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Original Research Article

Feasibility and Reliability of the My Jump 2 Smartphone Application in Measuring Peak Power, Flight Time and Jump Height in Physically Active Subjects during Two Different Jumping Tasks

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ABSTRACT

Muscle strength and power are often evaluated through jumping tasks. This study investigates the reliability of My Jump 2 (MJ2), a smartphone application (app) used for this assessment. Two commonly used jumps, the countermovement jump (CMJ) and squat jump (SJ), were analyzed. The study aimed to evaluate the reliability of MJ2 for assessing peak power, jump height, and flight time. **Materials and Methods:** Thirty-eight undergraduate students performed three jumps of each type in a randomized order. All jumps were executed on a contact mat and simultaneously recorded by the smartphone's slow-motion camera. Two independent researchers analyzed the video data by identifying take-off and landing frames to calculate flight time. The intra-class correlation coefficient (ICC), coefficient of variation (CV), and Lin's concordance correlation coefficient (CCC) were used for comparison. **Results:** Excellent reliability (ICC > 0.9) and high agreement were observed for flight time and jump height in both SJ and CMJ. Typical error and CV analysis indicated low variability for SJ, whereas CMJ jump height showed greater variability. However, peak power reliability and agreement were low (ICC < 0.5) for both jumps. **Conclusions:** The results suggest that MJ2 is a reliable and valid tool for assessing jump height and flight time, irrespective of the device used for data analysis. However, its power measurement capability differs from a contact platform's, likely due to the indirect methods used to estimate power. Based on these findings, the MJ2 app can be confidently used to measure flight time and jump height but should be used cautiously when assessing power.

Keywords—*Jumping, Reliability, Testing, Power, Countermovement jump, Squat jump.*

INTRODUCTION

In sports requiring continuous body movement, jumping is a fundamental task that relies on optimal lower-body coordination. These movements result from efficient energy transfer between lower limb joints,[1] and are essential for athletic success.[2] Vertical jumps are widely used to assess lower limb neuromuscular performance, as they correlate with injury risk prediction and athletic performance while serving as an indicator of power output.[3,4]

The squat jump (SJ) and countermovement jump (CMJ) are the most commonly analyzed jump types.[3] Jump height represents a key metric of neuromuscular performance. Mechanical power, a crucial component of sports performance, is often derived from jump height, as both SJ and CMJ require athletes to generate substantial mechanical work in a short duration.[3] This appears to be a critical factor in sports performance, distinguishing athletes by level,[5] experts vs. non-experts,[6] and related to sports performance characteristics, such as jumping.[7,8] As body weight is used to normalize power, it could be highlighted that individual power can significantly affect jump performance and, subsequently, reach jump height.[9]

Traditional instruments for assessing vertical jumps include force platforms, contact mats, linear position transducers, infrared cells, and optical systems.[10–12] However, these devices can be cumbersome, expensive, and require technical expertise, limiting accessibility for sports professionals.[4,13] Recent technological advancements have led to the increased use of mobile applications for real-time exercise assessment.[14] This type of assessment allows for increased familiarity for athletes (assessment at their training site), easy portability, and removes many constraints of time, space, and equipment/facilities required.[15,16] The high level of technology now available, combined with the ease of transport and use, emphasizes using mobile devices to assess physical exercise in real-time and store data for subsequent analysis.[17] Smartphone applications and wearables have been one of the most regular trends in the fitness industry in recent years[18] and present a cheaper alternative to other evaluation instruments. The My Jump 2 (MJ2) app was developed as a user-friendly, portable tool to accurately measure jumping performance.[19]

Several studies have validated MJ2 for jump height assessment in various populations, including active adults, children, elderly individuals, and athletes with cerebral palsy.[4,13,20–24] High intra-rater reliability has been demonstrated across multiple jumping types.[25,26] However, limited research has assessed the app's ability to measure power.

Yingling et al.[27] used the jump height data from the MJ2 app to assess peak power using Sayer's peak power equation.[28] The results reported were mixed, as they indicate excellent reliability for consistency between MJ2 and the force platform, but poor to excellent reliability for absolute agreement. According to the authors, the difference in the results could be explained by the fact that MJ2 uses time in the air for its calculations and does not consider the upper limb reach component of the jump, as measured by the force platform. Another study compared the MJ2 app and a force platform for assessing reactive strength index and mean power during a drop jump.[22] The results showed near-perfect levels of agreement for the reactive strength index, but a weaker agreement for mean power. According to the authors, this may be related to the different means of assessing power between MJ2 and the force platform. There is a lack of studies on the validity of power calculations derived from the MJ2 app. This means the data provided are still questionable and should be used cautiously.[29] To the best of our knowledge, no further studies have been conducted to assess other MJ2 app metrics, with most studies focusing on jump height.

Given the discrepancies in previous findings, further investigation is necessary. This study aims to analyze the validity, feasibility, and reliability of MJ2 for power measurement while providing additional evidence on its accuracy in measuring jump height and flight time.

METHODS

Participants

Sample size estimation was conducted based on the work of Donner et al.,[30] targeting a reliability of 0.8 with a minimum of 0.6, 90% power, a significance level of 0.05, and a 10% dropout rate, resulting in a required sample size of 36 participants.

A total of 38 undergraduate sports science students (34 males, 4 females; mean age: 21.84 ± 3.48 years; body mass: 69.24 ± 11.29 kg; height: 1.74 ± 0.09 m) volunteered. Inclusion criteria required participants to be free of lower extremity injuries or pain within the past three months. Written informed consent was obtained, and the study was approved by the Ethics Committee of the Polytechnic Institute of Leiria (CE/IPLEIRIA/22/2021), which considered the procedures mentioned in the Helsinki Declaration.[31]

Instruments

The study was conducted in a controlled laboratory setting. A Xiaomi Mi 11 Lite smartphone (version 14, Xiaomi, Beijing, China) recorded participants' feet in the frontal plane at a 1.5-meter distance[19] and a height of 30 cm using a tripod.[32] This position allowed for a clear view of the participant's lower extremities to ascertain take-off and landing moments. The smartphone's slow-motion camera recorded at 240 Hz with a 720-pixel resolution. Video data were exported for later analysis. Two independent evaluators analyzed the data: one using an iPad Mini-5 (version 16, CA, USA) (OBS-Ipad) and another using a MacBook Air M1 (version 15, CA, USA(OBS-Mac). A ChronoJump contact platform (version 1.9, ChronoJump Boscosystem, Spain) was used as the reference device for comparison. The validity of this platform has been previously established.[33]

Design and Procedures

This was an observational study, in which all data collection was conducted in a single session. The MJ2 app and contact platform simultaneously recorded all the jumps performed by the participants. Before data collection, the same evaluator took measurements of leg length and hip height at 90° knee flexion (distance from the greater trochanter to ground) since they are required for calculations in both the MJ2 app and Chronojump software.

Each participant completed a standard warm-up of dynamic stretching followed by three trial practices in total.[34] Participants performed three SJ and three CMJ trials, with a 30-second rest interval between each. The jump order was randomized, and verbal encouragement was provided. SJ required a squat position of ~90° of knee flexion, held for 2 seconds before jumping. Participants kept their hands on their hips for all jumps. Trials failing to meet the criteria were repeated. Subjects performed three SJ and three CMJ with a rest period of 30 s. between them. The order of jumps for each participant was randomized. All participants received verbal. All participants were required to refrain from vigorous physical exercise 24 hours before the testing and were properly dressed to perform the jumps. For safety purposes, there was a space of 1 m in front and sides of the contact platform. A whiteboard was placed in the back of the frame (Figure 1), with a specific coding, so that in the posterior analysis performed, observers could identify the subject and jump.

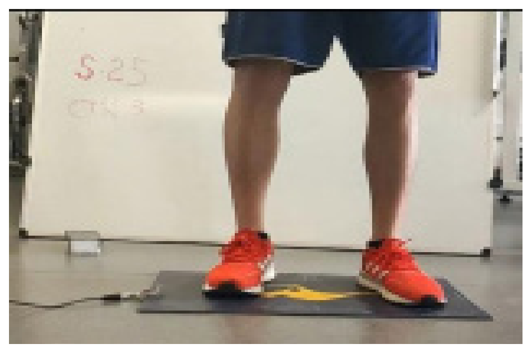

FIGURE 1. Data collection setup.

The same coding was used to record data on Chronojump software. Two evaluators with experience utilizing the MJ2 app independently assessed each of the 228 jumps (6 jumps for each of the 38 subjects), with a total number of 456 observations. Both observers have a Ph.D in sports science and previous experience working with strength and conditioning programs. For video analysis, observers manually determined take-off and landing frames, using the criteria for selecting video frames: both feet were off the ground (take-off) and at least one foot touched the ground (landing), as suggested earlier.[19] The videos were not analyzed in any consistent order of participants or jumps. Data retrieved for comparison were flight time, jump height, and power. In the MJ2 app, peak power estimations were based on the work of Samozino et al.,[35] with the following equation $P\ (W) = (\frac{h}{hp0}+1)\sqrt{\frac{gh}{2}}$, with m the body mass, g the gravitational acceleration, $hp0$ the vertical push-off distance, and h the jump height. The contact platform estimated peak power with the Sayers equations.[28] $P\ (W) = 60.7 \times h + 45.3 \times m - 2055$.

Statistical Procedures

Descriptive statistics were presented as mean ± standard deviation. Shapiro-Wilk tests assessed normality. Systematic bias between observations was tested using paired t-tests, and effect sizes were calculated.[36] The highest scores of the three jumps in each technique were used for calculations. Standardized mean differences (95% confidence intervals; CI) and Hedges's g corrected effect size[37] were calculated to determine the magnitude of change and compare observations, where the effect size (ES) was considered trivial if $g < 0.2$, small (0.2–0.5), moderate (0.5–0.8), large (0.8–1.60), and very large (> 1.60).[38] Reliability was assessed through Intraclass Correlation Coefficient (ICC) calculations. For intra-rater observations, a two-way random effect absolute agreement single rater ICC (3, 1) was used; for inter-rater, a two-way random effect absolute agreement multiple rater ICC (3, k) was performed.[39] ICC values < 0.5 were considered indicative of poor reliability, values of 0.5–0.75 were indicative of moderate reliability, values of 0.75–0.90 were indicative of good reliability, and values > 0.90 suggested excellent reliability.[39] All these tests were performed using Statistical Package for Social Sciences (SPSS, v26, IBM Corp., Armonk, NY, USA).

Additionally, Typical Error (TE), expressed as the coefficient of variation (CV%), and the smallest worthwhile change (SWC; 0.2 of the between-subjects standard deviation) were calculated through the use of the Excel spreadsheet provided by Hopkins[40] to support reliability analysis. The formula used for CV% was $CV(\%) = 100e^{sd/100} - 1)$, where sd is the standard deviation and for TE was $TE = sd_{(diff)}/\sqrt{2}$.[41]

High reliability was determined if ICC > 0.90 and CV < 5%.[42] The usefulness of the test was defined as "Marginal" (TE > SWC), "OK" (TE = SWC), and "Good" (TE < SWC).[43]

The agreement was calculated using Lin's concordance correlation coefficient (CCC) using a custom-made Excel spreadsheet based on Lin's recommendations.[44–46] Values > 0.95 were deemed necessary to consider a good agreement.[43]

RESULTS

Table 1 presents the descriptive information regarding the participants, also used for MJ2 and the contact platform.

TABLE 1. Descriptive Statistics of Participants and Performed Measurements.

Variables	Total Subjects	Male Subjects	Female Subjects
Age (years)	21.84 ± 3.48	21.88 ± 3.51	21.50 ± 3.20
Weight (kg)	69.24 ± 11.29	71.47 ± 9.58	50.25 ± 5.31
Height (m)	1.73 ± 0.08	1.75 ± 0.07	1.58 ± 0.03
Leg length (cm)	102.68 ± 16.27	103.03 ± 17.06	99.75 ± 5.72
Height at 90° flexion (cm)	63.53 ± 6.50	63.59 ± 6.66	63.00 ± 4.85

Note: Values are expressed as mean ± SD.

Intra-observer and contact platform reliability results for CMJ and SJ flight time, height, and power, are presented in Tables 2 and 3. The ICC scores were > 0.90 in all cases, indicating good reliability.

Inter-rater reliability scores are presented in Table 4 for CMJ and Table 5 for SJ. In both the CMJ and SJ, flight time and height ICC scores were > 0.90, and CV was below 5% in all situations except OBS-Ipad vs. platform (CV =

8.8) and OBS-Mac vs. platform (CV = 8.7). Moreover, in CMJ and SJ, when testing for power, OBS-Ipad and OBS-Mac vs. platform ICC scores were < 0.50, indicating poor reliability, thus precluding further analysis.

Significant paired differences were observed in both observers and the platform results in the CMJ (p = 0.001) and SJ (p = 0.04). ES (g) results were, however, all trivial (< 0.2). As for usefulness, the CMJ results for flight time were rated as Good, and for the CMJ height they were rated as Marginal. In the SJ results, the flight time was rated as Good for OBS-Ipad vs. OBS-Mac and OBS-Ipad vs platform and Marginal for OBS-Mac vs. platform. In the SJ results, all observations were rated as Marginal in the height analysis.

All agreement results for CMJ and SJ indicate good agreement between observers and the platform (CCC > 0.95). Exceptions were verified for CMJ and SJ power analysis, where in all cases the CCC was < 0.15, thus reflecting no agreement when contrasted with the platform.

TABLE 2. Intra-observer and Contact Platform Reliability for Countermovement Jump Performance Variables.

Variables	OBS-Ipad		OBS-Mac		Contact Platform	
	Mean ± SD	ICC (95% CI)	Mean ± SD	ICC (95% CI)	Mean ± SD	ICC (95% CI)
Flight Time (ms)						
Jump 1	516.201 ± 54.067		515.528 ± 53.288		5,22.500 ± 52.639	
Jump 2	514.646 ± 48.469	0.921(0.871; 0.955)	517.112 ± 48.886	0.917 (0.864; 0.953)	5,22.921 ± 47.442	0. 912 (0.855; 0.950)
Jump 3	519.742 ± 47.899		519.447 ± 49.201		5,26.053 ± 47.467	
Height (cm)						
Jump 1	33.024 ± 6.523		32.930 ± 6.431		33.781 ± 6.422	
Jump 2	33.139 ± 5.997	0.920 (0.868; 0.954)	33.076 ± 6.038	0.917 (0.863; 0.953)	33.777 ± 5.917	0.911 (0.855; 0.950)
Jump 3	33.398 ± 5.952		33.377 ± 6.108		34.163 ± 6.010	
Power (Watts)						
Jump 1	1,592.916 ± 381.748		1,574.776 ± 385.070		9,46.045 ± 330.540	
Jump 2	1,594.180 ± 385.424	0.963 (0.937; 0.979)	1,582.117 ± 388.016	0.961 (0.934; 0.978)	9,49.240 ± 345.460	0.994 (0.990; 0.997)

ICC (95% CI): Interclass correlation coefficient with upper and lower confidence intervals.

TABLE 3. Intra-observer and Contact Platform Reliability for Squat Jump Performance Variables.

Variables	OBS-Ipad		OBS-Mac		Contact Platform	
	Mean ± SD	ICC (95% CI)	Mean ± SD	ICC (95% CI)	Mean ± SD	ICC (95% CI)
Flight Time (ms)						
Jump 1	506.151 ± 52.384		505.081 ± 52.458		510.921 ± 50.382	
Jump 2	508.442 ± 53.189	0.929 (0.868; 0.963)	507.540 ± 53.238	0.930 (0.965; 0.964)	514.684 ± 51.208	0.931 (0.866; 0.965)
Jump 3	518.440 ± 56.659		518.158 ± 56.724		523.947 ± 54.610	
Height (cm)						
Jump 1	31.742 ± 6.426		31.611 ± 6.416		32.274 ± 6.244	
Jump 2	32.036 ± 6.569	0.926 (0.860; 0.961)	31.926 ± 5.541	0.926 (0.855; 0.962)	32.756 ± 6.398	0.928 (0.857; 0.963)
Jump 3	33.342 ± 7.062		33.308 ± 7.083		33.996 ± 6.883	
Power (Watts)						
Jump 1	1488.335 ± 338.602		1506.616 ± 368.425		926.492 ± 334.469	
Jump 2	1504.804 ± 359.699	0.943 (0.892; 0.970)	1520.048 ± 369.943	0.947 (0.900; 0.973)	931.680 ± 331.032	0.994 (0.988; 0.997)
Jump 3	1562.984 ± 380.007		1579.455 ± 379.079		948.434 ± 338.721	

ICC (95% CI): Interclass correlation coefficient with upper and lower confidence intervals.

TABLE 4. Interreliability for Countermovement Jump Performance Variables.

	CMJ Flight Time (ms)			CMJ Height (cm)			CMJ Power (W)		
	OBS-Ipad vs OBS-Mac	OBS-Ipad vs Platform	OBS-Mac vs Platform	OBS-Ipad vs OBS-Mac	OBS-Ipad vs Platform	OBS-Mac vs Platform	OBS-Ipad vs OBS-Mac	OBS-Ipad vs Platform	OBS-Mac vs Platform
Paired diff. (cm) (95% CI)	0.30 (-1.51; 2.10)	−6.31 (−8.53; −4.01)*	−6.61 (−8.45; −4.76)*	0.02 (−0.20; 2.47)	−0.77 (−1.05; −0.48)*	−0.79 (−1.02; −0.56)*	−0.75 (−15.16; 13.67)	638.82 (512.27; 765.36)*	632.33 (505.64; 759.02)*
Paired ES (g)	0.01	0.13	0.14	0.01	0.13	0.13	0.01	1.84	2.7
ICC (95% CI)	0.99 (0.99; 0.99)	0.99 (0.93; 0.99)	0.99 (0.89; 0.99)	0.99 (0.99; 0.99)	0.99 (0.94; 0.99)	0.99 (0.91; 0.99)	0.99 (0.99; 0.99)	0.25 (−1.89; 0.594)	0.26 (−1.88; 0.601)
CCC (95% CI)	0.99 (0.08; 0.999)	0.98 (0.97; 0.99)	0.98 (0.97; 0.99)	0.99 (0.99; 0.999)	0.98 (0.98; 0.99)	0.99 (0.97; 0.99)	0.99 (0.99; 0.99)	0.14 (0.019; 0.261)	0.15 (0.022; 0.266)
TE (95% CI)	0.08 (0.06; 0.10)	0.10 (0.08; 0.13)	0.08 (0.07; 0.11)	0.18 (0.15; 0.23)	0.45 (0.37; 0.58)	0.44 (0.36; 0.57)			
CV (95% CI)	0.80 (0.6; 1.0)	1 (0.8; 1.2)	0.80 (0.7; 1.0)	4 (3.3; 5.2)	8.80 (7.2; 11.6)	8.70 (7.1; 11.4)			
SWC (cm)	1.1	1.35	1.12	0.14	0.17	0.14			
Rating	Good	Good	Good	Marginal	Marginal	Marginal			

* *P*< 0.05; CMJ: countermovement jump; ES: effect size; CI: confidence interval; ICC: intraclass correlation coefficient; TE: typical error; CV: coefficient of variation; SWC: smallest worthwhile change; (95% CI): Upper and lower confidence intervals.

TABLE 5. Interreliability for Squat Jump Performance Variables.

	SJ Flight Time (ms)			SJ Height (cm)			SJ Power (W)		
	OBS-Ipad vs OBS-Mac	**OBS-Ipad vs Platform**	**OBS-Mac vs Platform**	**OBS-Ipad vs OBS-Mac**	**OBS-Ipad vs Platform**	**OBS-Mac vs Platform**	**OBS-Ipad vs OBS-Mac**	**OBS-Ipad vs Platform**	**OBS-Mac vs Platform**
OBS-Mac	OBS-Ipad vs Platform	OBS-Mac vs Platform					2.94 (−22.62; 28.50)	636.70 (505.57; 767.82)*	634.85 (510.51; 759.20)*
Paired diff. (cm) (95% CI)	0.28 (−4.53; 5.09)	−5.26 (−10.27; −0.26)*	−5.72 (−7.25; −4.18)*	0.03 (−5.75; 0.64)	−6.33 (−1.23; −0.01)*	−0.69 (−0.88; −0.50)*	0.01	1.73	1.78
Paired ES (g)	0.01	0.09	0.1	0.01	0.09	0.1	0.99 (0.98; 0.99)	0.21 (−0.200 0.642)	0.29 (−1.95; 0.64)
ICC (95% CI)	0.98 (0.97; 0.99)	0.98 (0.97; 0.99)	0.99 (0.93; 0.99)	0.98 (0.97; 0.99)	0.98 (0.96; 0.99)	0.99 (0.93; 0.99)	0.99 (0.96; 0.99)	0.13 (0.002; 0.246)	0.13 (0.001; 0.252)
CCC (95% CI)	0.97 (0.94; 0.98)	0.96 (0.92; 0.98)	0.99 (0.98; 0.99)	0.97 (0.94; 0.98)	0.96 (0.92; 0.98)	0.99 (0.99; 0.99)	-	-	-
TE (95% CI)	1.02 (1.02; 1.03)	1.02 (1.02; 1.03)	1.01 (1.01; 1.02)	1.04 (1.03; 1.05)	1.04 (1.03; 1.05)	1.01 (1.01; 1.02)	-	-	-
CV (95% CI)	2 (1.6; 2.6)	2.10 (1.7; 2.7)	0.70 (0.6; 0.9)	4 (3.3; 5.2)	4.20 (3.4; 5.5)	1.30 (1.1; 1.7)	-	-	-
SWC (cm)	2.89	3	0.93	0.37	0.38	0.11	-	-	-
Rating	Good	Good	Marginal	Marginal	Marginal	Marginal	-	-	-

* $p < 0.05$; SJ: Squat Jump; ES: effect size; CI: confidence interval; ICC: intraclass correlation coefficient; TE: typical error; CV: coefficient of variation; SWC: smallest worthwhile change; (95% CI): Upper and lower confidence intervals.

DISCUSSION

This study had two primary objectives. The first was to assess the validity and reliability of the MJ2 app in evaluating neuromuscular performance through power measurements. The results demonstrated high intra-rater reliability (ICC > 0.91) across all studied variables in CMJ and SJ, consistent with prior research.[25,26] Furthermore, mean differences between observers and the contact platform for CMJ and SJ (< 0.1 cm) aligned with previous findings on MJ2 app validity in both male and female participants.[23,25,26] Yingling et al.,[27] highlighted the necessity of establishing confidence in MJ2 due to the potential bias introduced by manually selecting take-off and landing moments. The present study supports this confidence, as its intra-rater reliability findings align with previous research. Regarding inter-rater reliability, ICC scores exceeded 0.90 for flight time and jump height, with CV values below 5%, indicating strong reliability.[42] These results correspond with prior studies on MJ2 reliability.[24,26,44,45] Additionally, excellent agreement (CCC > 0.95) was found between MJ2 and the contact platform for both jumps and observers, consistent with Bogataj et al.,[23] who reported a high level of agreement between MJ2 and a photoelectric cell system.

CMJ height exhibited slightly higher variability (CV > 5%) when compared with the platform, while SJ height remained within acceptable limits. These findings contrast with previous studies that reported higher CV values for MJ2.[22,25] Differences in jump type, sample size, and equipment used for validation may account for these discrepancies.[22] For example, studies involving primary school children found higher variability in SJ height, likely due to a lack of experience executing the movement.[13,23]

Regarding test usefulness, as determined by the relationship between TE and SWC, flight time was rated as good (TE < SWC) for both CMJ and SJ, while jump height was rated as marginal (TE > SWC). A comparable study[23] reported similar findings, with a marginal rating for SJ height but not for CMJ height.

The primary focus of this study was the assessment of neuromuscular performance via peak power estimation with MJ2. Results indicated poor reliability (ICC < 0.5) when comparing MJ2-derived power measurements with those from the contact platform. Conversely, inter-rater reliability between observers was high (ICC > 0.98) for both jumps. These findings diverge from those of Haynes et al.,[22] who reported moderate ICC values (ICC = 0.67) when assessing mean power in drop jumps. Yingling et al.,[27] also found good reliability (ICC = 0.85) for peak power estimation, highlighting variability across studies. In the present study, peak power values obtained from the contact platform were lower than those estimated by MJ2. This discrepancy may be attributed to differences in sampling frequency, as the contact platform records at 1,000 Hz, while MJ2 video data is captured at 240 Hz. These variations in data acquisition may obscure crucial details required for accurate power estimation.

Although both MJ2 and the contact platform estimate neuromuscular performance via jump height, they employ different equations. The contact platform utilized an equation proposed by Fox and Mathews,[45] whereas MJ2 applied the Samozino et al.,[35] equation, which is more recent. Prior studies have reported moderate agreement for mean power[22] and good agreement for peak power[27] when evaluating MJ2's power estimation reliability. Differences in reference instruments and potential MJ2 estimation errors may explain these discrepancies. Notably, power estimation accuracy depends on the precision of jump height measurements, as flight time overestimation can amplify measurement error due to the squared nature of the variable. The disparity in data acquisition rates (1,000 Hz for the contact platform vs. 240 Hz for MJ2) may also contribute to higher flight time and jump height values in MJ2 assessments.

Carlos-Vivas et al.,[44] corroborated this observation, reporting a slight overestimation of jump height in their findings. Even minor overestimations can influence power estimation, thereby affecting agreement between MJ2 and the contact platform. These findings suggest that accurate and reliable force and power measurements require direct assessments rather than indirect calculations.

This is the first study to evaluate MJ2's reliability using two devices (tablet and computer) for video analysis. The results indicate that manual frame selection is a valid and reliable method for assessing jump height and flight time, regardless of the device used for analysis. This minimizes the potential for bias and allows practitioners to use MJ2 across different screen sizes and environments. The study reinforces the reliability of MJ2 for assessing lower-body performance, offering a practical solution for practitioners.

A limitation of this study is the lack of information regarding participants' familiarity with the tested jump types. Although participants were active undergraduate sports science students, variations in the CMJ technique could have influenced the observed variability. Additionally, the findings are limited to the study sample and may not be generalizable to other populations. Future research should further investigate MJ2's power estimation capabilities by incorporating force platforms and alternative vertical jump tests (e.g., Abalakov) to enhance agreement, correlation, and mean difference assessments. Expanding the sample to include more female participants would also improve the generalizability of results.

Despite these limitations, the present study supports the use of MJ2 to measure jump height and flight time in an active young population. The increasing popularity, affordability, and technological advancements of smartphone applications suggest that tools like MJ2 will become integral to assessing physical fitness and health metrics.[47] These findings contribute to existing literature and enhance confidence in MJ2 as a rapid and reliable assessment tool for lower-body strength.

CONCLUSIONS

The results of the present study recommend using the MJ2 smartphone app as a valid, reliable, and useful tool for measuring jump height and flight time in active young adults. Due to its simplicity and practicability, it can be used by physicians, coaches, and other sports science practitioners to assess physical fitness, particularly lower-body performance.

AUTHOR CONTRIBUTIONS

Conceptualization, A.D. and D.T.; Resourses, M.S. and F.S.; Data collection, L.S. and P.M.; Data analysis P.P. and E.S.; Writing–Original Draft Preparation, A.D. and D.T; Writing–Review & Editing, M.E., M.S. and F.S.; Supervision, A.D.

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CONFLICTS OF INTEREST

The authors declare they have no competing interests.

CONSENT FOR PUBLICATION

Written consent was obtained from all participants regarding publication of data and/or image, as long as the images maintain the anonymity of the participant.

FURTHER DISCLOSURE

Not applicable.

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