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Original Article

Validity and reliability of the My Jump Lab and Jumpo 2 smartphone applications for measuring countermovement jump height: Comparison with a force platform using the impulse–momentum and flight-time methods

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Abstract
Problem statement. The My Jump Lab application has shown acceptable validity for estimating vertical jump height using formulas derived from flight-time. Nevertheless, its performance compared with more comprehensive analytical procedures—particularly the impulse–momentum approach—has not been thoroughly explored. In addition, the precision of alternative smartphone tools, such as Jumpo 2, still needs to be clarified in the scientific literature. **Approach.** A total of fifty young adult women completed three maximal countermovement jumps (CMJs), each simultaneously captured with a smartphone camera. Jump height (cm) was determined using the My Jump Lab and Jumpo 2 applications. The impulse–momentum method, calculated from force-platform recordings, was used as the primary reference standard, while height estimated via the flight-time method from the same platform served as a secondary criterion. **Purpose.** This study aimed to examine the validity and reliability of the My Jump Lab and Jumpo 2 applications for estimating countermovement jump (CMJ) height, using force-platform measurements obtained through the impulse–momentum and flight-time methods as reference criteria. **Results.** When compared with the impulse–momentum calculations from the force platform, both smartphone applications showed strong associations ($r \geq 0.70$). Despite this, statistically significant discrepancies were identified between the apps and the criterion measure ($p < 0.05$), with an average systematic difference of roughly 1.0 cm. In contrast, when the flight-time values from the force platform served as the comparator, the associations were very strong ($r \geq 0.90$), and no significant differences emerged ($p > 0.05$), with mean biases not exceeding 0.3 cm. Interrater agreement for both applications was excellent (ICC $\geq$ 0.90), although Jumpo 2 presented a significant rater-to-rater difference ($p < 0.05$). **Conclusions.** While the My Jump Lab and Jumpo 2 applications exhibited notable bias relative to the gold-standard impulse–momentum method, both tools demonstrated strong validity when evaluated against the force platform's flight-time approach—a method also used by common reference systems such as contact mats and photoelectric timing devices (even though these instruments were not tested in this study). Additionally, both applications showed excellent interrater reliability, with Jumpo 2 displaying a detectable discrepancy between evaluators.
Keywords: vertical jump; physical fitness; human performance; psychometric properties; smartphone applications.

Introduction

The countermovement jump (CMJ) is widely recognized as a fast, practical, and highly sensitive measure of lower-limb power and neuromuscular performance, making it a valuable indicator for tracking physical capabilities over time. Its ease of execution has contributed to its extensive use in both athletic and clinical environments (Claudino et al., 2017; Ramirez-Campillo et al., 2022; Rodríguez-Rosell et al., 2017). Traditionally, CMJ assessment relies on force platforms, which provide highly accurate measurements of jump height and a range of biomechanical variables such as force, power output, and takeoff velocity. Despite their precision, these platforms are costly, require specialized infrastructure, and are typically found only in well-equipped research laboratories or elite training centers (Bagchi et al., 2024), limiting their accessibility for field-based testing..

With advances in mobile technology, smartphone applications such as My Jump Lab and Jumpo 2 have emerged as practical, low-cost alternatives for estimating CMJ height. These apps operate by capturing the jump using the phone's camera and allowing the evaluator to identify the frame corresponding to takeoff and the frame

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marking initial ground contact upon landing. From this information, the software determines the number of frames elapsed during flight and uses the device's frame rate to compute flight-time (dos Santos et al., 2023). Jump height is then calculated from flight-time using equations based on gravitational acceleration (Bosco et al., 1983).

Evidence suggests that My Jump Lab provides strong validity and excellent reliability when compared with common reference instruments—including force platforms, contact mats, and photocell-based systems—particularly when the comparison uses flight-time–derived jump height (Gençoğlu et al., 2023; Rocha et al., 2025). Similarly, the limited research available on Jumpo 2 indicates promising levels of reliability and validity when evaluated against force-platform data derived from flight-time. However, the number of studies examining Jumpo 2 remains small, highlighting the need for further investigation to substantiate these early findings (Rocha et al., 2025; Vieira et al., 2021; Vieira et al., 2023).

It is important to note that devices such as contact mats, photocell systems, and most smartphone applications rely on the same underlying principle: jump height estimation from flight-time. This approach assumes a parabolic trajectory of the body's center of mass under constant acceleration. Although straightforward, this method is vulnerable to errors caused by changes in body posture during flight—for example, flexing the knees or altering arm position—which can artificially inflate the estimated height. These sources of error may be especially relevant in populations with limited motor control or in protocols with minimal jump technique standardization (Eythorsdottir et al., 2024; Xu et al., 2023).

A noteworthy issue in the literature is that the validity of smartphone applications has largely been assessed by comparing them with reference measures that also use flight-time—even when the comparison instrument is a force platform (Rocha et al., 2025). However, force platforms allow a more rigorous and biomechanically grounded analysis of jump performance through the impulse–momentum method. This method estimates jump height by integrating the vertical force-time curve to determine takeoff velocity, thereby reducing sensitivity to postural variations during flight and offering more precise insight into both the eccentric and concentric phases of the jump (Eythorsdottir et al., 2024; Xu et al., 2023).

Despite the clear advantages of the impulse–momentum method, few validation studies have used it as the reference for assessing the accuracy of My Jump Lab and Jumpo 2. This scarcity of evidence limits our understanding of how well these apps perform when benchmarked against a biomechanically robust criterion. Accordingly, the purpose of this study was to evaluate the validity and reliability of My Jump Lab and Jumpo 2 for estimating CMJ height, using the impulse–momentum method from a force platform as the primary reference standard and the platform's flight-time–derived jump height as a secondary comparator.

Materials and methods

Study design and participants

This study followed a nonexperimental, exploratory methodological design aimed at evaluating the measurement properties of the instruments under investigation (Page, 2012). Participants were recruited from the local community using online advertisements, messaging platforms, and face-to-face invitations in public locations in Jacarezinho, Paraná, Brazil.

To be eligible, individuals had to meet the following criteria: (a) female sex, aged between 18 and 35 years; (b) no participation in structured exercise programs within the past six months; (c) a negative response to all items on the Physical Activity Readiness Questionnaire (PAR-Q), confirming absence of conditions requiring medical clearance; (d) no self-reported musculoskeletal or neurological impairments capable of influencing test execution; (e) no diagnosed cardiovascular or respiratory disease; (f) intact cognitive ability sufficient to follow simple instructions; (g) nonsmoking status; and (h) not being pregnant.

A total of 50 participants satisfied all criteria and formed the study sample (age: 24.7 ± 5.2 years; body mass: 67.1 ± 11.4 kg; height: 163.6 ± 5.6 cm; BMI: 25.1 ± 4.4 kg/m²). All participants provided written informed consent. Ethical approval was granted by the Human Research Ethics Committee of Universidade Estadual do Norte do Paraná (CAAE: 89410418.4.0000.8123).

Vertical jump assessment

Before the CMJ tests, participants completed a standardized warm-up that included dynamic mobility exercises (hip flexion–extension, hip internal–external rotation, and trunk rotation; 10 repetitions each) followed by five submaximal CMJs. This procedure ensured adequate physical preparation and familiarization with the task. Participants then completed three maximal CMJs, separated by one minute of rest. All jumps were performed with hands positioned on the waist, participants wore their regular athletic shoes, and they were instructed to keep their knees fully extended during the flight phase.

Jump performance was recorded using a BIOMEC400 force platform (EMG System, Brazil). Ground reaction force data were sampled at 1000 Hz, processed with MATLAB routines, and integrated into the manufacturer's software (MathWorks, Natick, MA). Two height-estimation methods were derived from the force-platform data: (1) the impulse–momentum method, considered the biomechanical reference standard because it determines takeoff velocity from the vertical force–time curve, and (2) the flight-time method, which calculates height from the duration between takeoff and landing, similar to many field-based devices.

All force-platform trials were simultaneously video-recorded using the rear camera of a Samsung Galaxy A31 smartphone (30 FPS; Android 12). CMJ height was subsequently analyzed using the My Jump Lab (v. 1.3.4) and Jumpo 2 (v. 2.3.4) applications. The smartphone was mounted on a tripod positioned 1.0 m in front of the platform and 75 cm above the floor. Both apps compute flight-time from frame-by-frame video analysis. One evaluator identified the takeoff frame (loss of foot contact) and landing frame (initial foot contact), and an independent evaluator repeated the procedure to determine interrater reliability. Jump height was then calculated using the constant-acceleration equation (Bosco et al., 1983).

Statistical analysis

All statistical procedures were based on the mean value of the three maximal jumps. Data are expressed as means and standard deviations. The Shapiro–Wilk test verified the assumption of normality. One-sample t-tests were employed to examine the mean differences between each smartphone app and the force-platform measures, as well as differences between raters. Validity was assessed using Pearson's correlation coefficient (r), while agreement was explored via Bland–Altman plots (Bland & Altman, 1986). Interrater reliability was quantified using the intraclass correlation coefficient (ICC). Correlation magnitudes were categorized as weak ($<$ 0.40), moderate (0.40 to 0.69), strong (0.70 to 0.89), or very strong ($\geq$ 0.90) (Schober et al., 2018). Effect sizes for comparisons involving the apps and the force platform, and between raters, were computed using Cohen's d and interpreted as insignificant ($<$ 0.20), small (0.20 to 0.49), medium (0.50 to 0.79), or large ($>$ 0.80) (Cohen, 1988). All analyses were conducted with SPSS version 25.0 (Chicago, IL, USA), except for effect-size calculations, which were performed using G*Power 3.1 (Franz Faul, Universität Kiel, Germany). The significance threshold was set at $p < 0.05$.

Results

When CMJ height obtained from the smartphone applications was compared with the values derived from the force platform using the impulse–momentum method, both My Jump Lab and Jumpo 2 showed strong associations ($r \geq 0.70$). When the reference was the force platform flight-time method, the correlations became very strong ($r \geq 0.90$) for both applications (Figure 1).

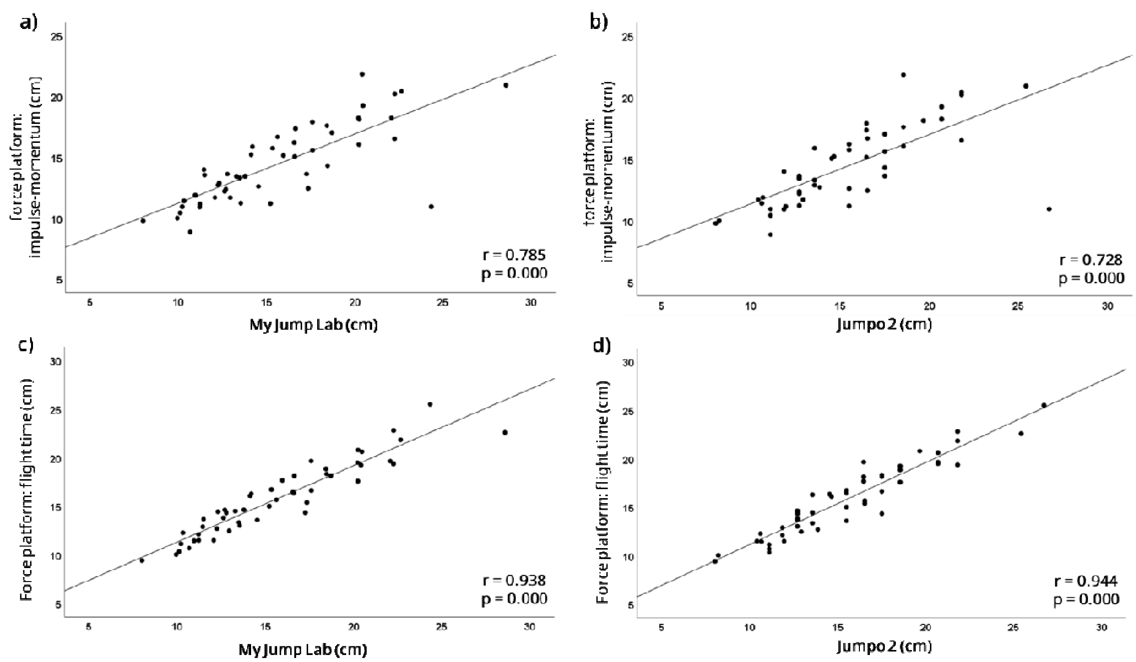

Figure 1. Correlation analyses between force-platform measures and smartphone applications for countermovement jump height (cm): a) force platform (impulse–momentum method) vs. My Jump Lab; b) force platform (impulse–momentum method) vs. Jumpo 2; c) force platform (flight-time method) vs. My Jump Lab; d) force platform (flight-time method) vs. Jumpo 2.

Table 1 summarizes the CMJ height values obtained from the force platform and the two applications. Using the impulse–momentum method as the criterion, both smartphone tools overestimated jump height—by a little more than 1 cm on average. Although these differences reached statistical significance, the corresponding effect sizes were small. When the force platform flight-time method was used for comparison, both applications slightly underestimated jump height (≤ 0.30 cm), and none of the differences were statistically significant; effect sizes were insignificant for My Jump Lab and small for Jumpo 2.

Table 1. Comparisons of CMJ height measured by the force platform and the My Jump Lab and Jumpo 2 smartphone applications.

Force platform (method)	CMJ height (cm)	Smartphone applications	CMJ height (cm)	Difference (cm)	p	Cohen's d
Impulse–momentum	14.43 (3.21)	My Jump Lab	15.63 (4.44)	1.20 (2.76)	0.003	0.43
		Jumpo 2	15.44 (4.16)	1.01 (2.86)	0.016	0.35
Flight-time	15.74 (3.72)	My Jump Lab	15.63 (4.44)	-0.11 (1.60)	0.608	0.07
		Jumpo 2	15.44 (4.16)	-0.30 (1.39)	0.124	0.21

Mean (standard deviation); CMJ: countermovement jump.

Figure 2 displays the Bland–Altman analyses for agreement between the force platform and the smartphone applications. When the impulse–momentum method served as the reference, the limits of agreement indicate that the applications may overestimate or underestimate height by approximately +6.5 cm and –4.5 cm, respectively. Using the flight-time method, the bias was minimal (≤ 0.30 cm) and the limits of agreement were narrower, around ±3 cm.

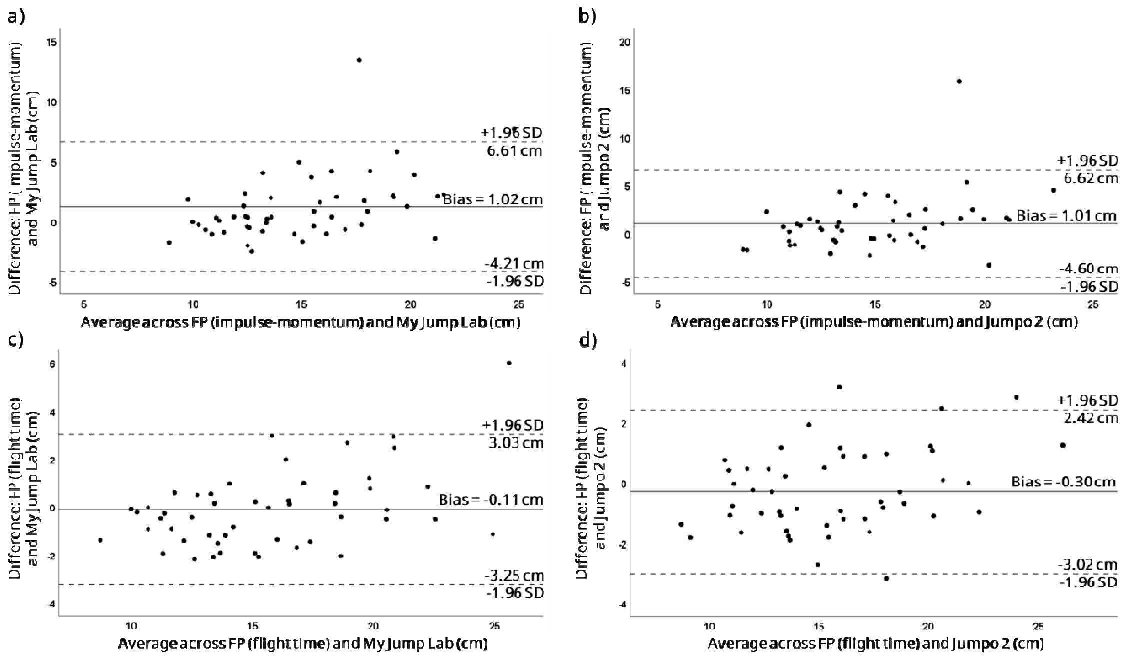

Figure 2. Bland–Altman plots illustrating the agreement between the force platform and the smartphone applications for measuring CMJ height (cm): a) force platform (impulse–momentum method) vs. My Jump Lab; b) force platform (impulse–momentum method) vs. Jumpo 2; c) force platform (flight-time method) vs. My Jump Lab; d) force platform (flight-time method) vs. Jumpo 2.

Interrater analysis is presented in Table 2. No significant difference was found between raters using My Jump Lab, and the effect size was insignificant. For Jumpo 2, the difference between raters was statistically significant, although the magnitude of this difference was small. Intraclass correlation coefficient values were excellent for both applications (ICC ≥ 0.90), indicating high consistency between raters.

Table 2. Interrater reliability for CMJ height using the My Jump Lab and Jumpo 2 applications.

Smartphone applications	Rater 1 (cm)	Rater 2 (cm)	Difference (cm)	p	Cohen's d	ICC ($CI_{95\%}$)	p
My Jump Lab	15.63 (4.44)	15.88 (4.02)	0.25 (1.55)	0.253	0.16	0.965 (0.939 – 0.980)	0.000
Jumpo 2	15.44 (4.16)	15.88 (4.02)	0.44 (1.21)	0.013	0.36	0.975 (0.953 – 0.986)	0.000

Mean (standard deviation); $CI_{95\%}$: 95% confidence interval.

Figure 3 illustrates the Bland–Altman plots for interrater agreement. For My Jump Lab, the measurement error was roughly ±3 cm (≈ 6 cm in total), whereas Jumpo 2 showed an error of approximately ±2.5 cm (≈ 5 cm in total).

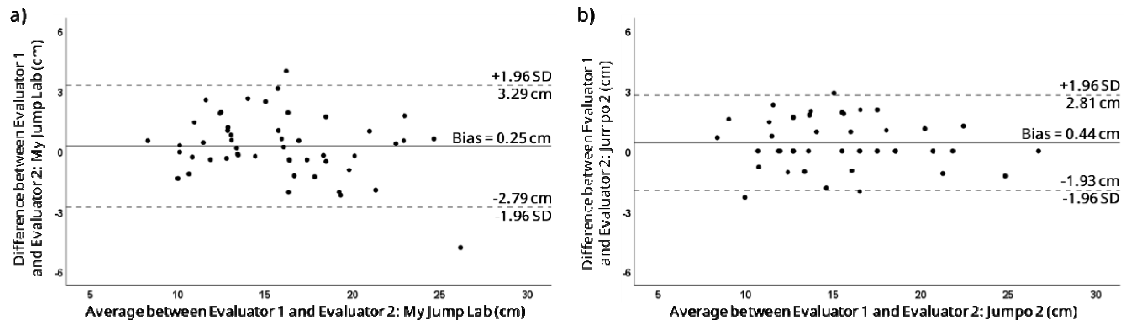

Figure 3. Bland–Altman plots illustrating interrater agreement for CMJ height (cm): a) My Jump Lab; b) Jumpo 2.

Discussion

The present study sought to determine the validity and reliability of the My Jump Lab and Jumpo 2 smartphone applications for estimating CMJ height using the impulse–momentum method, recognized as the most rigorous biomechanical standard for this purpose. A secondary comparison using the force platform flight-time method was also performed (Eythorsdottir et al., 2024; Xu et al., 2023). Overall, both applications showed strong associations with the impulse–momentum results ($r \geq 0.70$), though accompanied by a systematic overestimation close to 1 cm. When the comparison was made against the force platform flight-time values, correlations increased further ($r \geq 0.90$), with minimal bias (≤ 0.30 cm) and no significant differences.

These results align with previous investigations showing that both applications produce jump height values highly comparable to instruments that also rely on flight-time calculations (Rocha et al., 2025). My Jump Lab, in particular, has been examined more extensively and consistently demonstrates very good agreement with force platforms, photocells, and contact mats when jump height is derived from flight-time (Gençoğlu et al., 2023; Rocha et al., 2025). Although fewer studies have evaluated Jumpo 2, available findings also indicate satisfactory validity and reliability (Vieira et al., 2021; Vieira et al., 2023), supporting the outcomes observed here.. A notable strength of the present work is the use of the impulse–momentum approach as the primary reference. This method integrates net vertical force during the propulsive phase to determine takeoff velocity, from which jump height is calculated based on the displacement of the center of mass (McMahon et al., 2018; Street et al., 2001). Because it does not depend on the duration of the flight phase, the method avoids biases arising from postural adjustments that commonly distort flight-time estimates (Eythorsdottir et al., 2024). Its accuracy, however, depends on precise body mass measurement and high sampling frequencies (≥1000 Hz), which are characteristics exclusive to force platforms (Chow et al., 2023; Moir, 2008). As anticipated, the applications tended to overestimate jump height by slightly more than 1 cm on average in comparison to this gold-standard method. The relatively wide limits of agreement shown in the Bland–Altman analyses further illustrate the greater dispersion in measurements, with some individual jumps differing by more than 6 cm.

This discrepancy is expected because the applications compute jump height directly from flight-time, assuming equal center-of-mass height at takeoff and landing — an assumption often violated when jump technique varies (Eythorsdottir et al., 2024; Xu et al., 2023). Flexion of the knees or arm movements during flight lengthen the time in the air and lead to height overestimations. Prior research has also reported that My Jump Lab, particularly in its artificial intelligence–guided version, shows systematic differences when contrasted with impulse–momentum calculations, likely influenced by limited frame rate, algorithms based on image detection, and differences in event-definition criteria (Ríos-Gallardo et al., 2025).

In this study, videos were captured at 30 FPS, reflecting the native capacity of the smartphone used. This frame rate, which is considerably lower than the sampling frequencies of force platforms, inevitably restricts the temporal precision required for accurate identification of takeoff and landing frames (Gençoğlu et al., 2023; Tan et al., 2024). Manual selection of these frames — as required by both applications — may introduce additional variability. Force platforms, conversely, capture force signals at high sampling rates, ensuring more precise detection of critical mechanical events (Street et al., 2001).

Although both applications showed excellent interrater reliability (ICC ≥ 0.90), Jumpo 2 exhibited a statistically significant difference between raters, albeit with a small effect size. This pattern may relate to subtle differences in identifying key frames in low-frame-rate videos and aligns with earlier studies that reported slightly greater interrater variability for Jumpo 2 (Vieira et al., 2021; Vieira et al., 2023). Even so, Bland–Altman plots indicated acceptable measurement error, comparable to previous reliability analyses (Calandrini de Azevedo et al., 2023; Rocha et al., 2025).

From an applied perspective, the outcomes of this study support the use of both My Jump Lab and Jumpo 2 as feasible tools to assess CMJ height in environments where access to force platforms is limited. Recent research also suggests that the two applications yield comparable results across several CMJ parameters, with strong correlations between them (Branco et al., 2025). Their good agreement with the flight-time method reinforces their potential for performance monitoring, rehabilitation settings, and longitudinal assessments in athletic and clinical contexts (Bishop et al., 2022; Rago et al., 2018). Nevertheless, some limitations should be noted: a) both applications demonstrated reduced accuracy relative to the impulse–momentum method, possibly influenced by the untrained status of participants; b) although familiarized with the task, participants did not undergo a dedicated familiarization session, which might have reduced variability; c) the study included only healthy young women, restricting generalizability; and d) the 30 FPS frame rate may have constrained the precision of visual frame selection (Gençoğlu et al., 2023). Recording at higher frame rates (e.g., 240 FPS) — available in many smartphones — could improve the accuracy of flight-time detection (Ríos-Gallardo et al., 2025).

Conclusions

The present findings show that both My Jump Lab and Jumpo 2 exhibit notable discrepancies when their estimates of CMJ height are compared with force platform values derived from the impulse–momentum approach, which remains the most precise method available. This bias indicates that the applications have limited accuracy when contrasted with this gold-standard technique. Even so, when evaluated against the flight-time method—commonly used in practical settings by devices such as contact mats and photocell systems—both applications demonstrated high levels of validity. Interrater reliability was excellent for the two tools, although Jumpo 2 produced a significant difference between raters, suggesting greater susceptibility to operator influence or procedural inconsistencies.

Taken together, the results indicate that My Jump Lab and Jumpo 2 can serve as feasible, low-cost alternatives for estimating vertical jump height, especially in contexts without access to sophisticated laboratory-grade equipment. Their strong associations with the flight-time method highlight their usefulness for applications such as performance monitoring, rehabilitation follow-up, and repeated assessments over training periods. Nonetheless, the interpretation of absolute values should be approached with caution in scenarios that demand tight measurement precision, particularly research environments or biomechanical analyses based on impulse–momentum calculations.

To strengthen the evidence base, future studies should investigate the performance of these applications in broader populations encompassing varying ages, sexes, training levels, and clinical characteristics. Additional research examining further biomechanical outputs—such as force production, power, and rate of force development—may also clarify the potential for these applications to support more comprehensive neuromuscular assessments. Continued improvements in automated event detection and artificial intelligence may further decrease evaluator-dependent variability and enhance accuracy in upcoming software versions.

In summary, although not a substitute for force platforms in high-precision analyses, My Jump Lab and Jumpo 2 offer accessible, user-friendly, and scientifically grounded solutions for estimating vertical jump height in field environments. Their practicality makes them valuable tools for coaches, therapists, and researchers who require reliable monitoring of neuromuscular function and changes in performance or rehabilitation status over time.

Declaration of generative AI and AI-assisted technologies in the writing process

The authors confirm that no generative artificial intelligence or AI-assisted tools were used in the preparation, drafting, or editing of this manuscript.

Conflicts of interest

The authors declare that they have no conflicts of interest related to the content of this study and confirm that all authors reviewed and approved the final version of the manuscript.

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References

Bagchi, A., Raizada, S., Thapa, R. K., Stefanica, V., & Ceylan, H. İ. (2024). Reliability and Accuracy of Portable Devices for Measuring Countermovement Jump Height in Physically Active Adults: A Comparison of Force Platforms, Contact Mats, and Video-Based Software. *Life*, *14*(11), 1394. https://www.mdpi.com/2075-1729/14/11/1394

Bishop, C., Jarvis, P., Turner, A., & Balsalobre-Fernandez, C. (2022). Validity and Reliability of Strategy Metrics to Assess Countermovement Jump Performance Using the Newly Developed My Jump Lab Smartphone Application [journal article]. *J. Hum. Kinet*, *83*, 185-195. https://doi.org/10.2478/hukin-2022-0098

Bland, J. M., & Altman, D. G. (1986). Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet*, *1*(8476), 307-310.

Bosco, C., Komi, P. V., Tihanyi, J., Fekete, G., & Apor, P. (1983). Mechanical power test and fiber composition of human leg extensor muscles. *Eur J Appl Physiol Occup Physiol*, *51*(1), 129-135. https://doi.org/10.1007/bf00952545

Branco, L. V., Martini, F. A. N., Oliveira, G. C., Ribeiro, L. G., Faria, B. M., Filho, L. F. R. P., Daniel, K. L., Santos, P. P. N., Honorato, L. J., Oliveira, L. C., & Oliveira, R. G. (2025). Agreement of variables derived from the countermovement jump between the My Jump Lab and JumPo 2 applications. *Manual Therapy, Posturology & Rehabilitation Journal*, *23*, 1-7. https://doi.org/https://doi.org/10.17784/mtprehabjournal.2025.23.1429

Calandrini de Azevedo, A. B., Macedo Penna, E., Hugo, E., Carvalho Rodrigues, J. C., & Coswig, V. S. (2023). Validity and Reliability of a Mobile App to Measure Vertical Jumps in Older Women. *Revista Portuguesa de Ciências e Saúde*, *4*(01), 36-52. https://www.revistas.editoraenterprising.net/index.php/rpcs/article/view/565

Chow, G. C.-C., Kong, Y.-H., & Pun, W.-Y. (2023). The Concurrent Validity and Test-Retest Reliability of Possible Remote Assessments for Measuring Countermovement Jump: My Jump 2, HomeCourt & Takei Vertical Jump Meter. *Applied Sciences*, *13*(4), 2142. https://www.mdpi.com/2076-3417/13/4/2142

Claudino, J. G., Cronin, J., Mezêncio, B., McMaster, D. T., McGuigan, M., Tricoli, V., Amadio, A. C., & Serrão, J. C. (2017). The countermovement jump to monitor neuromuscular status: A meta-analysis. *J Sci Med Sport*, *20*(4), 397-402. https://doi.org/https://doi.org/10.1016/j.jsams.2016.08.011

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates. https://doi.org/https://doi.org/10.4324/9780203771587

dos Santos, M. I., Quaglio, M. R., de Oliveira, L. C., & de Oliveira, R. G. (2023). *Vertical jump assessment guide [Guia de avaliação do salto vertical]*. Editora CRV (in Portuguese). https://doi.org/https://doi.org/https://doi.org/10.24824/978652514964.6

Eythorsdottir, I., Gløersen, Ø., Rice, H., Werkhausen, A., Ettema, G., Mentzoni, F., Solberg, P., Lindberg, K., & Paulsen, G. (2024). The Battle of the Equations: A Systematic Review of Jump Height Calculations Using Force Platforms. *Sports Medicine*, *54*(11), 2771-2791. https://doi.org/10.1007/s40279-024-02098-x

Gençoğlu, C., Ulupınar, S., Özbay, S., Turan, M., Savaş, B., Asan, S., & İnce, İ. (2023). Validity and reliability of "My Jump app" to assess vertical jump performance: a meta-analytic review. *Sci Rep*, *13*(1), 20137. https://doi.org/10.1038/s41598-023-46935-x

McMahon, J. J., Suchomel, T. J., Lake, J. P., & Comfort, P. (2018). Understanding the Key Phases of the Countermovement Jump Force-Time Curve. *Strength & Conditioning Journal*, *40*(4), 96-106. https://doi.org/10.1519/ssc.0000000000000375

Moir, G. L. (2008). Three Different Methods of Calculating Vertical Jump Height from Force Platform Data in Men and Women. *Measurement in Physical Education and Exercise Science*, *12*(4), 207-218. https://doi.org/10.1080/10913670802349766

Page, P. (2012). Research designs in sports physical therapy. *Int J Sports Phys Ther*, *7*(5), 482-492.

Rago, V., Brito, J., Figueiredo, P., Carvalho, T., Fernandes, T., Fonseca, P., & Rebelo, A. (2018). Countermovement Jump Analysis Using Different Portable Devices: Implications for Field Testing. *Sports*, *6*(3), 91. https://www.mdpi.com/2075-4663/6/3/91

Ramirez-Campillo, R., Perez-Castilla, A., Thapa, R. K., Afonso, J., Clemente, F. M., Colado, J. C., de Villarreal, E. S., & Chaabene, H. (2022). Effects of Plyometric Jump Training on Measures of Physical Fitness and Sport-Specific Performance of Water Sports Athletes: A Systematic Review with Meta-analysis. *Sports Med Open*, *8*(1), 108. https://doi.org/10.1186/s40798-022-00502-2

Ríos-Gallardo, P. T., Carranza-García, L. E., Balsalobre-Fernández, C., & Montalvo, S. (2025). Reliability and Validity of an AI-Driven Smartphone Application for Measuring Countermovement Jump Height: A Comparison with Force Platform, Infrared Optical Timing, and Manual Video Analysis. *Measurement in Physical Education and Exercise Science*, 1-14. https://doi.org/10.1080/1091367X.2025.2532391

Rocha, E. F. d., Orssatto, L. B. R., Diefenthaeler, F., & Dellagrana, R. A. (2025). Jump Height With Smartphone Apps—Reliability and Agreement With Standard Methods: A Systematic Review With Meta-Analysis. *Strength Cond J*, 10.1519/SSC.0000000000000918. https://doi.org/10.1519/ssc.0000000000000918

Rodríguez-Rosell, D., Mora-Custodio, R., Franco-Márquez, F., Yáñez-García, J. M., & González-Badillo, J. J. (2017). Traditional vs. Sport-Specific Vertical Jump Tests: Reliability, Validity, and Relationship With the Legs Strength and Sprint Performance in Adult and Teen Soccer and Basketball Players. *J Strength Cond Res*, *31*(1), 196-206. https://doi.org/10.1519/jsc.0000000000001476

Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation Coefficients: Appropriate Use and Interpretation. *Anesth Analg*, *126*(5), 1763-1768. https://doi.org/10.1213/ane.0000000000002864

Street, G., McMillan, S., Board, W., Rasmussen, M., & Heneghan, J. M. (2001). Sources of Error in Determining Countermovement Jump Height with the Impulse Method. *Journal of Applied Biomechanics*, *17*(1), 43-54. https://doi.org/10.1123/jab.17.1.43

Tan, E. C. H., Weng Onn, S., & Montalvo, S. (2024). Measuring Vertical Jump Height With Artificial Intelligence Through a Cell Phone: A Validity and Reliability Report. *J Strength Cond Res*, *38*(9), e529-e533. https://doi.org/10.1519/jsc.0000000000004854

Vieira, A., Blazevich, A. J., AS, D. A. C., Tufano, J. J., & Bottaro, M. (2021). Validity and Test-retest Reliability of the Jumpo App for Jump Performance Measurement. *Int J Exerc Sci*, *14*(7), 677-686. https://doi.org/10.70252/ltav3104

Vieira, A., Ribeiro, G. L., Macedo, V., de Araújo Rocha Junior, V., Baptista, R. S., Gonçalves, C., Cunha, R., & Tufano, J. (2023). Evidence of validity and reliability of Jumpo 2 and MyJump 2 for estimating vertical jump variables. *PeerJ*, *11*, e14558. https://doi.org/10.7717/peerj.14558

Xu, J., Turner, A., Comfort, P., Harry, J. R., McMahon, J. J., Chavda, S., & Bishop, C. (2023). A Systematic Review of the Different Calculation Methods for Measuring Jump Height During the Countermovement and Drop Jump Tests. *Sports Med*, *53*(5), 1055-1072. https://doi.org/10.1007/s40279-023-01828-x