Selecting Metrics that Matter: Comparing the use of the Countermovement Jump for Performance Profiling, Neuromuscular Fatigue Monitoring and Injury Rehabilitation Testing

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Abstract

The countermovement jump (CMJ) is one of the most used performance assessments in strength and conditioning. While numerous studies discuss the usability of different metrics in this test, this is often done within the context of a specific aim. However, to our knowledge, no information currently exists providing practitioners with some over-arching recommendations on which metrics to choose when the purpose of using the test differs. This article discusses how the metrics selected to monitor during CMJ testing might differ when aiming to use it as a proxy for athletic performance, as part of neuromuscular fatigue monitoring, or as part of a test battery for return to performance in injured athletes.

Introduction

Jump testing is a common performance assessment in many sports owing to its relative simplicity (7,14), time efficiency (6), and kinematic correspondence (i.e., triple flexion and extension) to the sport itself (16,40,46,54). While numerous jump tests exist, their implementation as a test protocol should be guided by the needs and demands of an athlete or sport (7), and the countermovement jump (CMJ) is arguably the most commonly implemented jump test by practitioners and researchers (7,12). This may, in part, be because of the technical demands of other jump protocols. For example, the squat jump is challenged by small amplitude countermovements that occur readily at the beginning of the movement (53), reducing the occurrence of a purely concentric jump strategy. Similarly, drop jumps likely represent a more technically demanding task than a CMJ (37,45) that may not be appropriate for some athletes (e.g., youth or untrained) to perform. While different underlying reasons may exist for using one jump test over another, the CMJ is likely to be a more natural movement pattern for many athletes, and has become commonplace in practice and research (12,20).

A recent opinion piece from Bishop et al. (7) suggested that practitioners may wish to consider 'linking metrics together' when interpreting data from jump testing, as it enhances their ability to utilize all available information concurrently. For example, previous research has shown that CMJ height may be less sensitive to change after intense exercise than other strategy-based metrics, such as time to peak power and time to take-off (TTTO) (20-22). Additional research has also shown that increases in power are not always mirrored by increases in jump height (39), which may be explained by the fact that power only accounts for ~50-60% of how high an athlete jumps (35). Consequently, when faced with a scenario where one metric improves but another does not, it can be challenging to determine whether overall jump performance has truly got better, worse, or not changed, when monitoring multiple metrics concurrently. As a means of trying to overcome such challenges, recent literature has outlined the importance of linking CMJ metrics during the ongoing monitoring process (7). For example, when starting with a metric such as reactive strength index modified (RSI_Mod), which has been given increased interest in recent years (7,17,56), the metrics to monitor alongside this should likely be selected automatically. Jump height and TTTO represent the two component parts and should be interpreted with RSI_Mod so that practitioners can correctly understand how any change in RSI_Mod has been achieved. This is because changes in RSI_Mod can occur as a consequence of increases in jump height, reductions in TTTO, or both. Although anecdotal, this line of thinking about linking metrics together seems hard to dispute. However, it fails to acknowledge that consideration must first be given to which metrics are most appropriate in the first place. For example, previous research has investigated the association between the CMJ and independent measures of physical performance, such as strength (29,42), linear speed (10,26), and change of direction ability (36,41). Other studies have used the CMJ to detect an athlete's neuromuscular fatigue status (20,21). Finally, the CMJ is also commonly employed in injury-based research as part of test batteries that provide information for an athlete's rehabilitation journey (13,23,25). Consequently, with various reasons for using the CMJ, this brings into question whether the same metrics should be employed for different scenarios.

Therefore, the aims of this review are threefold: 1) to provide an overview of some of the common ways in which the CMJ has been used in research, 2) to provide some practical suggestions on how selecting metrics might differ when the purpose of using the CMJ test changes, and 3) discuss how subsequent data analysis methods might differ when aiming to detect true change for both group and individual athletes – noting that once we have chosen which metrics to monitor, understanding how best to utilize the data is a key part of the ongoing monitoring process.

Associations between the CMJ and Independent Measures of Performance

Determining the relationship between a test and other physical or athletic performance measures provides a biological basis for including it in a given set of protocols (7). Physical capacities such as strength, linear speed, and change of direction ability have all been deemed important to monitor in sports such as soccer (60), rugby league (15), tennis (47), netball (58), and even surfing (52). Thus, the forthcoming sub-sections will provide an overview of the association between CMJ performance (determined by different metrics) and these independent physical performance measures. However, it is important to note that these sections are only meant to provide a summary showcasing the consistent associations between CMJ performance and different physical capacities, thus, justifying the use of the CMJ test, as it links back to additional measures of capacity in sport.

Strength

When considering the association between the CMJ and strength, previous research has shown CMJ peak force is strongly associated with maximal force production capability during the isometric mid-thigh pull (IMTP; r = 0.43-0.64), isometric squat (r = 0.64), and 1RM back squat loads (r = 0.79) (42,59), highlighting its importance across a range of strength assessments. The same can be said for CMJ peak power, which shows large relationships with strength measures across multiple studies. Specifically, peak power has been associated with maximal force production capability during the IMTP (r = 0.43-0.75), isometric squat (r = 0.71), and maximal strength while squatting (r = 0.66-0.84) (9,42,59). Unsurprisingly, jump height has also been commonly used as a metric when investigating associations with strength measures in both absolute and relative data. For example, previous studies have shown weak to moderate relationships with absolute peak force during the IMTP (r = 0.27-0.41) (29,42), ISOS peak force (r = -0.07), and 1RM back squat (r = 0.22) (42). However, when these relationships were determined with relative strength levels, these values changed considerably: IMTP peak force (r = 0.59), ISOS peak force (r =

0.28), and 1RM back squat (*r* = 0.69). In contrast, strong associations have been reported elsewhere between CMJ height and both absolute (*r* = 0.74) and relative (*r* = 0.79) eccentric peak force during the squat (9).

Collectively, these studies show that several CMJ metrics (e.g., jump height, peak force, and peak power) are often significantly associated with strength, which we know to be a critical physical quality for both athletic development (57) and injury risk reduction (31).

Linear Speed

When considering the association between CMJ performance and linear speed, the outcome measure of jump height has been the most popular investigated metric. For example, previous research has shown moderate to strong relationships with 10-m or 10-yard acceleration times (*r* = -0.49 to -0.69), 30-m or 30-yard times (*r* = -0.58 to -0.77), 40-yard time (r = -0.58 to -0.79), 60-m time (*r* = -0.58 to -0.79), and 100 m (*r* = -0.57) (55,63). Of note, these relationships are all negative, indicating higher jumps were associated with faster sprint times. However, when velocity is used as the outcome measure, correlation values become positive, noting that the desired outcome for both jump height and velocity are the larger values. With this in mind, previous research has shown moderate to very strong associations between CMJ height and velocity at 10-m, 30-m, and 50-m (*r* = 0.82-0.86) (32) and peak in-match running velocity for female soccer players (*r* = 0.50) (43). Concerning the latter finding (43), this is arguably more important than establishing a relationship between CMJ performance and sprinting during a test protocol (as previous studies did) because in-match running speed is more likely to be considered a key performance indicator, having been established in a competition scenario. This is especially important given that prior literature has emphasized the importance of relating our test protocols to sporting performance (1,24,64).

Change of Direction Ability

Similar to the associations with linear speed, jump height has been a commonly investigated metric when determining the relationships between the CMJ and change of direction ability. Specifically, moderate to large relationships have been reported between jump height and the Illinois and pro-agility tests in both high school soccer ($r = -0.36$ to -0.48) and collegiate soccer and lacrosse ($r = -0.55$ to -0.70) athletes (63). Additionally, the agility t-test ($r = -0.59$) and zigzag test ($r = -0.77$) have also shown meaningful associations with CMJ height (2,26), highlighting the consistent moderate to large associations between how high an athlete can jump and faster change of direction speed times. Furthermore, the CMJ has also been used to distinguish between players of different abilities during a modified agility t-test (51). While no relationships were reported, a median split analysis was conducted to determine how CMJ characteristics differed between faster ($n = 12$) and slower ($n = 12$) players. While no meaningful differences occurred in CMJ height between groups, CMJ relative peak force was significantly higher in faster players (ES = 0.98; $p < 0.05$), again potentially highlighting the importance of concurrently monitoring peak force as a metric during the CMJ for performance profiling purposes.

Although the information above summarizes the association between the CMJ and different physical capacities, metrics such as jump height, peak force, and peak power are consistently related to independent measures of strength and speed. However, it is worth noting that the consistency of these relationships with linear and change of direction ability may partly be due to the metric of 'time' often being the selected outcome measure for the locomotive-based task. Consequently, and as has been done in jump testing (8,20,21), we suggest a more in-depth analysis of linear and change of direction ability is conducted, which is then linked back to metrics during the CMJ test. This would enable us to comprehend the link between proxy measures during jump testing and strategy data during locomotive-based tasks. Regardless, given the importance of strength and speed for many athlete populations (31,57), it seems that a strong basis exists for including metrics such as jump height, peak or mean force, and peak power, during CMJ testing.

Neuromuscular Fatigue Monitoring

An additional interest in CMJ research is its ability to detect neuromuscular fatigue in athletes (12,20,21,48,50). A previous meta-analysis investigating the efficacy of the CMJ in detecting neuromuscular fatigue noted that across 151 studies, 63 CMJ metrics had been utilized, with jump height and peak power being the most commonly reported metrics (12). However, results showed that both maximal jump height (effect size [ES] = -0.04) and peak power (ES = -0.04) were not sensitive to changes following fatiguing protocols. Thus, while these metrics appear to be strongly associated with independent physical performance measures, there may be better choices for neuromuscular fatigue monitoring.

In contrast, previous studies have shown that some time-based metrics may be more appropriate for practitioners to choose when using the CMJ. Specifically, metrics such as relative net impulse (ES = -0.69) and flight time (ES = -1.4) have shown the greatest changes immediately after intense exercise. However, when assessing changes over subsequent days (e.g., 24-72 hours), metrics such as time to peak power (ES = 0.41 to 1.5) and flight time:contraction time ratio (ES = -0.44 to -1.6) have shown the most notable changes (20,21). Of note here, all the metrics above have some element of 'time' being assessed with them, indicating that this is likely to be an important metric for neuromuscular fatigue monitoring. This is because athletes may adjust their jump strategy to produce the same force and achieve the same jump height (8,20).

Finally, an additional study by Gathercole et al. (22) investigated the effect of an acute repeated stair climbing protocol on CMJ performance and the chronic adaptations on CMJ performance after a structured 19-week training period. Results are shown in Table 1. To summarize, the chronic changes are less important, given that this section focuses on the effectiveness of the CMJ in detecting acute neuromuscular fatigue. However, compared to the acute changes, they showcase an important distinction for peak force and time-based metrics (i.e., eccentric, concentric, and total duration). Specifically, with very large increases in peak force and large reductions in duration-based metrics chronically, we can deduce that larger forces are being applied in a shorter period, which should be seen as a positive adaptation over the 19-week training period. However, the opposite is evident for the acute changes, with less force being applied and athletes taking longer to do it. Naturally, these reductions in CMJ performance are in response to being fatigued. Still, the results highlight that some metrics (which primarily focus on time) are more sensitive than others to elicit meaningful change.

*** Insert Table 1 about here ***

To summarize, and when this evidence is considered collectively, jump height and peak power may be less sensitive to detecting neuromuscular fatigue than other metrics, which might limit their applicability if practitioners wish to use the CMJ for neuromuscular fatigue monitoring. In contrast, time-based metrics such as time to peak power, flight time:contraction time ratio (essentially the same as RSI_Mod), and total phase duration (i.e., time to take-off) may be more appropriate choices this context.

Testing for Injured Athletes

The third area of interest relating to the CMJ for practitioners and researchers is monitoring jump performance for injured athletes as part of their rehabilitation journey. At this point, it should be acknowledged that there is an abundance of injury-focused literature that has used unilateral jump testing protocols (27,30,49); however, the associated data is almost always limited to outcome measures of height and distance, with a recent systematic review highlighting the limitations of this during ongoing monitoring in rehabilitation settings (28). This is further supported by additional measures in the CMJ, where research has shown that peak power was not associated with future injuries in professional rugby league (18) and Australian rules football players (19). Thus, it seems likely that the metrics that seem relevant for performance profiling (e.g., jump height and peak power) may hold less relevance during the injury rehabilitation process.

However, previous studies have shown that measuring landing forces and asymmetry data may be relevant during an athlete's rehabilitation journey. For example, Cohen et al. (13) quantified CMJ peak force during take-off and landing in injured and healthy soccer players. Take-off peak force asymmetries were 8% greater in injured players ($d = 0.13$), but landing force asymmetries were 57% greater ($d = 0.65$). Similarly, Hart et al. (23) also utilized the CMJ to compare jump performance in healthy and previously injured players. No significant between-group differences existed for jump height (ES = -0.24), relative peak power (ES = -0.22), or flight time:contraction time ratio (ES = -0.47). In contrast, previously injured players showed significantly greater asymmetries for concentric impulse (ES = 1.01), concentric peak force (ES = 1.35), eccentric:concentric force ratio (ES = 0.87), eccentric deceleration rate of force development (ES = 1.05), eccentric peak force (ES = 0.73), and force at zero velocity (ES = 0.73). Given that previous literature has outlined that asymmetries > 10% are associated with increased injury risk (30) and that consistent limb differences should be considered as an opportunity to develop increased maximal force production in the weaker limb (1,34), it seems plausible that performance variables such as jump height or peak power, may not be the most appropriate choice to monitor in injured athletes (44).

Considering all the information above, Figure 1 has been created, which provides a schematic of some of the metrics the evidence would support for monitoring (in addition to our anecdotal experiences) for performance profiling, neuromuscular fatigue monitoring, and injury rehabilitation assessments. As a final point, it is important to note that this article has focused on kinetic information obtainable from a force platform. However, especially where assessments are being performed for profiling during injury rehabilitation, video analysis, and kinematic data will also likely have their place, given that metrics such as knee valgus have consistently been shown to be a risk factor for severe knee injuries (44).

*** Insert Figure 1 about here ***

Considerations for Testing based on Current Evidence

Despite our suggestions in Figure 1, additional factors surrounding the broader notion of testing and analyzing CMJ data should also be considered, regardless of its purpose. Firstly, practitioners should be aware that specific verbal instructions are likely to impact the outcome of each recorded metric. For example, previous literature has suggested that it can be challenging to obtain maximal force and rate of force development data during the same trial (33), owing to one of these metrics being centered around maximal force production and the other focused on the rate of its production. Although this notion was originally discussed about isometric strength, any specific verbal cueing would likely impact jump performance, too (45). For example, in recent years, there has been a growing interest in time-related data, including metrics such as time to take-off and phase duration appearing in many studies (7,12,37). The relevance here is that any instructions that encourage the jump to be performed as quickly or ballistically as possible (in addition to jumping as high as possible) likely have the possibility of impacting time-based data. Therefore, once practitioners understand why they are using the CMJ, they should align their test instructions accordingly and remain consistent.

Second, practitioners should also be mindful of appropriate terminology during data analysis. For example, previous research has referred to the "eccentric" and "concentric" phases of movement during CMJ research (21,23). This would suggest that muscles are either lengthening or shortening, as defined by two distinct movement phases. However, it is not possible to determine this from force plate analysis; thus, more recent suggestions have proposed terminology, such as "braking" and "propulsive" phases, before take-off (11,38). Naturally, this is suggested because braking forces can be determined from force-time data, but also because a CMJ starts with an unweighting phase (38), a passive movement, as opposed to a conscious eccentric action.

Third, when aiming to assess changes in CMJ data, some previous studies reported measurement error or reliability data (20,21), which should be considered positive. However, this has often been done in a silo, with the data not linked to the change in test scores. Consequently, it would be more meaningful to establish whether any change in a given metric is greater or less than the error in the test (e.g., the coefficient of variation), which has been conducted in previous literature (5,7) and would provide a greater layer of depth in data analysis, given measurement error is likely to vary between populations. Furthermore, practitioners should also be cognizant of how long it takes metrics to return to baseline or non-fatigued values, highlighting the importance of test-retest protocols if using the CMJ for neuromuscular fatigue monitoring purposes.

Finally, during injury-based literature which reports asymmetry data, it seems rare for studies to have statistically quantified the direction of the imbalance. This is likely down to raw data being presented within the context of one injured limb and one healthy limb; thus, the assumption is that the asymmetry is present for a specific reason, with the injured limb always having lower capacity or test scores. However, it's worth acknowledging that much research has been done specifically on the direction of asymmetry in recent years (3,4,5) and has shown that large fluctuations in limb dominance can occur between test sessions, even when the magnitude of asymmetry is greater than 10%. Thus, and as previous literature has suggested (3,4,5), it is important that practitioners also consider fluctuations in the direction of asymmetry, as well as any changes in the magnitude value.

Practical Applications: Determining Real Change at the Group and Individual Level

Regardless of why practitioners may use jump testing, and based on previous suggestions surrounding the importance of measurement error (7,61), it seems prudent to offer practitioners some guidance on undertaking data analysis to determine true change. Further to this, given that practitioners are often challenged to individualize analysis and training when working with large groups of athletes, this section will outline how true change can be determined at both the group and individual level.

Table 2 shows some example data which provides three different jump metrics being monitored pre and post-training intervention for 20 athletes. This data is hypothetical, so the details of any intervention are redundant here. Rather, how the data is analyzed is useful when working with large squads of athletes. Pre and post-intervention scores have been reported, accompanied by baseline coefficient of variation (CV) values for each metric, percentage change, and a Hedges *g* ES value with 95% confidence intervals (CI). So, when analyzing group mean data, it is important to establish whether any subsequent change in test scores is greater than the variance or measurement error in the test (CV) (7,61). In doing so, practitioners can be confident that a real change has occurred. Specifically, jump height shows a 2.9% change which is less than the 3.8% CV value; thus, it cannot be considered real.

In contrast, time to take-off (TTTO) exhibits a 4.2% CV value, but the percentage change is greater and can be considered real. This is supported by the larger ES seen for TTTO compared to jump height. In addition, it is worth noting here that practitioners can be confident of a significant change in the metric of TTTO because the confidence interval of the ES does not cross 0 (i.e., both numbers in brackets are negative – and the same would apply if both had been positive). Finally, RSI_Mod exhibits a percentage change greater than the CV; however, the ES value is blunted compared to TTTO. This is because it is a ratio metric calculated as jump height divided by TTTO. Simply put, with an ES value of -0.75 for TTTO and 0.15 for jump height, it stands to reason that the ES for RSI_Mod is somewhere in-between, given how it is calculated. This provides a brief overview of how data can be analyzed when working with groups of athletes; however, results at the group level cannot be attributed to all individual athletes.

Table 3 provides example data for three individual athletes for the metric of jump height. This time, when aiming to establish true change at the individual level, each athlete's CV value is used (noting that this is their natural variability) to set a target score for the post-intervention testing. Step one is to convert the CV % to a decimal by dividing it by 100 (noting that CV values are typically reported in percentages, which are relative and computed by multiplying by 100 initially). Once converted to a decimal, this is added to a value of one and then multiplied by the previously determined test score (62). The advantage is that each athlete will exhibit their variation during testing, so any target is then specific to their variability. Table 3 shows that athletes 1 and 3 have shown a test score greater than their target value; thus, practitioners can be confident that this resultant change is greater than their own variance in the test. When practitioners are aware of such information, it enables them to consider the efficacy of their training interventions on an individual level, providing a deeper understanding of which athletes have responded best to the previous block of training and which ones perhaps require an alternative stimulus to drive positive adaptation.

*** Insert Tables 2 and 3 about here ***

Conclusion

In summary, practitioners may wish to consider that the metrics we monitor from CMJ testing may vary, depending on why we use the test. Specifically, outcome-orientated metrics such as height, force, and power seem to be strongly associated with independent measures of strength, linear speed, and change of direction ability across numerous studies, thus, justifying their inclusion as proxy measurements. From a neuromuscular fatigue monitoring perspective, time-based metrics such as RSI_Mod, time to take-off, and time to peak power appear to be sensitive to detecting the true change after intense exercise. Finally, if used as part of testing protocols for injured athletes, outcome measures-based data may still retain importance; however, landing force and inter-limb asymmetry metrics may be more effective at highlighting residual deficits in capacity between limbs.

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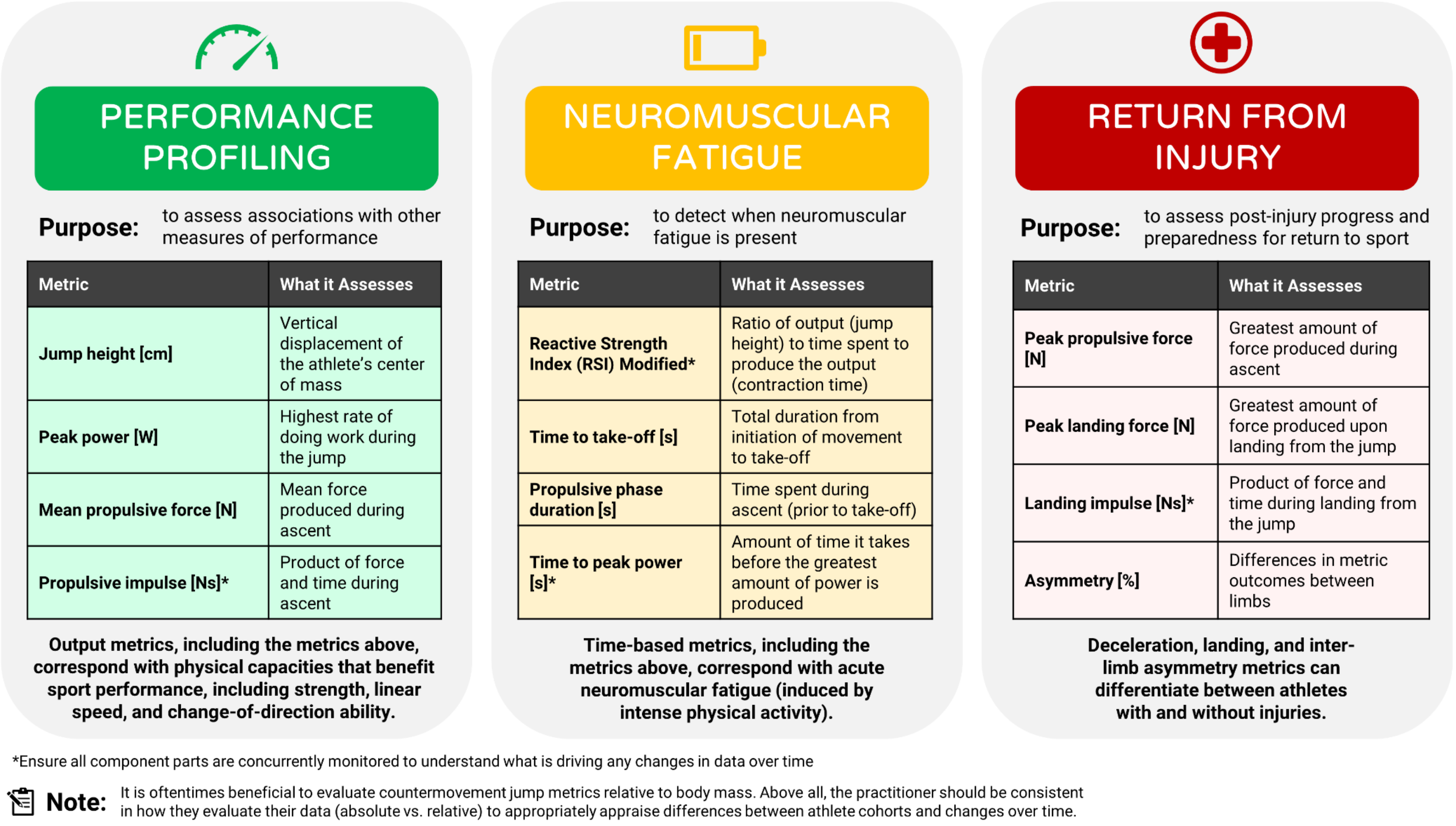
Table 1. Effect size data showcasing the magnitude of change in countermovement jump (CMJ) variables after an acute fatiguing protocol and in response to 19 weeks of structured training. *Note:* Table has been modified from Gathercole et al. (22), and effect size descriptors have been taken directly from the source.

	Acute Changes		**Chronic Changes**	
CMJ Metrics	*Effect Size*	*Descriptor*	*Effect Size*	*Descriptor*
Absolute peak power (W)	0.70	Small increase	0.17	Trivial increase
Absolute peak force (N)	-2.15	Large reduction	2.93	Very large increase
Relative peak power ($W \cdot kg^{-1}$)	0.78	Small increase	1.52	Moderate increase
Relative peak force ($N \cdot kg^{-1}$)	-1.25	Moderate reduction	3.23	Very large increase
Peak velocity ($m \cdot s^{-1}$)	0.36	Small increase	0.59	Small increase
Jump height (m)	0.47	Small increase	0.42	Small increase
F-V AUC ($N \cdot m \cdot s \cdot kg^{-1}$)	-1.25	Moderate reduction	4.57	Extremely large increase
Eccentric Duration (s)	1.91	Large increase	-2.80	Very large reduction
Concentric Duration (s)	0.88	Small increase	-1.60	Large reduction
Total Duration (s)	1.90	Large increase	-3.09	Very large reduction

W = watts; N = Newtons; $W \cdot kg^{-1}$ = watts per kilogram; $N \cdot kg^{-1}$ = Newtons per kilogram; $m \cdot s^{-1}$ = meters per second; m = meters; $N \cdot m \cdot s \cdot kg^{-1}$ = Newron meters per second per kilogram; s = seconds.



PERFORMANCE PROFILING

Purpose: to assess associations with other measures of performance

Metric	What it Assesses
Jump height [cm]	Vertical displacement of the athlete's center of mass
Peak power [W]	Highest rate of doing work during the jump
Mean propulsive force [N]	Mean force produced during ascent
Propulsive impulse [Ns]*	Product of force and time during ascent

Output metrics, including the metrics above, correspond with physical capacities that benefit sport performance, including strength, linear speed, and change-of-direction ability.

NEUROMUSCULAR FATIGUE

Purpose: to detect when neuromuscular fatigue is present

Metric	What it Assesses
Reactive Strength Index (RSI) Modified*	Ratio of output (jump height) to time spent to produce the output (contraction time)
Time to take-off [s]	Total duration from initiation of movement to take-off
Propulsive phase duration [s]	Time spent during ascent (prior to take-off)
Time to peak power [s]*	Amount of time it takes before the greatest amount of power is produced

Time-based metrics, including the metrics above, correspond with acute neuromuscular fatigue (induced by intense physical activity).

RETURN FROM INJURY

Purpose: to assess post-injury progress and preparedness for return to sport

Metric	What it Assesses
Peak propulsive force [N]	Greatest amount of force produced during ascent
Peak landing force [N]	Greatest amount of force produced upon landing from the jump
Landing impulse [Ns]*	Product of force and time during landing from the jump
Asymmetry [%]	Differences in metric outcomes between limbs

Deceleration, landing, and inter-limb asymmetry metrics can differentiate between athletes with and without injuries.

*Ensure all component parts are concurrently monitored to understand what is driving any changes in data over time

Note: It is oftentimes beneficial to evaluate countermovement jump metrics relative to body mass. Above all, the practitioner should be consistent in how they evaluate their data (absolute vs. relative) to appropriately appraise differences between athlete cohorts and changes over time.

Figure 1. Schematic overview of possible metrics that practitioners could consider, depending on why the countermovement jump (CMJ) is being used as an assessment method.

Table 2. Example mean ± standard deviation (SD) data for 20 athletes, with baseline coefficient of variation (CV) for the group, percentage change, and accompanying Hedges *g* effect sizes with 95% confidence intervals (CI).

Metric	**Mean ± SD (pre)**	**Mean ± SD (post)**	**CV % (pre)**	**% Change**	***g* (95% CI)**
Jump Height (cm)	45.5 ± 8.1	46.8 ± 9.4	3.8	2.9	0.15 (-0.50, 0.79)
TTTO (s)	0.81 ± 0.07	0.76 ± 0.06	4.2	6.2	**-0.75 (-1.42, -0.09)**
RSI_Mod	0.56 ± 0.09	0.61 ± 0.10	7.5	8.9	0.52 (-0.14, 1.17)

Note: Hedges g value in bold signifies a statistically significant change (p < 0.05).

M = meters; s = seconds; TTTO = time to take-off; RSI_Mod = reactive strength index modified.

Table 3. Example mean jump height data for three individual athletes after a 6-week training intervention, with baseline coefficient of variation (CV) used to set individual target scores, enabling meaningful change to be established at the individual level.

Athlete No.	**Jump Height (pre)**	**CV % (pre)**	**Target Calculation**	**Target Score**	**Jump Height (post)**
Athlete 1	42.0	4.1	42.0*1.041	43.7	**44.4**
Athlete 2	38.5	6.6	38.5*1.066	41.0	39.0
Athlete 3	44.6	3.1	44.6*1.031	46.0	**46.6**

Note: jump height is reported in meters. Additionally, although jump height is used here, the same process can be undertaken for any metric of interest.