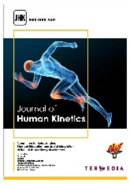

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Section IV – Psychological and Sociological Aspects of Sport and Exercise

First of All, Close Your Eyes: The Contribution of Vision to Countermovement Jump Performance

by

Artur Struzik [1],, Joanna Broda [1], Bogdan Pietraszewski [1]*

Depending on the motor task or the situation, visual stimuli may facilitate or hinder task performance. The purpose of this study was therefore to investigate the role of vision in CMJ performance. The study was conducted on a group of 30 physically active men (age: 21.5 ± 1.1 years, body height: 1.83 ± 0.07 m, body mass: 78.6 ± 10.7 kg) with no visual impairment and high jumping abilities. All participants performed a total of 12 CMJs: 6 under a full-vision condition (FV) and 6 under a no-vision condition (NV), in randomized order. Measurements were conducted using two Kistler 9286A force plates with Noraxon MR3 software. No significant differences were found in jump height (JH), mean power (MP) in the propulsion phase, propulsive time (PT), countermovement depth (CD) or countermovement time (CT) between the FV and NV conditions. Under the FV condition, peak power (PP) in the propulsion phase was by 87 ± 222 W higher than under the NV condition ($p < 0.05$ with small effect size). Furthermore, the relationships among the variables describing the CMJs (JH, PP, MP, PT, CD, and CT) under the FV and NV conditions were large, very large or nearly perfect ($p < 0.001$). The results show that eliminating visual stimuli may not have a negative impact on CMJ performance. On the contrary, eliminating visual stimuli can reduce interference that negatively affects maximum performance (e.g., maximum jump height). This surprising observed phenomenon may be possible due to the important role played by the proprioceptive system and kinesthetic feedback.

Keywords: *force plate; power; proprioception; visual stimuli*

Introduction

The countermovement jump (CMJ) is a type of a vertical jump commonly used in sports practice to assess an athlete's power and force capabilities (Anicic et al., 2023). In the CMJ, the subject first performs a rapid downward movement (countermovement), followed by a dynamic upward push-off. The execution of the CMJ depends on a number of factors, one of which is the segmental coordination of the entire body. Segmental coordination involves the interaction between the central nervous system and the muscles (Rodacki et al., 2002). The conscious activation and inhibition of muscles by the nervous system allow the body parts to move in harmony with each other, creating the conditions necessary for maximum take-off velocity. Due to the short duration of the countermovement and propulsion phases, movement corrections within a given phase are not possible once it has been initiated. Consequently, as the motion exhibits a ballistic nature, jump height is determined by the execution of the countermovement and push-off in accordance with the initial movement pattern (Zehr and Sale, 1994).

Precise visual-motor coordination is crucial for successful execution of jumps during sports competitions, under both the offensive and defensive conditions (Brouwer et al., 2005; Popowczak and Zwierko, 2025). Vision enables players to assess the situation on the court—such as the position of the ball, other players, and the distance to the goal—and thereby plan their strategy or adjust their movement technique (Miller and Clapp, 2011; Williams and Ericsson, 2005; Zemková et al., 2025). Visual stimuli can also

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[1] *Department of Physiology and Biomechanics, Wroclaw University of Health and Sport Sciences, Wroclaw, Poland.*
* Correspondence: artur.struzik@awf.wroc.pl

serve as motivational factors. Several studies have confirmed the role of additional external factors in enhancing jump height (Akbaş et al., 2022; Wulf and Dufek, 2009). Stine et al. (1982) concluded that athletes' visual abilities differed from those of non-athletes, characterized by a wider visual field, enhanced peripheral acuity, improved dynamic visual acuity, and more accurate depth perception. The sense of sight is continuously stimulated regardless of the sport practiced. Vision plays a crucial role in movement planning and three-dimensional environmental analysis (Presta et al., 2021).

Numerous studies have investigated the effect of vision and its absence on landing tasks (Chu et al., 2012; Magalhães and Goroso, 2009; Santello et al., 2001). Vision plays a key role in controlling pre-landing movements, however, when vision is limited, previous experience (muscle memory), as well as proprioceptive and vestibular information, can partially compensate for the lack of visual input (Imai et al., 2025). Drop landing under no-vision (NV) conditions leads to increased impact forces compared to full-vision (FV) conditions, underscoring the importance of visual cues in modulating landing mechanics (Chu et al., 2012; Santello et al., 2001). Proprioceptive (body sensory) and vestibular (balance and spatial orientation) signals received during the initial trials under reduced vision conditions enable the body to adapt to the situation (Mortazavi Najafabadi et al., 2025). Consequently, despite the lack of visual information, the nervous system generates appropriate motor output (i.e., pre-landing muscle activation), which closely resembles that observed under FV conditions. This highlights the compensatory role of other sensory modalities, such as proprioception, when visual input is unavailable (Magalhães and Goroso, 2009).

To the best of our knowledge, only one study to date has examined jump height under FV and NV conditions in healthy subjects (Abdollahipour et al., 2016). Jump height was higher under the FV compared to the NV condition. Killebrew et al. (2013) reported that the absence of visual stimuli negatively affected power during the double-leg press exercise. Based on the above findings, one would expect a reduction in visual input to negatively impact CMJ height. On the other hand, Iguchi et al. (2022) observed that the maximum CMJ height did not differ between young adults with and without visual impairment. However, those researchers noted the small sample size and suggested that their observation required further confirmation.

Therefore, the question remains whether individuals without visual impairment can perform multi-joint tasks under conditions of limited vision. To the best of our knowledge, there are currently no studies reporting CMJ performance under FV and NV conditions in individuals without visual impairment and high jumping abilities. Therefore, the purpose of this study was to investigate the role of vision in CMJ performance, including jump height, power, phase duration, and countermovement depth. It was hypothesized that a reduction in visual stimuli would lead to a decrease in CMJ height.

Methods

Participants

Thirty physically active men (age: 21.5 ± 1.1 years, body height: 1.83 ± 0.07 m, body mass: 78.6 ± 10.7 kg) without visual impairment and with high jumping abilities were recruited for the study. The participants were engaged in physical activity at least twice a week for a total of a minimum 3 h (at an amateur level). None of the subjects reported a musculoskeletal injury 12 months prior to the day of measurement. The inclusion criterion for the study was to perform a CMJ to a minimum height of 40 cm. The CMJ height criterion was verified on a group of 134 people in a pre-test session.

All measurements were carried out in the Biomechanical Analysis Laboratory (with PN-EN ISO 9001:2009 certification) of the Wroclaw University of Health and Sport Sciences, Wroclaw, Poland. Before starting the tests, each participant was familiarized with the purpose of the study, the movement tasks to be performed and the measurement methods to be used. All subjects provided informed consent for inclusion before participating in the study.

This study was conducted following the principles of the Declaration of Helsinki, and approved by the Senate’s Research Bioethics Commission of the Wroclaw University of Health and Sport Sciences, Wroclaw, Poland (protocol code: 10/2024; approval date: 29 May 2024).

Measures

The CMJs were performed on two Kistler

9286A force plates (Kistler Instrumente AG, Winterthur, Switzerland) to measure ground reaction forces (*GRF*). Data analysis was performed using Noraxon MR3 software (Noraxon Inc., Scottsdale, AZ, USA). The following variables were estimated for each CMJ: jump height (JH), peak power (PP), mean power (MP), countermovement depth (CD), countermovement time (CT) and propulsive time (PT).

JH was estimated based on the net impulse method (Linthorne, 2001; Mizuguchi et al., 2015). Impulse, which is the integral of force over time, causes a change in the momentum of the body. By applying the impulse-momentum theorem to the CMJ, from a stationary position (beginning of the movement, time t_0 with $v_0 = 0$ m/s) to the instant of take-off (at t_{to} time, when $GRF = 0$), the momentum during the propulsion phase can be described as:

$$\int_{t_0}^{t_{to}} [GRF(t) - mg]dt = mv_{to} \qquad (1)$$

where v_{to} is the vertical take-off velocity, t_{to} is the instant of take-off with v_{to}, t_0 is the beginning of the movement ($GRF = m \cdot g$), *GRF* is the vertical component of ground reaction force, m is the jumper's mass and g is the acceleration due to gravity (Linthorne, 2001). Therefore, v_{to} can be estimated as:

$$\frac{\int_{t_0}^{t_{to}} [GRF(t) - mg]dt}{m} = v_{to} \qquad (2)$$

Based on the determined v_{to}, JH was estimated using Equation 3:

$$JH = \frac{{v_{to}}^2}{2g} \qquad (3)$$

PP was the maximum value of the power-time curve during the propulsion phase, which is the product of the $GRF(t)$ and $v(t)$ curves (v means vertical velocity of the center of mass (COM)). The $v(t)$ curve was obtained by integrating the $a(t)$ curve over the time interval from t_0 to t_{to} (a means vertical acceleration of the COM). The $a(t)$ curve was obtained by subtracting the jumper's body weight ($m \cdot g$) from the $GRF(t)$ record and then dividing by jumper's body mass (m) (Linthorne, 2001). MP was calculated by averaging instantaneous values of the power over the propulsion phase.

CD was the magnitude of minimum value of the $y(t)$ curve (y means vertical displacement of the COM), which occurs at the boundary between the countermovement and propulsion phases, estimated by integrating the $v(t)$ curve:

$$y(t) = \int_{t_0}^{t_{to}} v(t)\, dt\,, \qquad (4)$$

where y is vertical displacement of the COM, v is the vertical velocity of the COM, t_{to} is the instant of take-off, and t_0 is beginning of the movement (Gajewski et al., 2018).

CT (time of the countermovement phase) is the time between the beginning of the movement t_0 (the beginning of the lowering of the *GRF* value in relation to the jumper's body weight) up to the CD point when $v = 0$ m/s (the point when the direction of the COM movement changes from downward to upward). PT (time of the propulsion phase) is the time between the CD point and the t_{to} point when the feet lose contact with the ground and $GRF = 0$ (McMahon et al., 2018).

Design and Procedures

All participants performed a total of 12 CMJs while wearing ski goggles: 6 under FV (normal ski goggles) and 6 under NV (occluded ski goggles) conditions, in randomized order (two jumps per condition were performed consecutively in a random sequence). The execution of the CMJ consisted of a rapid lowering of the COM, followed by a vertical take-off and landing at the take-off point. The participants were instructed to perform each CMJ to the greatest possible height after self-preferred countermovement depth. CMJs were performed with an arm swing. Each participant performed an individually adjusted warm-up before taking the measurements. The warm-up lasted approximately 15 min and included jogging, dynamic stretching exercises and several trial jumps. To avoid the effect of fatigue, a 30-s rest interval between the jumps was applied (Kuitunen et al., 2006).

Jumping tasks under NV conditions have already been successfully and safely performed by both people without visual impairment (Abdollahipour et al., 2016) and blind people (Iguchi et al., 2022). Hence, the study design should not raise concerns in terms of participants' safety. Additionally, due precautions were taken, i.e., a large and flat measurement space (Figure 1).

Statistical Analysis

The collected data were analyzed using two distinct statistical approaches: MAX_JUMPS and ALL_JUMPS. In the MAX_JUMPS approach, the highest CMJ under the FV condition and the highest CMJ under the NV condition for each participant were selected for further analysis. On the other hand, in the ALL_JUMPS approach, all correctly recorded CMJ trials were included in the analysis, comprising a total of 288 jumps. The Shapiro-Wilk test was used to verify the distribution of the variables obtained.

In the MAX_JUMPS approach, for variables with an approximately normal distribution, the student's *t*-test for dependent samples was used to compare CMJ performance between the FV and NV conditions. The Wilcoxon signed-rank test was used when the distribution of variables was non-normal. Relationships between variables describing the CMJ under FV and NV conditions were assessed using the *r*-Pearson correlation coefficient (Spearman's rank correlation coefficient for variables with non-normal distribution). The usual scale for correlation coefficients (CCs) was used for interpretation of *r* values: 0.0–0.1 (trivial); 0.1–0.3 (small); 0.3–0.5 (moderate); 0.5–0.7 (large); 0.7–0.9 (very large); and 0.9–1 (nearly perfect). Depending on the test (parametric or non-parametric), Cohen's *d* or r_g was calculated as the effect size. The following interpretation of the effect size was adopted: 0.2–0.5: small effect, 0.5–0.8: medium effect and >0.8: large effect (Vacha-Haase and Thompson, 2004).

In the ALL_JUMPS approach, a two-way ANOVA was conducted, with ID as the first factor (participant) and CONDITION as the second factor (FV, NV). The Kolmogorov-Smirnov test indicated no significant deviation from normality for any of the analyzed variables. Additionally, the skewness and kurtosis values of the analyzed variables fell within acceptable limits, supporting the validity of the analysis (Demir, 2022). Eta squared (η^2) was calculated to quantify the effect size, representing the proportion of variance explained by the respective factor. According to conventional guidelines adapted from Cohen (1988), η^2 values of 0.01, 0.06, and 0.14 were considered small, medium, and large effects, respectively.

For variables describing CMJs under FV and NV conditions, the interclass correlation coefficient (ICC) was calculated to determine intrasession reliability. ICC values less than 0.5 indicated poor reliability, values between 0.5 and 0.75 indicated moderate reliability, values between 0.75 and 0.9 indicated good reliability, and values greater than 0.90 indicated excellent reliability (Koo and Li, 2016).

Statistica 13.3 software (TIBCO Software Inc., Santa Clara, CA, USA) was used to performed all analyses. For all performed tests, the significance level of $\alpha < 0.05$ was adopted.

Results

For all analyzed variables describing CMJs under FV and NV conditions, the ICC was excellent (Table 1).

In the MAX_JUMPS approach, with the exception of PP and MP under the NV condition, all other analyzed variables presented approximately normal distributions. Although the distribution of PP and MP under NV conditions was non-normal, the skewness was within an acceptable range (Demir, 2022).

No significant differences were found in JH, MP, CD, CT or PT between the FV and NV conditions (Table 2). Under the FV condition, PP was by 87 ± 222 W higher than under the NV condition ($p < 0.05$). The effect sizes were small for the variables analyzed. Furthermore, the relationships between the variables describing the CMJs under the FV and NV conditions were large, very large or nearly perfect ($p < 0.001$).

A two-way ANOVA revealed a significant main effect of CONDITION on CMJ performance, specifically with regard to JH ($F[1,227] = 11.315$; $p < 0.001$, $\eta^2 = 0.002$), PP ($F[1,227] = 5.079$; $p < 0.05$, $\eta^2 = 0.001$), MP ($F[1,227] = 7.353$; $p < 0.01$, $\eta^2 = 0.002$)), and CT ($F[1,227] = 12.272$; $p < 0.001$, $\eta^2 = 0.010$), although the effect sizes η^2 were practically non-significant, suggesting a negligible practical impact of the experimental condition. For PT and CD, the main effect of CONDITION was not statistically significant.

However, the interaction ID x CONDITION was not significant for JH, PP, MP, and PT, indicating that the effect of CONDITION on CMJ performance did not differ meaningfully across participants. The ID x CONDITION interaction was significant only for CT ($F[29,227] = 3.621$; $p < 0.001$, $\eta^2 = 0.087$) and CD ($F[29,227] = 2.204$; $p<0.001$, $\eta^2 = 0.031$). Therefore, the effect of CONDITION varied across participants only for

CT and CD. The effect size η^2 for CT indicated a moderate interaction effect ($\eta^2 = 0.087$), while the effect for CD could be interpreted as small.

Additionally, a significant main effect of ID was observed for JH ($F[29,227] = 147.666$; $p < 0.001$, $\eta^2 = 0.941$), PP ($F[29,227] = 192.399$; $p < 0.001$, $\eta^2 = 0.955$), MP ($F[29,227] = 128.553$; $p < 0.001$, $\eta^2 = 0.932$), CT ($F[29,227] = 29.587$; $p < 0.001$, $\eta^2 = 0.714$), PT ($F[29,227] = 58.544$; $p < 0.001$, $\eta^2 = 0.868$), and CD ($F[29,227] = 60.092$; $p < 0.001$; $\eta^2 = 0.857$), indicating substantial between-subject variability. The η^2 values observed for JH, PP, MP, CT, PT, and CD all indicated very large effect sizes, suggesting that individual differences accounted for the majority of variance in these variables.

Table 1. ICC values for variables describing CMJs under full-vision (FV) and no-vision (NV) conditions.

	FV	NV
JH	0.94	0.94
PP	0.97	0.97
MP	0.95	0.93
CD	0.92	0.95
CT	0.91	0.91
PT	0.91	0.91

JH: jump height; PP: peak power; MP: mean power; CD: countermovement depth; CT: countermovement time; PT: propulsive time

Table 2. The variables describing CMJs under full-vision (FV) and no-vision (NV) conditions (for the MAX_JUMPS approach).

	FV MEAN ± SD	NV MEAN ± SD	*p*	Effect size	CC
JH [m]	0.473 ± 0.059	0.469 ± 0.059	0.104	0.31	0.98**
PP [W]	5343 ± 981	5256 ± 929	0.014*	0.45	0.98**
MP [W]	2566 ± 471	2595 ± 486	0.094	0.31	0.96**
CD [m]	0.312 ± 0.055	0.312 ± 0.065	0.950	0.01	0.63**
CT [s]	0.54 ± 0.12	0.52 ± 0.09	0.198	0.24	0.76**
PT [s]	0.28 ± 0.04	0.28 ± 0.04	0.496	0.13	0.83**

*JH: jump height; PP: peak power, MP: mean power; CD: countermovement depth; CT: countermovement time; PT: propulsive time; CC: correlation coefficients; * significant difference between FV and NV conditions at p < 0.05; ** significant relationship between FV and NV conditions at p < 0.001*

Figure 1. Laboratory testing set-up (no-vision conditions).

Discussion

The aim of this study was to investigate the role of vision in CMJ performance, including jump height, power, phase duration, and countermovement depth. For the MAX_JUMPS approach, due to the lack of significant differences between the FV and NV conditions for the variables describing CMJs (JH, MP, CD, CT, PT), it can be stated that physically active people with a relatively high level of jumping abilities are able to perform this complex movement similarly under both FV and NV conditions, despite the exclusion of visual stimuli. It seems surprising, especially in the context of reports indicating the negative impact of visual stimuli reduction on movement performance (Abdollahipour et al., 2016; Iwańska and Urbanik, 2013; Killebrew et al., 2013), that a person can jump as high with their eyes blindfolded as with the eyes open. In addition, 9 of the 30 subjects were able to achieve a greater JH under the NV than under the FV condition (although by a small value $\Delta = 0.010 \pm 0.008$ m). The JH, MP, CD, CT, PT values were similar under the NV compared to the FV condition, as further highlighted by the significant positive relationships and small effect sizes (Table 2). PP is only an instantaneous value that offers relatively little insight about the CMJ performance (Cormie et al. 2009). Take-off velocity is determined by the propulsion phase impulse; hence MP is a much more valuable variable for determining the performance of CMJ than PP.

The analysis using the ALL_JUMPS approach confirmed the findings obtained with the MAX_JUMPS approach. Although the effect of CONDITION was statistically significant for JH, PP, MP, and PT, the effect size values indicated a negligible impact on CMJ performance. With regard to the ID x CONDITION interaction, differences in responses to FV vs. NV conditions among individuals were not significant for JH, PP, MP, and PT. The effect of CONDITION varied across participants only for CT (with moderate interaction effect size) and CD (with small interaction effect size). This suggests that, for certain participants, the NV condition may have resulted in a reduced countermovement time, potentially due to greater concentration on task execution in the absence of visual stimuli. Individual differences in CMJ performance were the main source of variability, as indicated by the very large and significant ID effect. This was expected and likely reflected natural variability in human motor abilities. It can therefore be concluded that JH, PP, MP, CT, PT, and CD exhibited relatively similar values under the FV and NV conditions. However, certain signs of adaptation to the NV condition may be reflected in a reduced CT.

Iwańska and Urbanik (2013) reported the crucial role of proprioceptors, particularly muscle spindles and Golgi tendon organs, in providing detailed information about limb positioning during CMJs. The intense muscle contractions associated with maximal jumping performance increase the impulses sent by muscle spindles, enhancing proprioception and facilitating effective jump execution even in the absence of visual input. The proprioceptive feedback during dynamic movements like the CMJ is highly complex and influenced by sudden muscle stretching in the stretch-shortening cycle and the simultaneous activation of antagonistic muscle groups. This interaction, regulated by the Golgi tendon organs, prevents excessive force generation and protects the muscle-tendon complex from potential damage. These mechanisms support the observed independence of CMJ performance from visual stimuli, as proprioceptive signals dominate in controlling jump mechanics (Magalhães and Goroso, 2009). Confirmation of this concept was also reported by Iguchi et al. (2022) who noted that the maximum CMJ height did not differ among young adults with and without visual impairment.

However, previous research shows that a lack of visual stimuli decreases CMJ height because the neuromuscular system may control balance and propulsion force less effectively, especially when jumping to the required height rather than the maximum height (Fairbrother, 2010). So far, only one study has analyzed JH under FV and NV conditions in healthy subjects (Abdollahipour et al., 2016). Abdollahipour et al. (2016) noted a decrease in JH when visual input was excluded (FV and NV conditions). Iwańska and Urbanik (2013) also reported that excluding visual stimuli (eyes closed) inhibited achieving maximum JH during the CMJ and the squat jump (SJ). However, these discrepancies, compared to the present study, may be attributed to methodological differences, such as task demands and attentional conditions (i.e., adding external focus such as an overhead goal).

As noted earlier, vision is crucial in team games to control the situation on the field. Players must not only focus on the ball, but also monitor their own and the opponent's team players. Buscemi et al. (2024) pointed out that central-peripheral coordination allowed athletes to better register environmental cues without constant eye movements, enhancing situational awareness. Even if research does not include a vertical jump task, some studies (Buscemi et al., 2024; Edmunds et al., 2019; Shahani et al., 2026) suggest a nuanced approach to sports training, where both proprioceptive and visual training components play complementary roles. While sport-specific training, such as in soccer, aims to enhance visual skills (peripheral and spatial vision) and remains valuable (Presta et al., 2021), our study emphasizes the importance of proprioceptive training. Proprioceptive training also develops various aspects of athletic performance, including physiological capacity, balance, power, knee joint position sense, muscle activation, and technical ball-control skills (Yilmaz et al., 2024).

It can be suggested that proprioception is an important factor in dynamic movements such as the CMJ, while visual stimuli appear to be of lesser importance. However, in sports involving more complex demands that require both rapid reaction and precise movement control, integrated training appears to be essential. This approach integrates proprioceptive training with visual exercises, with the objective of enhancing overall performance and decision-making in dynamic situations (Gidu et al., 2022; Yilmaz et al., 2024). Despite the fact that certain studies have demonstrated the positive impact of the overhead goal on jump height, the training method incorporating this technique has not been shown to yield superior results in comparison with training without the overhead goal. The use of overhead goals as a strong motivating factor may be justified for use in periodic testing, but not as a regularly used element of training (Akbaş et al., 2022; Wulf and Dufek, 2009).

The implementation of proprioception-focused training sessions, e.g., excluding vision, has the potential to enhance overall athletic performance. The elimination of visual stimuli has been demonstrated to result in enhanced motor automatization, thereby enabling athletes to allocate greater cognitive resources to environmental perception in comparison to the execution of the movement itself. This may improve the athlete's ability to adapt to both internal (e.g., neural or muscular) and external (e.g., environmental) perturbations (Zagrodny et al., 2023). Possible evidence for this is the significant ID x CONDITION interaction observed for CT. For instance, in the context of a sporting event, athletes tend to prioritize the location of the ball on the field over the mechanics of running. Their concentration is oriented towards the accomplishment of the objective, as opposed to the physical act of movement itself (Xia et al., 2026). Consequently, the integration of proprioceptive training in conjunction with visual training appears to be imperative for attaining maximal performance that demands both power and precise movement control. This approach may also be applied in the rehabilitation of athletes following injuries (including those involving the lower limbs), as well as in injury prevention. Proprioceptive control is considered one of the key factors in effectively reducing the incidence of ankle sprains, knee sprains, and low back pain (Riva et al., 2016). However, the impact of proprioceptive training involving exercises without visual input on motor performance, rehabilitation, and injury prevention remains an area that requires further investigation. Thus, the statement that the proprioceptive system plays a more important role than visual input during a maximal vertical jump should still be regarded as a hypothesis, requiring future experimental confirmation to substantiate this interpretation.

A limitation of this study includes the type of participants who were healthy men with high jumping abilities. Consequently, the results cannot be generalized to the broader population. Theoretically, different outcomes may be expected in women, older adults, individuals with visual impairment and balance disorders, or those with low physical fitness. It is presumed that the absence of visual stimuli can be a greater inconvenience for groups with lower physical fitness compared to those with high jumping abilities. However, in individuals with low jumping abilities, the achieved JH (e.g., approximately 20 cm) may be insufficient for the differences between FV and NV conditions to reach statistical significance. When designing the experiment, it was expected that significant differences between FV and NV conditions would only be observed at sufficiently high JH. Future research should focus on specific groups of athletes, including those with previous injuries, and incorporate virtual reality technology as a means to manipulate visual stimuli. An additional direction for future research could involve the collection of neurophysiological data, particularly from lower limb muscles, alongside biomechanical variables describing the CMJ.

Conclusions

Our research shows that limiting visual stimuli does not necessarily have a negative effect on CMJ performance. In fact, it can reduce the negative impact of interference on maximum effort (e.g., maximum JH). Of course, vision cannot be completely eliminated during training. Therefore, we suggest that exercises that do not require external information (e.g., the position of the ball or the opponent) should also be performed with closed eyes. While this approach eliminates the possibility of using additional external stimuli as motivating factors to maximize performance, such as an overhead goal, reducing unnecessary hindering external stimuli may be more important.

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ORCID iD:

Artur Struzik: https://orcid.org/0000-0002-4798-7899

Joanna Broda: https://orcid.org/0009-0004-2919-095X

Bogdan Pietraszewski: https://orcid.org/0000-0002-4279-4828

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