may also contribute to performance in the $30\text{-}15_{IFT}$.

The 505 COD test explained 44% of the variance in the V_{IFT}. While COD ability is generally evaluated using brief tests (such as the 505 COD task) (3), its assessment during high-intensity intermittent exercise may be more useful to practitioners working with team sport athletes (14). Indeed, the 505 task assesses a single maximal COD, whereas the $30\text{-}15_{IFT}$ includes many CODs and is therefore more reprehensive of team sport matches. Research has demonstrated that performing the $30\text{-}15_{IFT}$ without any COD (linear test) results in higher V_{IFT} scores than the traditional test (14). This may be explained by the energetic demands associated with

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the deceleration, turn and acceleration phases of each COD (19), which could result in earlier cessation of exercise during the traditional compared to the linear 30-15$_{IFT}$ test. Furthermore, evidence suggests that team sport athletes with greater weekly training/competitive volumes demonstrate a lower deterioration in running economy during shuttle runs (8), suggesting that COD performance is a trainable quality (24) and that may be assessed through shuttle running tasks. These findings in conjunction with the current data suggest that V_{IFT} can provide information relating to the COD ability of team sport athletes.

Past research has not yet assessed the relationship between V_{IFT} and maximal sprinting speed. Theoretically, a faster athlete may perform better than their slower peers during the 30-15$_{IFT}$ because each individual shuttle will be performed at a lower relative running speed. Buchheit (6) explained this concept by highlighting that in individuals with equivalent VO_{2max}, those with a faster maximal sprint speed have a greater anaerobic speed reserve and therefore can reach a higher V_{IFT} at the same relative running speed. In support of this, the flying 20 m sprint test was largely correlated with V_{IFT}, explaining 36% of variance in V_{IFT}. In agreement with Buchheit (6), the relationship between V_{IFT} and flying 20 m sprint times in the current study suggests anaerobic speed reserve potentially influences V_{IFT}. Nevertheless, since the current investigation did not assess participants for velocity at VO_{2max}, determination of anaerobic speed reserve was not possible. Future studies should investigate the relationship of anaerobic speed reserve with anaerobic capacity measures and V_{IFT}. In addition, while our data show maximal sprinting speed is an important contributor to performance in the 30-15$_{IFT}$, 64% of the variance in V_{IFT} is not explained by flying 20 m sprint performance. As such, other factors must also determine performance in the 30-15$_{IFT}$. Given that V_{IFT} will be reached at a speed that is substantially below

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maximal sprint speed, it is unlikely that this quality can be accurately assessed through the $30\text{-}15_{IFT}$ alone.

Interestingly, CMJ and 10 m sprint tasks were poorly related to the V_{IFT}. Specifically, CMJ mean force and 10 m sprint time accounted for only 12% and 1% of variation in V_{IFT}, respectively. These findings oppose those of Buchheit (5), who reported large correlations between V_{IFT} scores, CMJ height (r = 0.65) and 10 m sprint time (r = 0.63). To some extent, the different CMJ methodology employed by Buchheit (5) and the current study may explain these disparate findings. While the current study employed a gold standard force plate that directly quantified the selected jump variable (mean concentric force) during trials, Buchheit (5) used a jump mat that calculated jump height from flight time. Mean force during single CMJ efforts has been shown to be the only jumping variable exhibiting good reliability in conjunction with a typical error smaller than its smallest worthwhile change (9), likely because it is measured directly rather than inferred by mathematical calculation. However, it is difficult at this point to reconcile the disparate findings between the two studies regarding 10 m sprint time. It is worth noting that Buchheit (5) recruited male and female youth athletes whereas the current study investigated adult male athletes. To this end, the differences between Buchheit (5) and the present study may be related to the difference in physical development between participants. Accordingly, it is possible that the relationship between sprinting abilities and other important determinants of V_{IFT} may differ between youth and adult participants, although further research is required to investigate this.

While the use of a single composite test to monitor performance across a range of physiological capacities is appealing, there are some important limitations with this strategy. Firstly, if an athlete scores better in the $30\text{-}15_{IFT}$ following a training period,

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it is not possible to determine which individual capacities have been improved, only that their intermittent fitness has increased. This is particularly relevant when considering that V_{IFT} has also been found to correlate largely with laboratory-based measures of VO_{2max} (5), and ventilatory thresholds are well correlated between the 30-15_{IFT} and a continuous incremental running test (7). Therefore, V_{IFT} has aerobic and anaerobic determinants that are difficult to separate without undertaking further testing. In addition, substantial inter-individual differences exist in physical qualities such as COD ability (14). To illustrate, participants with mechanical proficiency in COD tasks may have greater movement economy in the COD component of the 30-15_{IFT}, and will therefore not deplete energy stores to the same degree as less proficient individuals (8). Despite the large relationship between 505 COD time and V_{IFT} in the present study, it is likely that specific tests are required to comprehensively assess COD ability. While the current data suggest that V_{IFT} is related to performance in several specific aspects of intermittent fitness, practitioners should be mindful of the potential limitations associated with composite performance measures.

PRACTICAL APPLICATIONS

The 30-15_{IFT} is a field-based test that can be easily implemented for large groups of athletes. Its composition lends itself to monitoring athletes who engage in intermittent activities, such as team sport athletes. Proponents of the 30-15_{IFT} suggest that it can indicate potential across a range of intermittent fitness characteristics. The current data provide some support to this notion, with V_{IFT} being very largely related to field-based measures of anaerobic capacity (300 m shuttle run test) and repeated sprint ability (RST_{Total}). Furthermore, performance in the 505 COD test and maximal sprinting speed (flying 20 m sprint) were both largely correlated with V_{IFT}, although it

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is likely that specific tests are required to comprehensively assess individual differences in these abilities. For the coach with limited testing opportunities, such as during a tightly scheduled competition phase, the 30-15$_{IFT}$ appears to be a viable option to monitor intermittent fitness characteristics in team sport athletes. Nevertheless, the current data do not support using V_{IFT} to differentiate jumping and acceleration performance, and monitoring these capacities would require specific testing protocols.

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FIGURE CAPTIONS

Figure 1. Linear regression between field-based testing results and the final running velocity achieved during the 30-15 Intermittent Fitness Test (V_{IFT}) in $km \cdot h^{-1}$ for 52 participants (running variables) and 31 participants (CMJ).

505 COD = 505 change of direction test; RST_{Total} = repeated sprint test total time; countermovement jump (CMJ).

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Table 1. Dynamic warm-up protocol utilized prior to field-testing sessions.

Exercise	**Distance or repetitions**
Slow jog	40 m
High knees	20 m
Butt kicks	20 m
Side shuffles	20 m per side
Carioca	20 m per side
A-skips	20 m
Squats	10
Walking lunges	10 per leg
Hip rotations (internal/external)	10 internal and external per leg
Buildup shuttles (50, 70, 90% effort)	3 x 20 m

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Table 2. Descriptive, anthropometric and performance data from field-based testing. Data are mean ± SD.

Variable	**Mean value**
Subject characteristics	
Age (yr)	24.3 ± 4.4
Height (cm)	180.5 ± 7.0
Body mass (kg)	85.1 ± 12.2
Σ7 skinfolds (mm)	76.2 ± 31.9
Performance tests	
10 m sprint (s)	1.84 ± 0.11
20 m sprint (s)	3.19 ± 0.20
40 m sprint (s)	5.69 ± 0.44
Flying 20 m sprint (s)	2.50 ± 0.29
505 change of direction (s)	2.36 ± 0.21
300 m shuttle (s)	70.8 ± 7.3
RST_{Mean} (s)	6.2 ± 0.5
RST_{Total} (s)	37.5 ± 2.9
RST_{Dec} (%)	7.3 ± 4.5
V_{IFT} ($km \cdot h^{-1}$)	18.0 ± 1.9

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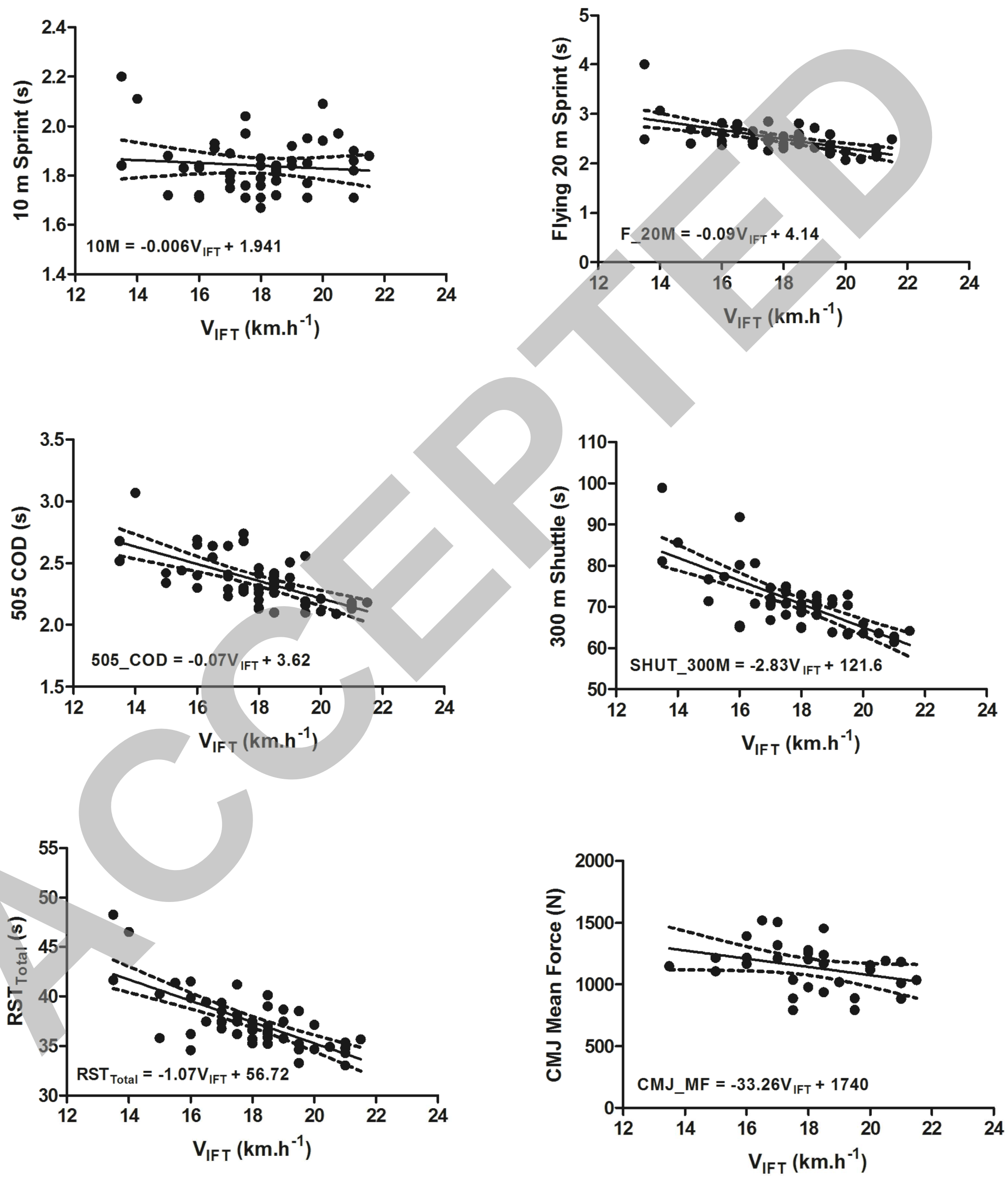

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