# Jump performance and field-based anaerobic capacity profiles of international standard amateur mixed martial arts athletes

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**Abstract:**

Mixed martial arts (MMA) is a combat sport requiring the ability to complete repeated high impulse actions for 9-25 minutes. This study reports proxy measures of lower body neuromuscular performance and anerobic capacities of tier 3 standard amateur MMA athletes for the first time. A cohort of n=9 female (age = 20.5±2.8) and n=12 male (age=20.8±1.6) participants completed squat jumps, countermovement jumps, and drop jumps to provide proxy measures of their neuromuscular performance and reactive strength. The cohort also completed the special judo fitness test (SJFT) as a proxy for their anaerobic capacity. Participant's MMA success rates were determined using their MMA bout winning %. Relationships between physiological measures and success rates were calculated using Pearson's r correlation coefficient ($p<0.05$). Both male and female jump characteristics were generally equal to athletes from other combat sports, but below athletes from non-combat sports. Males and females were found to be 'poor/very poor' in the majority of SJFT factors. Female success rate was found to have very large relationships to jump variables (SJ r = 0.713; CMJ r = 0.794; CMJ-AS r = 0.718; all $p<0.05$). Male success rate was found to have very large relationships to SJFT factors (# of throws r = 0.732; SJFT index r =  - 0.648; both $p<0.05$). These results indicate that MMA success is dependent on different physiological factors in each sex. These results may also highlight areas for concern in MMA athlete's physiological performance standards.

**Key words:** anaerobic capacity, neuromuscular performance, SJFT, winning%

## INTRODUCTION

Mixed martial arts (MMA) is a combat sport that combines various martial arts techniques including striking and grappling actions from other sports such as Brazilian jiujitsu (BJJ), wrestling, judo, boxing, kickboxing, muay Thai and others (James et al., 2013; Kirk et al., 2020; Lenetsky & Harris, 2012). Similar sports such as pankration were widely practiced in European antiquity before disappearing during the $3^{rd}$-$4^{th}$ century CE (Poliakoff, 1987; Potter, 2012). Combat sports combining grappling and striking actions re-emerged in the early $20^{th}$ century in Brazil through *vale tudo* (anything goes) contests (Gracie & Danaher, 2003). The modern sport of MMA became codified in the USA with the adoption of the 'unified rules of MMA', which gradually became the global norm (ABC, 2018). Professional MMA bouts are 3 rounds of 5 minutes, with championship bouts or bouts deemed to be of significance typically spanning 5 rounds of 5 minutes. International amateur competition consists of adapted rules, including use of 3 rounds of 3 minutes, enforced wearing of shin guards, and the prohibition of elbows, knees and some submission techniques (IMMAF, 2017). Data regarding the technical-tactical aspects of professional MMA competition have been detailed previously (Kirk et al., 2020). Such data, however, are not presently available for amateur MMA.

Given the maximum duration of competition (9-25 minutes), relatively high lactate production (~9–20 $mmol \cdot L^{-1}$) (Kirk et al., 2020), and the likelihood of high impulse actions being decisive for success (Del Vecchio et al., 2011; Kirk, 2018), MMA may be classified as a high intensity aerobic endurance event (Draper & Marshall, 2013). There are limited data regarding the physical capacities of MMA athletes, or how well this population is conditioned to meet their competition demands. Previous studies (Alm & Yu, 2013; de Oliveira et al., 2015; Schick et al., 2010) show MMA athletes may be classified as 'recreationally trained' – 'trained' based on $\dot{V}O_2max$ (De Pauw et al., 2013). Summaries of participant's force production (Kirk et al., 2020) also indicate that this group of athletes may be weaker than those from related combat sports such as wrestling (Schmidt et al., 2005), judo (Franchini, Del Vecchio, et al., 2011) and BJJ (Marinho et al., 2016). James et al. (2017) demonstrated that higher level MMA athletes possess greater lower-body force and impulse than lower level athletes in back squat 1RM, and in both loaded and unloaded squat jump. It may, therefore, stand to reason that superior neuromuscular performance leading to greater force and impulse capacity may be predictive of success in MMA. Athletes displaying greater impulse are theoretically capable of producing more forceful actions in the initial 100-250ms of muscle contraction, enabling more successful dynamic sports performance (Maffiuletti et al., 2016; Suchomel et al., 2015). This effect may enable the transference of high rate of force development (RFD) from the ground into the opponent in striking and grappling actions (Lenetsky et al., 2013; Ruddock et al., 2016). Countermovement jump (CMJ) may provide a proxy measurement of such neuromuscular performance due to RFD being a determining factor in jump height (McLellan et al., 2011). Accordingly, improved CMJ performance has been related to increased punch force (Loturco et al., 2016) and increased activity in boxing (Rimkus et al., 2019).

There have been few attempts to measure the anaerobic capacity of MMA athletes. Mekhdieva et al. (2021) used Wingate tests to determine that MMA competitors displayed inferior peak relative power (national medalists = 8.14±0.61 $W \cdot kg^{-1}$; international medalists = 8.29±0.32 $W \cdot kg^{-1}$) to participants of equivalent competitive standards in judo, football, cross country skiing and athletics. Similarly, a case study of an international standard professional MMA athlete reported peak relative power = 7.5-7.6 $W \cdot kg^{-1}$ (Lovell et al., 2013). These results indicate that despite MMA performance likely occurring in the aerobic-anaerobic transition zone (Draper & Marshall, 2013), the athletes taking part may not be adequately prepared to meet these demands. Due to the skill-based nature of the sport, however, skill specific tests may provide a more appropriate measurement of this population's physiological capacities. No such tests currently exist for MMA.

The special judo fitness test (SJFT) was designed to assess the anaerobic performance of judo athletes in a way that mirrors the actions occurring in that sport (Franchini, Sterkowicz, et al., 2011). The SJFT has been found to be valid predictor of jump height and peak relative power ($W \cdot kg^{-1}$) as measured via Wingate testing (Ceylan et al., 2022). The ability of the SJFT to discriminate between elite and sub-elite judo athletes (Ceylan & Sukru, 2018) and its relation to multiple competition performance indicators (Lopes-Silva et al., 2021) has resulted in this test becoming a standard part of judo testing batteries. Similar tests have been proposed for use in BJJ, but due to the recent development of these methods, there are few norm data available, whilst their validity are still to be fully established (da Silva Junior et al., 2022; Wasacz et al., 2024). Whilst SJFT is not MMA specific, its utility in determining an athlete's ability to work in the aerobic-anaerobic transition zone using grappling actions may provide useful insight of MMA athlete's capacities in a more ecologically valid way than ergometer-based testing. Whilst previous work has attempted to relate MMA athlete's lower body force production to competition success rates (James, Beckman, et al., 2017), this was done using force plate technology. There are currently no published studies that relate MMA athlete's jump performance to competition success rates. Accordingly, jump performance as a proxy measurement of force may be more accessible and easier for coaches to measure and monitor in a training environment to better understand their athlete's likelihood of success.

The aim of this study, therefore, was to report the jump and SJFT characteristics of international standard amateur MMA athletes for the first time. Given the aforementioned physiological requirements of MMA competition, it may be the case that athlete's competition performance may be distinguished by their lower body neuromuscular performance as measured via jumps, and their ability to work in the aerobic-anaerobic transition zone as determined by SJFT. To this end, a secondary aim of this study was to examine the relationships between: jump characteristics and MMA performance success rate for each sex; SJFT and MMA performance success rate for each sex.

## METHODS

### *Participants*

Twenty one amateur, tier 3 (McKay et al., 2021) MMA athletes from the Polish MMA Association were recruited to take part in this study: 12 males (age = 20.8 ± 1.6, stature = 178.09 ± 5.9 cm, body mass (BM) = 76.3 ± 13.7 kg, years of MMA training 4.5 ± 1.2, number of bouts: 11.6 ± 13.4; wins = 10 ± 11.2; losses = 2.7 ± 2.7) and 9 females (age =20.5 ± 1.8 yrs, stature = 163.4 ± 6 cm, BM = 59.3 ± 5.6 kg, years of MMA training: 3.7 ± 1.2, number of bouts: 8.3 ± 4; wins = 5.9 ± 3.2; losses = 2.4 ± 2.1). All participants were required to have competed in at least one amateur bout and have no professional bout experience. Participants were grouped based on sex due to male and female combat sport athletes displaying differences in maximal jump (Abidin & Adam, 2013) and SJFT performance (Sterkowicz-Przybycien & Fukuda, 2014). All athletes were free from injury and were not engaged in pre-competition body mass manipulation at the time of testing (Baribeau et al., 2023). Whilst MMA is not conducted in a seasonal format, due to the timing of Polish MMA Association tournaments, this cohort could be said to have been in a preparatory period. All data were collected as part of the quarterly monitoring procedures of the Polish MMA Association, with informed consent provided by the participants in keeping with the Declaration of Helsinki (Winter & Maughan, 2009).

### *Procedures*

Due to the data presented in this manuscript being collected as quarterly monitoring procedures, the reported analyses are post-hoc in a retrospective case-controlled design. Testing sessions commenced with anthropometric measurements, followed by jump measurements. The squat jump (SJ), countermovement jump (CMJ), and countermovement jump with arm swing (CMJ – AS) were used to assess lower body neuromuscular performance. Drop jump (DJ) tests were used to calculate reactive strength ratio (RSR). One hour after jump testing was completed the participants performed the SJFT.

**Anthropometric measures**

Body mass and stature was measured via stadiometer (SECA 285; SECA, Hamburg, Germany).

**Jump testing**

Optojump photoelectric cells (Microgate, Bolzano, Italy) were used to measure the flight time (FT) of all jumps. Jump height (JH) was calculated automatically using $9.81 \times FT^2/8$ (Bosco et al., 1983). Reliability of Optojump measurements have been shown to be excellent, with CV =2.7% and ICC = 0.985 (Glatthorn et al., 2011). All participants had previous experience of each jump type due to these being part of their regular testing battery. All jumps were conducted on a standard, rigid gymnasium floor. SJ, CMJ and CMJ-AS were tested following a standardized dynamic warm up including 50% and 75% effort jumps. Participants completed 2 maximal effort jumps for all jump types. If any jump was perceived to be less than maximal effort by the investigators or athlete, or if it differed by >2cm to the previous trial, the jump was repeated. The mean of both trials for each jump type was used for statistical analysis. A rest period of 30s was given between trials of the same jump type, with 3 mins rest given between different jump types. Peak relative power ($W{\cdot}kg^{-1}$) was estimated for the SJ, CMJ and CMJ-AS post-hoc using the equation provided by Sayers et al. (1999). All variables were found to have excellent reliability ($ICC_{(3, 1)}$= 0.95–0.98) with low variability (CV <5%).

**Squat Jump**

Participants first completed the SJ, starting from the upright standing position with their hands on their hips. They were instructed to flex their knees and hips and hold a joint angle of approximately 90°. On the count of 3 from one of the researchers, participants were instructed to jump as high as possible without any countermovement.

**Countermovement Jump**

Participants then completed the CMJ starting from the upright standing position with their hands on their hips. They were instructed to flex their knees and hips to approximately 90° as quickly as possible and jump as high as possible without pausing during flexion-extension. CMJ-AS were completed in the same manner but the participants used a free arm swing during the jump.

**Drop Jumps**

Finally, participants completed three drop jumps (DJ) with their hands on hips from a box height of 0.4m. Participants were instructed to step off the box and jump as high as possible upon contact with the ground, minimising knee flexion and ground contact time (GCT), and ensuring that their heel did not touch the ground. Any trials where the heel was seen to touch the ground were repeated by the athlete. Drop jump FT (s) and GCT (s) were recorded and used to calculate reactive strength ratio (RSR) in seconds of FT per second of GCT ($FT \cdot s_{GCT}^{-1}$) using FT/GCT. A box height of 0.4m was chosen to enable direct comparison of results to previous data reported from professional MMA athletes (UFC, 2018). Healy et al. (2018) reported this method to be reliable (ICC range of 0.88-0.98).

**Special judo fitness testing**

One hour after jump testing was completed the participants performed the SJFT. Prior to completing the SJFT participants performed a 10 min warm up including 3 mins of self-paced jogging, dynamic stretches for all major muscle groups. This consisted of 10 dynamic exercises progressing from moderate to high intensity (high knee pulls, straight-leg march, power skip, light skip, high glute pulls, light high knees, light butt kicks, rapid high knees, carioca, and walking lunge) followed by 10 mobilisation and activation movements: foot sweeps, finger wrist and ankle rotations, trunk side stretch, trunk rotator stretch, hip circles, knee bends, cartwheels both sides, forwards rolls, backwards rolls, and forward rolls with legs spread, judo falling techniques (ukemi) and 10 repetitions of throwing drills for the ippon-seoi nage throw technique. The cohort all had previous experience of training in judo (3.9 ± 0.6 yrs), so all were familiar with the techniques being used in the SJFT. The participants were instructed to complete each throw on their self-selected dominant side.

The execution of the SJFT followed recommendations of Sterkowicz (1995). The SJFT is divided into three periods (A = 15s; B and C = 30s) separated by 10s intervals of passive recovery. Participants were grouped with two other athletes of similar stature and mass who were stood 6m apart from each other, with the participant being tested stood in between the two, 3m from both. During each period, the participant sprinted between and threw each of the two partners using the one-armed shoulder throw (ippon-seoi-nage) as many times as possible within the time limit. Participant's heart rate (HR) was measured immediately after completing the SJFT and again after 1min of passive recovery in beats·$min^{-1}$ (Polar H9, Kempele, Finland). Thereafter, the SJFT index was calculated as follows in arbitrary units (AU):

SJFT Index (AU) = (HR immediately post + HR 1 min post)/total number of throws

*Statistical Analyses*

Statistical analyses were performed using SPSS Statistics (SPSS 20, Inc., and Chicago, IL, USA). Data was presented as mean±SD. All variables were deemed to be normally distributed using Shapiro-Wilk's test ($p>0.05$). Pearson correlation coefficient (r) was used to evaluate the association between MMA performance success % ([number of wins/number of total bouts]x100) and physical fitness with $p<0.05$ used as the alpha level. Participant's number of total bouts and wins were recorded from their official competition record as reconised and stored by the Polish MMA Association. Correlation thresholds were set to: trivial (0 – 0.09), small (0.1 – 0.29), moderate (0.3 – 0.49), large (0.5 – 0.69), very large (0.7 – 0.89), near perfect (0.9 – 0.99) and perfect (1) (Hopkins, 2002). Due to these data being exploratory retrospective analyses, power for these results were calculated post-hoc using a point biserial model with two tails in G*Power 3.1.97.

## RESULTS

Descriptive statistics for all variables are presented in Table 1. Performance in the SJFT is shown in Table 2 and classified according to established norms for females (Sterkowicz-Przybycien & Fukuda, 2014) and males (Sterkowicz-Przybycien et al., 2019) respectively. MMA competition success rates for females = 60.5±19.6%, whilst males = 74.7± 19.1%. Correlations of participant's MMA performance success rates to each jump and SJFT variable are also reported in Table 1. Female success rates were found to be correlated with each reported jump variable, with the relationship between CMJ height and success having high post hoc power. Male jump variables had no statistically relevant relationships to success rates.

Male success rates were, however, found to be correlated to their SJFT performance, with the number of throws having high post hoc power. Female SJFT had no relation to their success rates.

**Table 1 – Means±SD for jump and SJFT variables, and correlations to MMA performance success rates.**

| | Females (n = 9) | | | Males (n = 12) | | |
|---|---|---|---|---|---|---|
| **Variable** | **Mean±SD** | **r and p value** | **Post hoc power** | **Mean±SD** | **r and p value** | **Post hoc power** |
| **SJ (cm)** | 30.5±5.4 | **0.713 (very large) p = 0.031** | β = .74 | 38.3±6.4 | 0.001 (trivial) p = 0.998 | |
| **SJ Power (W·kg$^{-1}$)** | 41.2±5.6 | | | 48±5 | | |
| **CMJ (cm)** | 31.9±5.2 | **0.794 (very large) p = 0.011** | β = .91 | 40.2±6.4 | -0.006 (trivial) p = 0.986 | |
| **CMJ Power (W·kg$^{-1}$)** | 42.1±5.6 | | | 49.4±4.8 | | |
| **CMJ-AS (cm)** | 34.5±5.2 | **0.718 (very large) p = 0.029** | β = .75 | 47.2±7.4 | 0.12 (small) p = 0.725 | |
| **CMJ-AS Power (W·kg$^{-1}$)** | 45.1±5.4 | | | 55.1±5.4 | | |
| **RSR (FT·s$_{GCT}$$^{-1}$)** | 2.12±0.5 | 0.453 (moderate) p = 0.221 | | 2.05±0.5 | 0.261 (small) p = 0.438 | |
| **Flight time (s)** | 0.51±0.05 | N/A | | 0.55±0.05 | N/A | |
| **Ground contact time (s)** | 0.25±0.05 | N/A | | 0.28±0.07 | N/A | |
| **# of throws in SJFT** | 23.7±1.7 | 0.483 (moderate) p = 0.188 | | 24.8±2.1 | **0.732 (very large) p = 0.01** | β = .91 |
| **SJFT Index (AU)** | 14.7±1.9 | -0.395 (moderate) p = 0.293 | | 14.4±1.4 | **-0.648 (very large) p = 0.031** | β = .75 |

Nb. Correlations are the named variable in relation to MMA performance success rates [(number of wins/number of bouts)*100]; SJ = squat jump; CMJ = countermovement jump; CMJ-AS = countermovement jump with arm swing; RSI = reactive strength index; SJFT = special judo fitness test; RSR = reactive strength ratio; Post hoc power calculated using G*Power 3.1.97 for significant correlations only.

**Table 2 - Special Judo Fitness Test performance of amateur female and male MMA athletes**

| | Number of throws (count) | HR immediately post SJFT (beats·min$^{-1}$) | HR 1 min post SJFT (beats·min$^{-1}$) | SJFT index (AU) |
|---|---|---|---|---|
| **Females (n = 9)** | 23±2 [very poor] | 186±10 [average] | 165±16 [poor] | 15.27±2.10 [very poor] |
| **Males (n = 12)** | 25±2 [average] | 186±9 [average] | 168±12 [poor] | 14.21±1.47 [poor] |

Nb. SJFT = special judo fitness test; HR = heart rate; […] shows female norm categories referenced from (Sterkowicz-Przybycien & Fukuda, 2014) or male norm categories referenced from (Sterkowicz-Przybycien et al., 2019)

## DISCUSSION

The aim of this study was to report the jump and SJFT characteristics of international standard amateur MMA athletes for the first time, and to examine the relationships between: jump characteristics and MMA performance success rate; SJFT and MMA performance success rate. From the data presented it can be concluded that female MMA performance success rates may be more influenced by single high impulse actions, whilst male MMA performance success rates may be more influenced by short duration repeated high impulse actions. As such, female and male amateur MMA participants may have differing physiological determinants of performance.

Periodisation and the use of supplementary strength and conditioning (S&C) has previously been found to be minimal amongst MMA athletes (Batra, 2019; Kirk et al., 2021; Uddin et al., 2020). This is despite the possible benefits of such practices on physiological markers of performance (Suchomel et al., 2016; Turner, 2011). Despite this seeming lack of training aimed at specific physiological adaptations, both males and females produced similar CMJ heights to national and international standard athletes from related combat sports including wrestling, judo, kickboxing and boxing (Haugen et al., 2020). This may be indicative of the positive effect of training combat sport specific technical actions on jump performance, given the high impulse nature of such techniques. The CMJ of combat sport and MMA athletes alike, however, fall below the mean±SD of other sports including cricket, association football and hockey (Woolford et al., 2013). Further, when comparing this cohort's RSR results to norm values reported from professional competitors (UFC, 2018) the female group in the current study would be classified as ‘very poor’ – ‘fair’ depending on body mass division, with the male group being ‘bad’ – ‘poor’ depending on body mass division. In addition, both group’s GCT was above the 0.25s threshold for a ‘fast’ stretch shortening cycle (Flanagan & Comyns, 2008). As such, it may be the case that by eschewing supplementary S&C training, amateur MMA athletes are not optimising their potential adaptations. Supplementary training in the form of high impulse resistance training, high load resistance training and plyometrics is related to enhancements of both the structural and neural components of muscular performance (Slimani et al., 2016; Suchomel et al., 2016). Previous evidence suggests that these training methods are not widely used in MMA, with muscular endurance work being preferred (Batra, 2019). A similar finding occurred in boxing, where only half of the developmental athletes surveyed engaged in ‘strength/power’ training. These boxers also perceived endurance-based circuit training to be sufficient for neuromuscular development (Finlay et al., 2021). It follows that the current cohort’s poor jump heights in relation to other sports likely results from inadequate neuromuscular training reducing their potential RFD (McLellan et al., 2011). Focusing on muscular endurance and circuit training means that the physiological underpinnings of force and impulse are not being widely developed in MMA athletes. This may be a key focus for future MMA training interventions, with a focus on the role of plyometrics and other high impulse training practices in improving sports performance (Slimani et al., 2016).

The specific relationship between RFD and combat sports performance is unknown. It has been theorised that a high RFD from the ground into the opponent would enable superior performance in striking and grappling actions (Lenetsky et al., 2013; Ruddock et al., 2016). This may be supported somewhat in the female group displaying very large relationships between their jump variables and their rate of success in MMA competitions. This outcome is, however, not present in the male group with male success instead being related to SJFT. MMA performance characteristics have been shown to differ between sexes (Del Vecchio et al., 2015; Miarka et al., 2018), with female MMA athletes potentially requiring a less diverse skill set than males (Kirk, 2018). Females spend more time engaged in low intensity activity (Del Vecchio et al., 2015), with high intensity time for both sexes reducing as the bout progresses (Antoniettô et al., 2019). Male MMA bouts feature a higher number and frequency of successful high impulse techniques than female bouts (Del Vecchio et al., 2015). It is likely that execution of such actions are the determining factor for success in MMA (James, Robertson, et al., 2017), with external load measurements providing an indication of which techniques may be classified as relatively high impulse (Kirk et al., 2015). Success in female

MMA may, therefore, be dependent on a competitor being proficient in using isolated high impulse actions allowing them to hurt or attain a more dominant position over their opponent. Conversely, male MMA athletes may be required to complete multiple high impulse actions in succession to achieve the same result as their female contemporaries. The resulting greater reliance on anaerobic capacity to perform multiple high impulse actions in succession (Draper & Marshall, 2013) may explain male success rates being related to SJFT but not jump variables. Why these differences in performance requirements exist between sexes cannot be explained by these data, and is an area for future research.

Both sexes were classified as ‘poor/very poor’ in the majority of SJFT factors, though males were found to be ‘average’ in the number of completed throws. This outcome should be viewed in the context of SJFT being a judo specific test using a technique that is not commonly practiced or used by MMA athletes (Kirk et al., 2015). Taking this into account, the results still demonstrate below average anaerobic performance capacities in this cohort. This is mirrored by previous studies reporting poor performances by MMA athletes in Wingate tests (Lovell et al., 2013; Mekhdieva et al., 2021), particularly when compared to athletes from the related sport of wrestling (Pallarés et al., 2012). Collectively these results may again highlight potential weaknesses in the preparation of MMA athletes. Training for an event characterised by repeated high impulse actions for 9-25 minutes should focus on optimising both aerobic and anaerobic capacities to enable sustained energy resynthesis throughout (Draper & Marshall, 2013). This population’s previously mentioned reliance on muscular endurance and circuit training methods may therefore be misplaced, given the inadequate cardiovascular load provided by these types of sessions (Gotshalk et al., 2004; Jones & Carter, 2000). Training guidelines to enable the stimulus required for physiological adaptation to occur have previously been provided for combat sports and MMA athletes (Harvey, 2018; Mikeska, 2014; Ruddock et al., 2021). Researchers and applied sport scientists should work with coaches to develop the use of these methods, and to better understand the potential reasons for a lack of such training in this population.

## LIMITATIONS

This study includes athletes from one region only, with the presented results being retrospective analyses of data collected in a training environment. Anaerobic capacity was estimated by proxy using a judo specific test which is not designed for MMA. Whilst similar tests have been developed for BJJ (da Silva Junior et al., 2022; Wasacz et al., 2024), further work is required to establish the validity of these methods and their suitability for use with MMA athletes. Therefore, in lieu of a validated, MMA specific test being available, the SJFT was determined to be the most appropriate field-based test currently offered. A 0.4m box was used during the DJ measurements to enable comparison to norms from a professional cohort (UFC, 2018). However, it has been suggested that box height should be based on an athlete's strength level (Beattie et al., 2017). The large variance in RSR reported here may indicate that using a box height specific to the athlete may improve accuracy and reliability of these measurements. MMA success in this study was based on the athlete's winning %. This variable may not be robust due to the competitive structure of MMA meaning that no two athlete's winning % can be compared. The results reported here should, therefore, be interpreted in context.

## CONCLUSIONS

The results of this study provide jump and SJFT performance characteristics of international standard amateur MMA athletes for the first time. MMA athletes display jump characteristics broadly in keeping with other combat sport athletes, but lower than athletes from non-combat sports. Using the SJFT as a marker of anaerobic capacity, both male and female participants were found have below average performance in this area. The physiological underpinnings of MMA success may differ between the two sexes. Female MMA success rates may be related to their jump characteristics, with athletes capable of greater high impulse neuromuscular performance being more successful. Male MMA success rates, however, may be related to their SJFT performance as a proxy for anaerobic capacity. These results may be indicative of differing technical/tactical approaches and performance requirements between the two sexes. Finally, these results may demonstrate potential weaknesses in current MMA training practices, whilst highlighting which physiological capacities to target during competition preparation.

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