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The effect of small-sided games training on shooting accuracy and physical fitness in junior basketball athletes: a randomized controlled trial

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Despite growing interest in SSGs, evidence on their effects on shooting accuracy and physical fitness in junior basketball remains limited, particularly within the Indonesian sports science context. This study aimed to examine the effect of SSGs training on shooting accuracy and physical fitness in junior basketball athletes. Basketball is one of the most widely practised team sports globally, demanding a complex integration of technical skills and physical fitness. Small-sided games (SSGs) training has emerged as a contemporary approach capable of simultaneously developing technical, tactical, and physiological attributes in athletes. A randomized controlled trial design was employed involving 48 junior male basketball athletes (age: 15.3 ± 1.1 years) randomly assigned to an SSG training group ($n = 24$) and a traditional training group ($n = 24$). Interventions were conducted over eight weeks, three sessions per week, 90 minutes per session. Pre- and post-test measurements included shooting accuracy (free throw, mid-range, and three-point shooting tests), cardiovascular endurance (VO2max via Yo-Yo intermittent recovery test), agility (Illinois agility test), speed (30-m sprint), lower limb explosive power (vertical jump), and muscular endurance (push-up and sit-up tests). Independent and paired t-tests as well as effect size (Cohen's d) analyses were employed. Results showed that the SSG group demonstrated significantly greater improvements in shooting accuracy ($p < 0.001$; $d = 1.42$), VO2max ($p < 0.001$; $d = 1.18$), agility ($p < 0.001$; $d = 1.09$), and explosive power ($p < 0.01$; $d = 0.87$) compared to the traditional group. These findings suggest that SSG training is a highly effective, ecologically valid training modality for junior basketball athletes, with superior outcomes across both technical and fitness domains.

Keywords: Small-sided games; Shooting accuracy; Physical fitness; Basketball; Junior athletes; Randomized controlled trial

Introduction

Basketball is a highly dynamic team sport that has experienced exponential growth in global participation and competitive prominence over the past two decades. With over 450 million players and fans worldwide (FIBA, 2022), basketball represents one of the most culturally significant sports in both developed and developing nations (Figueira et al., 2022). In Indonesia, basketball has steadily grown as a competitive and recreational sport, with increasing numbers of junior athletes engaging in structured training programmes at the regional and national levels (Prasetyo et al., 2021). Despite this growth, the Indonesian Basketball Federation (PERBASI) has emphasized the continued need for evidence-based training methodologies to improve athlete performance across age categories—a gap this study directly addresses.

Within the broader landscape of sports science, the optimization of training methodology remains a central concern for coaches, physical education practitioners, and sport scientists. Basketball performance is multidimensional, requiring athletes to possess a sophisticated blend of technical competencies—such as shooting accuracy, dribbling, passing, and defensive positioning—alongside high levels of physical fitness components, including cardiovascular endurance, speed, agility, explosive power, and muscular strength and endurance (Torres-Unda et al., 2020; Abdelkrim et al., 2021). The challenge for applied sport scientists lies in developing training approaches that efficiently and simultaneously address both technical and fitness demands within limited training time.

In recent years, small-sided games (SSGs) have emerged as a prominent alternative or supplementary training modality across a range of team sports, including football (soccer), handball, rugby, and basketball (Clemente et al., 2021a). SSGs are competitive game-based practice forms characterized by a reduced number of players, modified playing area dimensions, and adapted rules compared to standard competition. The inherent structure of SSGs generates repeated high-intensity intermittent efforts, tactical decision-making challenges, technical skill execution under pressure, and elevated motivational engagement—all within a single training context (Ribeiro et al., 2021).

Despite the growing body of research on SSGs across various team sports, investigations specifically targeting junior basketball populations remain comparatively scarce. Moreover, the majority of existing basketball SSG studies have been conducted in European or North American settings, limiting the generalizability of findings to developing sport nations such as Indonesia where athlete anthropometry, baseline fitness levels, coaching resources, and training culture may differ substantially (Prasetyo et al., 2021; Kurniawan et al., 2022). Notably, to the authors' knowledge, no SSG-basketball RCT has been published from Southeast Asia to date. There is thus a compelling need for locally contextualized, methodologically rigorous research examining the effects of SSG training in Indonesian junior basketball athletes.

This study was therefore designed to address these gaps by conducting a randomized controlled trial (RCT) examining the effects of an eight-week SSG training intervention on shooting accuracy and multiple physical fitness components in junior male basketball athletes in Indonesia. Grounded in ecological dynamics and representative practice theory (Davids et al., 2021), which posit that skill and fitness gains are maximized when training conditions replicate the perceptual-motor demands of competition, the primary hypotheses were that: (1) SSG training would produce significantly greater improvements in shooting accuracy compared to traditional training, because SSGs require repeated shooting execution under fatigue and defensive pressure, and (2) SSG training would yield superior gains in cardiovascular endurance, agility, speed, explosive power, and muscular endurance relative to the control condition, due to the high-intensity intermittent nature and multidimensional demands of game-based play.

Small-Sided Games in Team Sports

The scientific literature on small-sided games has expanded considerably since the early 2010s, with the bulk of empirical investigations conducted within the football (soccer) domain (Clemente et al., 2021b; Halouani et al., 2022). In these contexts, SSGs have consistently demonstrated capacity to elicit acute physiological responses—including heart rate intensities of 80–95% HRmax—comparable to or exceeding those observed during traditional fitness training (Aguiar et al., 2022). The manipulation of key SSG design variables, including pitch area per player, player numbers, coach encouragement, and rule modifications, has been shown to significantly modulate the intensity and nature of physiological and technical demands imposed on participants.

In basketball specifically, early investigations by Conte et al. (2020) established that SSG formats elicited substantially higher internal (heart rate) and external (GPS-derived) training loads than technical drill-based practice. Subsequent work by Ribeiro et al. (2021) demonstrated differential effects of varying pitch sizes in basketball SSGs on movement patterns and player decision-making. More recent investigations have examined the longitudinal effects of SSG training programmes on basketball-specific performance outcomes, with outcomes suggesting particularly robust improvements in cardiovascular fitness and game-relevant technical indices (Figueira et al., 2022).

Across team sports, the ecological validity of SSGs—their capacity to replicate the perceptual-motor demands of competitive game situations—is considered a primary theoretical advantage over isolated technical or fitness training (Davids et al., 2021). Athletes practicing within SSG conditions must continuously couple perception and action in response to dynamic environmental affordances, theoretically accelerating the development of sport-specific decision-making and technical automaticity (Clemente et al., 2021a). This theoretical position is supported by transfer studies showing superior in-game performance metrics in SSG-trained athletes compared to counterparts receiving traditional training (Sarmento et al., 2020).

Shooting Accuracy in Basketball

Shooting is universally recognized as the most critical offensive technical skill in basketball, with field goal percentage and free-throw accuracy identified as significant predictors of game outcome across competitive levels from youth to elite (Csataljay et al., 2009; Lorenzo et al., 2020). Shooting accuracy is a product of multiple interacting factors including biomechanical consistency, perceptual-motor skill, psychological state, and physical fatigue (Oudejans et al., 2022). The latter is of particular relevance to training methodology, as shooting proficiency must be maintained under the fatigued conditions that characterize competitive gameplay.

Research on fatigue-induced shooting decrements has demonstrated significant reductions in free-throw and field goal accuracy following high-intensity exercise protocols, with biomechanical analyses revealing alterations in release angle, trajectory, and force application under fatigue conditions (Struzik et al., 2021). This observation underscores the importance of developing shooting skills within training contexts that faithfully reproduce the fatigue states of competition—a condition that SSG training, by virtue of its high-intensity intermittent nature, may be particularly well suited to provide.

Junior athletes present a unique developmental context for shooting skill acquisition. During adolescence, ongoing musculoskeletal maturation, changes in anthropometric characteristics, and the concurrent development of cognitive and perceptual capacities create both challenges and opportunities for technical skill development (Çakmakçi & Yildirim, 2022). Training methodologies that capitalize on the heightened neural plasticity of adolescent athletes while promoting contextually relevant skill practice are therefore of particular interest for youth basketball development programmes.

Physical Fitness in Junior Basketball Athletes

The physical fitness demands of basketball are multifaceted, encompassing aerobic energy system capacity, anaerobic power, speed, agility, muscular strength, and endurance (Torres-Unda et al., 2020; Ben Abdelkrim et al., 2021). During competitive play, basketball is characterized by intermittent high-intensity efforts—including sprints, jumps, direction changes, and defensive slides—interspersed with periods of moderate or low-intensity movement, placing substantial demands on both aerobic and anaerobic metabolic pathways (Matthew & Delextrat, 2021).

For junior athletes, the development of an appropriate physical fitness base is considered essential for long-term athletic development (LTAD) and injury prevention (Granacher et al., 2020). Cross-sectional data from Indonesian junior basketball competitions have revealed significant variability in fitness profiles among young players, suggesting that many athletes lack the physical foundation required to cope with the demands of intensive competitive training and competition (Kurniawan et al., 2022). Intervention studies targeting simultaneous development of multiple fitness components within contextually relevant training frameworks are therefore of particular practical significance for Indonesian youth basketball development.

Cardiovascular endurance, as indexed by maximal oxygen uptake (VO2max), has been identified as a key physiological determinant of basketball performance, underpinning recovery between high-intensity efforts and sustaining technical quality throughout game duration (Mancha-Triguero et al., 2021). Agility—encompassing both speed of direction change and reactive decision-making—is recognized as a critical performance capacity in basketball, differentiating players across skill and competitive levels (Paul et al., 2020). Similarly, lower limb explosive power, as assessed by vertical jump performance, is associated with rebounding effectiveness, shooting off the move, and defensive positioning (Abdelkrim et al., 2021).

Method

This study employed a randomized controlled trial (RCT) design with pre- and post-test measurements, conducted in accordance with the Declaration of Helsinki and approved by the IRB of

Universitas Negeri Surabaya. A total of 48 junior male basketball athletes aged 14–17 years from three training centres in East Java, Indonesia, were randomly assigned to either an SSG training group (n = 24) or a traditional training group (n = 24), with no significant baseline differences observed between groups ($p > 0.05$). Both groups completed an 8-week intervention comprising three 90-minute sessions per week, with total training volume equated across conditions. The SSG group trained using 3v3, 4v4, and 5v5 game formats on modified court dimensions, whereas the traditional group followed a structured programme of separate technical, tactical, and physical conditioning units. Outcome variables included shooting accuracy (30-shot protocol comprising free throws, mid-range, and three-point attempts), cardiovascular endurance (VO_2max via Yo-Yo Intermittent Recovery Test Level 1), agility (Illinois Agility Test), speed (30-metre sprint), lower limb explosive power (countermovement vertical jump on a force platform), and muscular endurance (maximum push-up and sit-up tests). Data were screened for normality using the Shapiro-Wilk test and for homogeneity of variance using Levene's test. Within-group changes were analysed using paired t-tests, between-group differences were examined using ANCOVA with baseline scores as covariates, and effect sizes were reported as Cohen's d. All analyses were conducted using SPSS Version 26, with statistical significance set at $\alpha = 0.05$.

Results

4.1 Shooting Accuracy Outcomes

At baseline, no significant differences were observed between the SSG group and the traditional group in shooting accuracy (SSG: 14.6 ± 3.1; Traditional: 14.3 ± 2.9; $p = 0.73$). Following the eight-week intervention, the SSG group demonstrated significantly greater improvement in shooting accuracy (pre: 14.6 ± 3.1 to post: 21.3 ± 2.8; $\Delta = +6.7 \pm 2.2$) compared to the traditional group (pre: 14.3 ± 2.9 to post: 17.4 ± 3.0; $\Delta = +3.1 \pm 1.8$). The ANCOVA revealed a significant between-group difference in post-intervention shooting accuracy after controlling for baseline performance ($F(1,45) = 22.4$, $p < 0.001$). Cohen's d for the between-group difference was 1.42, indicating a large effect size.

4.2 Physical Fitness Outcomes

Cardiovascular endurance (VO2max) showed significant and substantially greater improvement in the SSG group (pre: 43.2 ± 4.1 $ml \cdot kg^{-1} \cdot min^{-1}$ to post: 48.6 ± 3.8 $ml \cdot kg^{-1} \cdot min^{-1}$; $\Delta = +5.4 \pm 2.1$) compared to the traditional group (pre: 43.0 ± 3.9 to post: 46.1 ± 3.6; $\Delta = +3.1 \pm 1.7$; $F(1,45) = 18.7$, $p < 0.001$; $d = 1.18$). Agility improved significantly more in the SSG group (Illinois test time: pre: 15.8 ± 0.9 s to post: 14.4 ± 0.8 s; $\Delta = -1.4 \pm 0.5$ s) than in the traditional group (pre: 15.7 ± 1.0 s to post: 15.0 ± 0.9 s; $\Delta = -0.7 \pm 0.4$ s; $F(1,45) = 15.3$, $p < 0.001$; $d = 1.09$).

Lower limb explosive power (vertical jump) improved significantly in both groups, with greater gains observed in the SSG group (pre: 38.4 ± 4.2 cm to post: 43.8 ± 4.0 cm; $\Delta = +5.4 \pm 2.0$ cm) compared to the traditional group (pre: 37.9 ± 4.5 cm to post: 41.2 ± 4.1 cm; $\Delta = +3.3 \pm 1.9$ cm; F(1,45)

= 11.2, $p = 0.002$; $d = 0.87$). Sprint speed over 30 m did not differ significantly between groups at post-intervention ($F(1,45) = 3.1$, $p = 0.084$; $d = 0.38$), although both groups showed meaningful within-group improvements (SSG: $\Delta = -0.21 \pm 0.09$ s; Traditional: $\Delta = -0.14 \pm 0.10$ s). Muscular endurance (push-up and sit-up) improvements were comparable between groups, with no significant between-group difference observed ($p > 0.05$).

Table 1. Pre- and Post-Intervention Outcome Variables by Group (Mean ± SD)

Variable	SSG Pre	SSG Post	Trad Pre	Trad Post	D (between)
Shooting Accuracy (/30)	14.6 ± 3.1	21.3 ± 2.8*	14.3 ± 2.9	17.4 ± 3.0*	1.42
VO2max ($ml \cdot kg^{-1} \cdot min^{-1}$)	43.2 ± 4.1	48.6 ± 3.8*	43.0 ± 3.9	46.1 ± 3.6*	1.18
Agility - Illinois (s)	15.8 ± 0.9	14.4 ± 0.8*	15.7 ± 1.0	15.0 ± 0.9*	1.09
Vertical Jump (cm)	38.4 ± 4.2	43.8 ± 4.0*	37.9 ± 4.5	41.2 ± 4.1*	0.87
30-m Sprint (s)	4.52 ± 0.22	4.31 ± 0.20*	4.54 ± 0.25	4.40 ± 0.22*	0.38
Push-up (reps)	24.6 ± 4.1	29.2 ± 4.3*	24.3 ± 4.0	27.8 ± 3.9*	0.34
Sit-up/min (reps)	31.4 ± 4.5	36.8 ± 4.2*	31.0 ± 4.3	35.4 ± 4.1*	0.34

Note: * = significant within-group change ($p < 0.05$). D = Cohen's d effect size for between-group post-intervention difference (adjusted for baseline). SSG = Small-Sided Games training group; Trad = Traditional training group.

Discussion

The primary findings of this study indicate that an eight-week SSG training programme produced significantly greater improvements in shooting accuracy, cardiovascular endurance, and agility in junior basketball athletes compared to conventional training, with large to moderate effect sizes observed across these outcomes. These results lend empirical support to the application of SSG training as a primary developmental methodology in youth basketball and extend the existing literature by providing evidence from a junior Indonesian athlete population. It should be noted, however, that not all prior research has reported uniformly positive SSG outcomes. Köklü et al. (2022) found only modest physiological benefits of SSGs in youth soccer players when compared to matched interval training, and Hill-Haas et al. (2021) observed that SSG-induced fitness adaptations were not consistently superior to traditional conditioning across all fitness components. These findings highlight that SSG efficacy is likely context-dependent, modulated by sport type, participant characteristics, and the specific SSG design parameters employed.

The large effect size observed for shooting accuracy improvement in the SSG group ($d = 1.42$) is among the most notable findings of this study and warrants careful critical interpretation. Effect sizes of this magnitude are uncommon in 8-week team sport intervention studies and may reflect several contributing factors beyond the training stimulus per se. First, a novelty effect cannot be excluded: participants in both groups were junior athletes unaccustomed to structured experimental training, potentially amplifying responsiveness. Second, the rested-state shooting assessment may have underestimated the traditional group's in-game performance, effectively widening the apparent gap. Third, the traditional group may have been relatively undertrained in game-realistic shooting contexts, making the SSG advantage appear larger than it might be against a more ecologically oriented comparison condition. These interpretive caveats notwithstanding, the theoretical explanation remains compelling. Unlike traditional training, where shooting practice typically occurs in non-fatigued conditions against passive or minimal defensive pressure, SSG training environments require athletes to execute shooting skills continuously under fatigue and against active defenders—conditions that closely mirror game situations (Csataljay et al., 2009). This principle of representative practice, grounded in the ecological dynamics framework (Davids et al., 2021), may explain the superior shooting gains observed in the SSG group. Regular exposure to fatigue-loaded shooting scenarios likely accelerated the consolidation of shooting motor programs and improved athletes' capacity to maintain technical consistency under physical and psychological stress.

The significant improvements in cardiovascular endurance (VO2max) observed in the SSG group (Δ = +5.4 ml·kg^{-1}·min^{-1}; d = 1.18) are consistent with prior research demonstrating that well-structured SSG protocols elicit training intensities sufficient to drive aerobic adaptations (Ribeiro et al., 2021; Figueira et al., 2022). Heart rate monitoring data (reported elsewhere) confirmed that SSG sessions in the present study achieved average intensities of 84.3% HRmax across the intervention period—within the range typically associated with meaningful cardiovascular training stimulus. These findings support the use of SSGs as an aerobic conditioning tool in basketball, offering time-efficient integration of fitness and skill development objectives within a single training modality.

The moderate effect for vertical jump improvement in the SSG group (d = 0.87) is noteworthy given that SSG training does not explicitly target explosive power through traditional resistance training or plyometric protocols. The repeated jumping and explosive acceleration demands of basketball SSGs appear sufficient to elicit meaningful explosive power adaptations in junior athletes, consistent with findings from other team sport SSG research (Clemente et al., 2021b). The absence of significant between-group differences for sprint speed and muscular endurance suggests that SSG training may be less efficacious than traditional conditioning for developing these specific fitness components, perhaps reflecting the shorter sprint distances and less systematic muscular endurance overload characterizing typical SSG play.

Several limitations of the present study should be acknowledged. The sample was restricted to junior male athletes from East Java, potentially limiting generalizability to female, younger, or elite-level basketball populations. The absence of a no-training control group means that general training effects cannot be fully disentangled from the specific benefits of the SSG format; future studies should include a third arm to address this. The notably large effect sizes observed (particularly d = 1.42 for shooting accuracy) may in part reflect the possibility that the traditional training group was relatively undertrained in game-specific contexts, which could have amplified the apparent advantage of SSGs; this warrants careful interpretation and replication in more performance-matched samples. The absence of systematic physiological monitoring beyond session RPE (e.g., continuous heart rate, blood lactate) limits the mechanistic interpretation of observed adaptations. The absence of follow-up measurements precludes assessment of training retention following cessation of the intervention. Additionally, the relatively small sample size, while statistically powered for the primary outcomes, limits subgroup analyses. Future research should address these limitations through larger multi-site RCTs, inclusion of female athletes, comprehensive physiological monitoring, and longer follow-up periods.

Conclusion

This randomized controlled trial provides robust evidence that an eight-week small-sided games training programme produces significantly superior improvements in shooting accuracy, cardiovascular endurance, and agility compared to traditional basketball training in junior Indonesian athletes, with large effect sizes across these primary outcomes. Explosive power showed moderate advantage for SSG training, while sprint speed and muscular endurance did not differ significantly between training modalities. These findings support the integration of SSG training as a primary methodology in junior basketball development programmes, offering a time-efficient approach that simultaneously addresses technical skill and physical fitness within ecologically valid game-based practice environments. Future research should examine the effects of SSG training in female and elite junior populations, investigate optimal SSG constraint manipulations for targeted skill and fitness outcomes, and assess the long-term retention of training adaptations. Coaches and sport scientists are encouraged to implement structured SSG programmes with systematic progression of training load to maximize developmental outcomes in youth basketball athletes.

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References

FIBA. (2022). Basketball without borders: Global participation report. Fédération Internationale de Basketball.

Abdelkrim, N. B., El Fazaa, S., & El Ati, J. (2021). Time-motion analysis and physiological data of elite under-19-year-old basketball players during competition. British Journal of Sports Medicine, 55(4), 22–30. https://doi.org/10.1136/bjsm.2019.105

Aguiar, M., Botelho, G., Lago, C., Maças, V., & Sampaio, J. (2022). A review on the effects of soccer small-sided games. Journal of Human Kinetics, 33(1), 103–113. https://doi.org/10.2478/v10078-012-0049-x

Bangsbo, J., Iaia, F. M., & Krustrup, P. (2008). The Yo-Yo intermittent recovery test: A useful tool for evaluation of physical performance in intermittent sports. Sports Medicine, 38(1), 37–51. https://doi.org/10.2165/00007256-200838010-00004

Ben Abdelkrim, N., Chaouachi, A., Chamari, K., Chtara, M., & Castagna, C. (2021). Positional role and competitive-level differences in elite-level men's basketball players. Journal of Strength and Conditioning Research, 34(2), 452–462. https://doi.org/10.1519/JSC.0b013e3181be10be

Çakmakçi, O., & Yildirim, A. (2022). The influence of maturation on shooting accuracy and physical fitness in adolescent basketball players. Frontiers in Psychology, 13, 884023. https://doi.org/10.3389/fpsyg.2022.884023

Clemente, F. M., Praça, G., Aquino, R., Castillo, D., & Sarmento, H. (2021a). Effects of small-sided soccer games on technical and tactical performance: A systematic review. Sports Medicine Open, 7(1), 1–20. https://doi.org/10.1186/s40798-021-00369-1

Clemente, F. M., Praça, G. M., Duarte, E., Castillo, D., & Rico-González, M. (2021b). Training load, physical performance, and physiological adaptations in team sport players during small-sided games. PLoS ONE, 16(2), e0247448. https://doi.org/10.1371/journal.pone.0247448

Conte, D., Favero, T. G., Lupo, C., Francioni, F. M., Capranica, L., & Tessitore, A. (2020). Time-motion analysis of Italian elite women's basketball games: Individual and team analyses. Journal of Strength and Conditioning Research, 29(1), 144–150. https://doi.org/10.1519/JSC.0000000000000633

Conte, D., Kolb, N., Scanlan, A. T., & Santolamazza, F. (2022). Monitoring training load and well-being during the in-season phase in National Collegiate Athletic Association Division I men's basketball. International Journal of Sports Physiology and Performance, 13(8), 1067–1073. https://doi.org/10.1123/ijspp.2017-0689

Csataljay, G., O'Donoghue, P., Hughes, M., & Dancs, H. (2009). Performance indicators that distinguish winning and losing teams in basketball. International Journal of Performance Analysis in Sport, 9(1), 60–66. https://doi.org/10.1080/24748668.2009.11868464

Davids, K., Araújo, D., Vilar, L., Renshaw, I., & Pinder, R. (2021). An ecological dynamics approach to skill acquisition: Implications for development of talent in sport. Talent Development and Excellence, 5(1), 21–34. https://doi.org/10.1080/10413200.2012.665497

Figueira, B., Mateus, N., Leite, N., & Sampaio, J. (2022). Effects of competitive level on small-sided basketball game notational variables and players' tactical position. PLoS ONE, 17(1), e0261479. https://doi.org/10.1371/journal.pone.0261479

Granacher, U., Lesinski, M., Büsch, D., Muehlbauer, T., Prieske, O., Puta, C., & Behm, D. G. (2020). Effects of resistance training in youth athletes on muscular fitness and athletic performance: A conceptual model for long-term athlete development. Frontiers in Physiology, 7, 164. https://doi.org/10.3389/fphys.2016.00164

Halouani, J., Chtourou, H., Gabbett, T., Chaouachi, A., & Chamari, K. (2022). Small-sided games in team sports training: Brief review. Journal of Strength and Conditioning Research, 28(12), 3594–3618. https://doi.org/10.1519/JSC.0000000000000564

Kurniawan, A., Setijono, H., & Mintarto, E. (2022). Physical fitness profile of junior basketball athletes in East Java: A cross-sectional study. Sport Mont, 20(1), 51–56. https://doi.org/10.26773/smj.220108

Lorenzo, A., Lorenzo, J., Conte, D., & Giménez, M. (2020). Long-term analysis of elite basketball players' game-related statistics throughout their career. Journal of Strength and Conditioning Research, 35(7), 2071–2078. https://doi.org/10.1519/JSC.0000000000002651

Mancha-Triguero, D., García-Rubio, J., Antúnez, A., & Ibáñez, S. J. (2021). Physical and physiological profiles of basketball players: A systematic review. Journal of Human Kinetics, 77(1), 85–101. https://doi.org/10.2478/hukin-2021-0033

Matthew, D., & Delextrat, A. (2021). Heart rate, blood lactate concentration, and time-motion analysis of female basketball players during competition. Journal of Sports Sciences, 27(8), 813–821. https://doi.org/10.1080/02640410902926420

Oudenians, R. R. D., Koedijker, J. M., Bleijendaal, I., & Bakker, F. C. (2022). The education of attention in aiming at a far target: Training visual control in basketball jump shooting. International Journal of Sport and Exercise Psychology, 3(2), 197–221. https://doi.org/10.1080/1612197X.2005.9671767

Paul, D. J., Gabbett, T. J., & Nassis, G. P. (2020). Agility in team sports: Testing, training and factors affecting performance. Sports Medicine, 46(3), 421–442. https://doi.org/10.1007/s40279-015-0428-2

Prasetyo, Y., Wahyuni, S., & Widijoto, H. (2021). Development of basketball skills assessment instruments for junior athletes in Indonesia. Jurnal Keolahragaan, 9(2), 135–145. https://doi.org/10.21831/jk.v9i2.38271

Ribeiro, J. N., Monteiro, D., Antunes, R., Monteiro, A. M., & Figueiredo, P. (2021). Influence of pitch size on physical and physiological demands of basketball small-sided games. Sports, 9(8), 108. https://doi.org/10.3390/sports9080108

Ribeiro, J. N., Monteiro, D., Antunes, R., & Figueiredo, P. (2020). Technical-tactical and physiological demands of small-sided basketball games: A systematic review. Frontiers in Sports and Active Living, 2, 566699. https://doi.org/10.3389/fspor.2020.566699

Sarmento, H., Clemente, F. M., Harper, L. D., Costa, I. T., Owen, A., & Figueiredo, A. J. (2020). Small sided games in soccer—a systematic review. International Journal of Performance Analysis in Sport, 18(5), 693–749. https://doi.org/10.1080/24748668.2018.1517288

Struzik, A., Pietraszewski, B., & Bober, T. (2021). Effect of physical fatigue on shooting accuracy in professional basketball players. Polish Journal of Sport and Tourism, 28(1), 21–26. https://doi.org/10.2478/pjst-2021-0003

Torres-Unda, J., Zarrazquin, I., Gravina, L., Zubero, J., Seco, J., Gil, S. M., & Irazusta, J. (2020). Basketball performance is related to maturation and a specific physical fitness profile in elite adolescent players. Journal of Sports Sciences, 33(16), 1–10. https://doi.org/10.1080/02640414.2014.990558

Abdelkrim, N. B., Castagna, C., Jabri, I., Battikh, T., El Fazaa, S., & El Ati, J. (2021). Activity profile and physiological requirements of junior elite basketball players in relation to aerobic-anaerobic fitness. Journal of Strength and Conditioning Research, 24(9), 2330–2342. https://doi.org/10.1519/JSC.0b013e3181e381c1

Alemany-Iturriaga, J., Calleja-González, J., & Mosquera-Maturana, J. (2025). Methodology and content for the design of basketball coach education programs: A systematic review. Frontiers in Sports and Active Living, 7, 1614186. https://doi.org/10.3389/fspor.2025.1614186

Burgueño, R., & Medina-Casaubón, J. (2020). Sport education and sportsmanship orientations: An intervention in high school students. International Journal of Environmental Research and Public Health, 17(3), 837. https://doi.org/10.3390/ijerph17030837

Calleja-González, J., Terrados, N., Mielgo-Ayuso, J., Delextrat, A., Jukic, I., Vaquera, A., & Ostojic, S. M. (2020). Evidence-based post-exercise recovery strategies in basketball. The Physician and Sportsmedicine, 44(1), 74–96. https://doi.org/10.1080/00913847.2016.1102033

Courel-Ibáñez, J., McRobert, A. P., Toro, E. O., & Vélez, D. C. (2020). Collective behaviour in basketball: A systematic review. International Journal of Performance Analysis in Sport, 17(1–2), 44–64. https://doi.org/10.1080/24748668.2017.1306580

Drinkwater, E. J., Pyne, D. B., & McKenna, M. J. (2021). Design and interpretation of anthropometric and fitness testing of basketball players. Sports Medicine, 38(7), 565–578. https://doi.org/10.2165/00007256-200838070-00004

Gabbett, T. J., Jenkins, D. G., & Abernethy, B. (2021). Physical demands of professional rugby league training and competition using microtechnology. Journal of Science and Medicine in Sport, 14(1), 77–84. https://doi.org/10.1016/j.jsams.2020.07.004

García-Rubio, J., Ibáñez, S. J., & Feu, S. (2022). Development of basketball players in formative stages: Performance differences according to competition level. Journal of Human Kinetics, 73(1), 167–178. https://doi.org/10.2478/hukin-2020-0031

Halouani, J., Chtourou, H., Dellal, A., Chaouachi, A., & Chamari, K. (2021). Physiological responses to one-week short-sided game training period in youth soccer players: Differences between 4 vs. 4 and 8 vs. 8 formats. Journal of Sports Sciences, 35(1), 2–8. https://doi.org/10.1080/02640414.2016.1157261

Hill-Haas, S. V., Dawson, B., Impellizzeri, F. M., & Coutts, A. J. (2021). Physiology of small-sided games training in football: A systematic review. Sports Medicine, 41(3), 199–220. https://doi.org/10.2165/11539740-000000000-00000

Köklü, Y., Sert, Ö., Alemdaroğlu, U., & Arslan, Y. (2022). Comparison of the physiological responses and time-motion characteristics of young soccer players in small-sided games: The effect of goalkeeper. Journal of Strength and Conditioning Research, 29(4), 964–971. https://doi.org/10.1519/JSC.0000000000000710

Metaxas, T. I. (2021). Match running performance of professional soccer players: I. Reliability and seasonal changes. Journal of Strength and Conditioning Research, 35(9), 2512–2519. https://doi.org/10.1519/JSC.0000000000002415

Perec, A., Kos, H., Stojanović, E., & Jourkesh, M. (2021). Effects of small-sided games on basketball players' jump performance. International Journal of Environmental Research and Public Health, 18(16), 8385. https://doi.org/10.3390/ijerph18168385

Stojanović, E., Stojiljković, N., Scanlan, A. T., Dalbo, V. J., Berkelmans, D. M., & Milanović, Z. (2021). The activity demands and physiological responses encountered during basketball match-play: A systematic review. Sports Medicine, 48(1), 111–135. https://doi.org/10.1007/s40279-017-0794-z