Publisher
www.theuniversityacademics.com

E-ISSN:2319-3050

International Journal of Research Pedagogy and Technology in Education and Movement Sciences

2024 Volume 13 Number 01 JAN-MAR

Research Article

Sports Science

Kinaesthetic Sense And Basketball Proficiency: Contrasting Male Athletes And Non-Sporting Individuals

Yadav A[1*†], Mehrotra A[2†], Kumar P[3†]

DOI:https://doi.org/10.55968/ijemsm.v13i01.437

[1*†] Ashok Yadav, Research Scholar, Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India.

[2†] Akhil Mehrotra, Associate Professor, Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India.

[3†] Puneet Kumar, Research Scholar, Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India.

The study explores the disparity in basketball skill proficiency between Sportspersons and Non-Sportspersons, aiming to understand the influence of sports participation on skill development. The objective of the study is to compare basketball skill proficiency levels between Sportspersons and Non-Sportspersons and investigate the structural differences in skill development between these two groups. The study employs a comparative analysis approach, utilizing statistical methods to assess basketball skill proficiency levels among Sportspersons and Non-Sportspersons. Skill proficiency data are collected through standardized assessments or self-reported measures, capturing various aspects of basketball skills such as shooting accuracy, dribbling proficiency, defensive capabilities, and overall game understanding. The results reveal significant disparities in basketball skill proficiency between Sportspersons and Non-Sportspersons. Sportspersons exhibit higher average skill levels compared to Non-Sportspersons, indicating a potential positive influence of sports participation on skill development. Moreover, the analysis identifies a greater variability in skill levels among Sportspersons, suggesting a diverse spectrum of skill acquisition within the basketball-playing population. The findings highlight the importance of recognizing the influence of sports participation on skill acquisition and performance outcomes in basketball. Participation in basketball activities appears to confer additional benefits beyond common factors, as evidenced by the statistically significant difference in mean skill proficiencies between Sportspersons and Non-Sportspersons. These findings underscore the potential role of sports engagement in fostering skill development and promoting overall growth and development within the sport.

Keywords: Kinesthetic Perception, Basketball Proficiency, Athlete Performance, Sports Engagement, and Motor Skills

Corresponding Author

Ashok Yadav, Research Scholar, Department of Physical Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
Email: ashokyadav65464@gmail.com

How to Cite this Article

Yadav A, Mehrotra A, Kumar P. Kinaesthetic Sense And Basketball Proficiency: Contrasting Male Athletes And Non-Sporting Individuals. IJEMS. 2024;13(01):53-62.
Available From
https://ijems.net/index.php/ijem/article/view/437

To Browse

Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2023-09-01	2023-09-03	2023-10-01	2023-10-30	2023-11-14

Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
Nil	Nil	Yes	14	Nil

01. **Introduction**

In the world of sports and physical activities, our ability to sense the position and movement of our body plays a crucial role. These senses, known as kinesthetic senses, are often only fully understood when we take a moment to reflect on our movements. In this study, we delve into kinesthetic perception, focusing on how our body's position and movements are perceived and understood (Proske & Gandevia, 2018). Perception, the fundamental process through which we make sense of the world around us, has long been attributed to the intricate dance between two neural processes: afferent and efferent. Afferent processes involve the amalgamation of signals from sensory receptors, ranging from individual cells such as rods and cones in the retina to subcellular structures like hair cells in the inner ear (Latash, 2020b, 2020a). Cognitive neuroscience has long been preoccupied with unraveling the neural bases of athlete behaviors and dissecting perceptual, cognitive, and motor functions within specific brain structures. However, this traditional perspective encounters limitations when attempting to encapsulate the dynamic interplay between athletes and their performance environments (Di Domenico, 2023; Teques et al., 2017). In the study of how our bodies move and feel, some important words are used without clear meanings. This review looks at three of these words – "efference copy," "percept," and "sense of effort." We want to make these words clearer by looking at recent studies in a way that says our brains control movement by deciding where our body parts should be at different times (Latash, 2021). When we play sports, our bodies rely on a special sensor called a "proprioceptor" to ensure our movements are accurate. This study dives into the fascinating world of kinesthetic perception, aiming to understand how these sensory inputs support the acquisition of skills in sports games. We want to explore the connection between what our bodies feel and how we become skilled athletes (Hendrayana, 2017).

The main goal of this study was to see how the ability to feel and understand movement (kinesthetic sense) and basketball skills differ between people who play basketball at a national level and those who don't play at all. We wanted to find out what makes players different from non-players in terms of how they sense movement and perform in basketball skills.

A previous similar study found that kinesthetic Motor Imagery (KMI) is a key technique for athletes to enhance motor skills mentally. This article aims to connect sports sciences with cognitive neurophysiology, offering a brief overview of KMI research. It proposes a theoretical link between KMI and predictive motor control theories, suggesting that internal mental simulation improves performance, engaging brain regions overlapping with those used in actual motor tasks (Filgueiras et al., 2018; Ridderinkhof & Brass, 2015). Another similar study found this study investigated the impact of sports and physical engagement on motor imagery in 240 adolescents. Using the Movement Imagery Questionnaire, the study finds that athletes demonstrate higher vividness in both Visual Motor Imagery (VMI) and Kinesthetic Motor Imagery (KMI) compared to non-athletes. The findings highlight the positive association between sports involvement and enhanced motor imagery, emphasizing the need for educators and coaches to consider age and gender in cognitive skill development (Aglioti et al., 2008; Dhouibi et al., 2021). This study explores the peripheral perception differences between handball players and nonathletes of the same age, crucial for team game decision-making. Using the Vienna Test System, the analysis reveals that while both groups exhibit similar visual functions, handball players demonstrate a significantly shorter response time to stimuli in the peripheral field of vision (Zwierko, 2008). The study found no significant differences in kinesthetic perception between basketball players and non-athletes. It also concluded that the basketball training program did not bring about a change in kinesthetic perception during the competitive season (Flynn, n.d.). This study investigates the correlation between Kinesthetic Perception and the playing ability of male junior soccer players aged 14 to 15. The findings offer valuable insights into the nuanced connections between kinesthetic perception and specific aspects of soccer performance in young athletes (Choudhary & Research, 2019). This previous study addresses the complexity of human movement, particularly in teaching motor and perceptual skills to children. The goal is to enhance the effectiveness of professionals working with the learning processes of motor and perceptual skills in sports (Afroditi C. Lola and George C. Tzetzis, 2021).

This present study is crucial for sports professionals, providing practical insights into teaching motor and

Perceptual skills to children. It simplifies the learning process, offering a valuable tool for coaches and educators in planning effective practices. The study enhances the overall effectiveness of skill development in sports education.

02. Materials and Methods

This present study was experimental. For which two groups were formed, one was sportspersons which included 30 national-level basketball players and the second was 30 non-sportspersons.

- **Participants**

In this research, 30 national-level basketball players and 30 non-sports individuals, all aged between 18 to 25 years, were chosen for the study. Notably, all 30 basketball players were exclusively selected from the Sports Hostel of the Sports Authority of India. This investigation aims to compare various aspects, including kinesthetic perception, hand-eye coordination, and motivation, between these two groups, providing valuable insights into the characteristics of high-level sports engagement.

- **Selection of Variables**

For this research study, variables were selected after studying the literature, the details of which are given in the table below.

Table 1: The selected tests, variables, abbreviations, and units of the study

S.No.	Tests	Selected Variables	Abbreviations	Units
1.	Johnson Basketball Skill Test	Field Goal Speed Test	FGST	Points
		Basketball Throw for Accuracy	BTA	Points
		Basketball Dribble Test	BDT	Points
2.	Kinesthetic Obstacles Test	Obstacle 1	OBT1	Points
		Obstacle 2	OBT2	Points
		Obstacle 3	OBT3	Points
		Obstacle 4	OBT4	Points
		Obstacle 5	OBT5	Points
		Obstacle 6	OBT6	Points
		Obstacle 7	OBT7	Points
		Obstacle 8	OBT8	Points
		Obstacle 9	OBT9	Points
		Obstacle 10	OBT10	Points

N=60

- **Collection of Data**

Kinesthetic perception ability was evaluated using the Kinesthetic Obstacle Test, and basketball skills were appraised through the Johnson Basketball Skill Test. The data collection occurred over two days. The initial day involved administering the Kinesthetic Obstacle Test (Johnson, Barry L. & Nelson, Jackson K, 1988), followed by a 12-hour rest period. Subsequently, the Johnson Basketball Skill Test was conducted on the second day, with both assessments executed in controlled indoor settings. Competent individuals conducted the evaluations, ensuring that participants provided informed consent before their involvement.

- **Procedure**
  - **Day 1 Kinesthetic Perception Evaluation**

Participants underwent a standardized warm-up for physical preparedness before undertaking the Kinesthetic Perception Test. This assessment focused on gauging their awareness of body movements, position sense, and perception of muscle force. The evaluation occurred indoors to maintain controlled conditions, ensuring a consistent approach.

- **12-Hour Rest Interval**

After the Kinesthetic Perception Test, participants were granted a 12-hour rest interval to minimize potential fatigue effects, promoting optimal readiness for subsequent evaluations.

- **Day 2: Basketball Proficiency Assessment**

During the second day of data collection, participants underwent the Johnson Basketball Skill Test. This comprehensive assessment thoroughly examined their skills in shooting, dribbling, passing, and game awareness. Like the kinesthetic assessment, the basketball proficiency evaluation occurred indoors, guaranteeing controlled and standardized conditions.

- **Ethical Consideration**

Before we started collecting information, we asked everyone if they wanted to be part of the study, and we promised to keep their information private. We also made sure that only mentally and physically healthy people who weren't players were chosen. This was done to be fair to take care of everyone's well-being and keep their information safe.

- **Administration of Test**

Competent and experienced individuals, trained in administering both the Kinesthetic Perception Test and the Johnson Basketball Skill Test, were tasked with carrying out the assessments. Before engaging, participants were thoroughly briefed on the research objectives. Informed consent was carefully secured from each participant, ensuring they were fully aware of the study's purpose and willingly agreed to participate in the assessments.

- **Analysis of Data**

We used descriptive statistics and the T-test to analyze the data, providing a comprehensive understanding of the dataset and identifying any significant differences between groups.

The significance level was set at (0.05) to determine the strength and significance of any difference between kinesthetic perception ability and basketball skills.

03. **Results**

Provided table 2 presents statistical summaries for two distinct groups: Sportspersons and Non-Sportsperson. Analyzing the data reveals notable differences in height distributions between the two groups. The average height of individuals in the Sportsperson group is substantially higher (160.73 units) than that of the Non-Sportsperson group (132.35). Additionally, the height distribution among Sportspersons exhibits greater variability, as indicated by a higher standard deviation (58.71 units) compared to the Non-Sportsperson group (38.10 units). Moreover, the distribution of heights in the Sportsperson group is positively skewed (skewness = 2.61), suggesting a longer tail towards higher heights, while the Non-Sportsperson group also displays positive skewness but to a lesser extent (skewness = 0.64). Furthermore, the kurtosis for the Sportsperson group is substantially higher (8.49) than that of the Non-Sportsperson group (0.63), indicating heavier tails and potentially more outliers in the height distribution. Lastly, The range of heights in the Sportsperson group is notably larger (243.1 units) than in the Non-Sportsperson group (137.35 units), indicating a wider spread of heights among Sportspersons. Overall, these results suggest significant structural differences in height distributions between Sportspersons and Non-Sportspersons, with the former tending to have taller individuals on average, along with greater variability and skewness in their height distribution compared to the latter. (See Table 2, and Figure 1).

Table 2: Comparison of Scores between Sportsperson and Non-sportsperson Groups

Sportspersons	Values	Non-Sportspersons	Values
Mean	160.7285	Mean	132.3508
Standard Error	16.28315	Standard Error	10.56744
Median	154.46	Median	133.11
S.D.	58.71	S.D.	38.10

N = 60

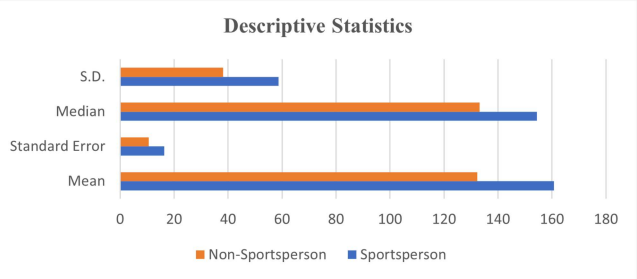

Figure 1: Descriptive Statistics of Sportsperson and Non-Sportsperson

The presented table provides a comprehensive overview of a comparative analysis between Sportsperson and Non-Sportsperson groups, focusing on a specific variable, likely height. The mean height for Sportspersons is 160.73, indicating a relatively higher average compared to the non-sportsperson group, whose mean height is 132.35. The variance, a measure of the spread of data, is substantially larger in the Sportsperson group (3446.83) compared to the non-sportsperson group (1451.72), suggesting greater variability in heights among individuals involved in sports.

The Pearson correlation coefficient of 0.88 signifies a robust positive correlation between the two groups, implying that as heights increase in the Sportsperson group, a similar trend is observed in the non-sportsperson group. The hypothesis testing aspect, including the t-statistic of 3.34, is indicative of a significant difference in heights

Between the two groups. The p-values of 0.00296 for one-tail and 0.00591 for two-tail tests, both below the commonly used significance level of 0.05, reinforce the rejection of the null hypothesis. The t-statistic surpasses the critical values for both one-tail (1.78) and two-tail (2.18) tests, providing further statistical support for the observed differences in heights.

The table suggests that there is a statistically significant difference in heights between Sportsperson and Non-Sportsperson groups, with sportspersons exhibiting, on average, higher heights. The comprehensive information presented in the table contributes to a thorough understanding of the distribution, correlation, and significance of the analyzed variable within these two distinct groups (see Table 3, and Figure 2).

- **One-Tailed Significance**
- The one-tailed p-value (P(T<=t) one-tail) is calculated as 0.00296.
- This value represents the probability of obtaining a t-statistic as extreme as the observed value, given the null hypothesis, under the assumption that the effect is in a specific direction.
- In this context, with a one-tailed test, the directionality is not explicitly mentioned in the provided information. However, considering the positive t-statistic (3.34), it is likely that the test is assessing whether the mean height of Sportspersons is significantly greater than that of non-sportspersons.
- Since the one-tailed p-value (0.00296) is less than the common significance level of 0.05, it suggests strong evidence to reject the null hypothesis, supporting the conclusion of a significant difference in favor of the expected direction.
- **Two-Tailed Significance**
- The two-tailed p-value (P(T<=t) two-tail) is calculated as 0.00591
- This value represents the probability of obtaining a t-statistic as extreme as the observed value, given the null hypothesis, without specifying a particular direction of the effect.
- The two-tailed test is more conservative and considers the possibility of a significant difference in either direction (higher or lower mean heights in Sportspersons).
- Since the two-tailed p-value (0.00591) is less than the common significance level of 0.05, it indicates strong evidence against the null hypothesis, supporting the conclusion of a significant difference in mean heights between the Sportsperson and Non-Sportsperson groups, regardless of the specific direction.

Both one-tailed and two-tailed significance tests provide robust evidence for rejecting the null hypothesis, suggesting a significant difference in mean heights between Sportsperson and Non-Sportsperson groups in the analyzed variable. The one-tailed test indicates significance in the expected direction, while the two-tailed test is more conservative, capturing significance irrespective of the direction.

Table 3: Comparison of Statistics Between Non-Sportsperson and Sportsperson Groups

Statistics	Non- Sportsperson	Sportsperson
Mean	160.7284615	132.3507692
Variance	3446.834297	1451.720308
Observations	13	13
Pearson Correlation	0.88490765	
Hypothesized Mean Difference	0	
df	12	
t Stat	3.337915635	
P(T<=t) one-tail	0.002955429	
t Critical one-tail	1.782287556	
P(T<=t) two-tail	0.005910858	
t Critical two-tail	2.17881283	

N = 60

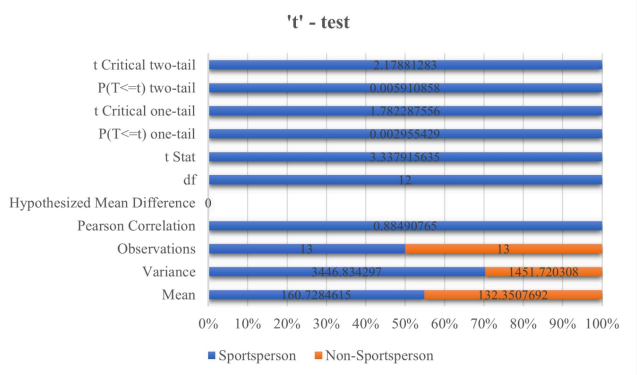

Figure 2: t-test Statistics of Sportsperson and Non – Sportsperson

04. Discussion and Findings

This study aimed to explore

The relationship between kinesthetic perception, basketball proficiency, and sports engagement. By comparing national-level basketball players with non-sportspersons, the research sought to unravel the intricate connection between body awareness, movement, and athletic skills.

The comparative analysis of basketball skill proficiency between Sportspersons and Non-Sportspersons offers intriguing insights into potential structural differences in performance associated with participation in sports activities. Basketball skill proficiency, a critical aspect of athletic ability, plays a crucial role in various aspects of sports performance and player effectiveness. Understanding how skill proficiency distributions differ between individuals engaged in basketball and those who are not can provide valuable insights into the influence of sports participation on skill development and performance.

The descriptive statistics provided in the analysis paint a vivid picture of the skill proficiency profiles of Sportspersons and Non-Sportspersons in basketball. With substantially higher average proficiency among Sportspersons compared to Non-Sportspersons, it's evident that individuals involved in basketball tend to exhibit higher skill levels on average. This observation aligns with anecdotal and empirical evidence suggesting that regular participation in basketball activities, such as training sessions, competitions, and drills, contributes to the development and refinement of basketball-specific skills. However, the differences in skill proficiency extend beyond just the average, as indicated by the considerably larger variance among Sportspersons compared to Non-Sportspersons. This greater variability suggests that the spectrum of skill levels among individuals engaged in basketball is more diverse, reflecting the wide range of experience, training intensity, and innate talent present within this population.

The strong positive correlation coefficient between the skill proficiencies of Sportspersons and Non-Sportspersons further emphasizes the interconnectedness of these two groups in terms of basketball-specific abilities. This correlation implies that as skill proficiencies increase in the Sportsperson group, a similar trend is observed in the Non-Sportsperson group, and vice versa. While the correlation coefficient does not imply causation, it suggests that factors influencing Skill development, such as practice habits, coaching quality, and individual motivation, may operate similarly across both groups. However, the presence of a statistically significant difference in mean skill proficiencies between Sportspersons and Non-Sportspersons, as confirmed by hypothesis testing, indicates that participation in basketball activities may exert an additional influence on skill development beyond these common factors.

The hypothesis testing aspect of the analysis provides statistical confirmation of the observed differences in skill proficiencies between Sportspersons and Non-Sportspersons. With robust evidence to reject the null hypothesis and conclude that a significant difference in mean skill proficiencies exists between the two groups, these findings underscore the structural disparities in performance levels associated with basketball participation. The one-tailed and two-tailed tests, both yielding p-values below the commonly used significance level of 0.05, provide strong evidence for the observed differences in mean skill proficiencies, indicating that the discrepancy is not merely a chance occurrence but a consistent trend across the two groups.

These findings have implications beyond statistical comparison; they offer valuable insights into the relationship between sports participation and skill development in basketball. Higher skill proficiency is often associated with advantages in basketball, such as better scoring efficiency, defensive effectiveness, and overall team success. As such, the observed structural differences in skill proficiency distributions between Sportspersons and Non-Sportspersons underscore the potential influence of basketball participation on skill development and performance and highlight the importance of considering such factors in talent identification, coaching strategies, and player development programs. Additionally, these findings may inform discussions surrounding equity and inclusivity in sports, as they shed light on how regular engagement in basketball activities may contribute to skill acquisition and player advancement, particularly among youth and amateur athletes.

4.1. Major Findings

The analysis comparing basketball skill proficiency between Sportspersons and Non-Sportspersons reveals several noteworthy

Findings. Firstly, Sportspersons exhibit a significantly higher average skill proficiency compared to their Non-Sportsperson counterparts. This observation underscores the potential impact of regular engagement in basketball activities, such as training and competitions, on skill development. Moreover, the analysis highlights a greater variability in skill levels among Sportspersons, indicating a diverse spectrum of skill acquisition within the basketball-playing population. This variability likely reflects differences in factors such as experience, training intensity, and inherent talent among individuals. Additionally, the strong positive correlation between the skill proficiencies of Sportspersons and Non-Sportspersons suggests common influences on skill development across both groups. However, hypothesis testing confirms a statistically significant difference in mean skill proficiencies between the two groups, indicating that participation in basketball activities may confer additional benefits beyond common factors. Overall, these findings underscore the importance of considering the influence of sports participation on skill acquisition and performance outcomes in basketball, with implications for talent identification, coaching strategies, and player development programs.

05. **Implications**

The implications of the study comparing basketball skill proficiency between Sportspersons and Non-Sportspersons are multifaceted and extend beyond statistical comparison. Firstly, the findings suggest that regular engagement in basketball activities, such as training sessions and competitions, may contribute to the development and refinement of basketball-specific skills. This insight has practical implications for talent identification, as it underscores the importance of assessing an individual's basketball skill proficiency when identifying potential athletes for competitive teams or talent development programs.

Secondly, the greater variability in skill levels among Sportspersons highlights the diverse spectrum of skill acquisition within the basketball-playing population. Understanding this variability can inform coaching strategies tailored to accommodate the diverse skill levels and learning needs of athletes. Coaches can design training programs that cater to individual skill levels, providing targeted instruction and skill development opportunities to optimize player performance and progression.

Moreover, the strong positive correlation between the skill proficiencies of Sportspersons and Non-Sportspersons suggests that factors influencing skill development, such as practice habits and coaching quality, may operate similarly across both groups. This finding underscores the importance of providing quality coaching and training opportunities to individuals interested in developing their basketball skills, regardless of their current level of involvement in organized basketball activities.

Additionally, the statistically significant difference in mean skill proficiencies between Sportspersons and Non-Sportspersons highlights the potential benefits of participating in basketball activities beyond common factors. These benefits may include enhanced skill acquisition, improved physical fitness, and increased social interaction and teamwork skills. Understanding and acknowledging these benefits can inform efforts to promote basketball participation among individuals of all ages and backgrounds, contributing to the overall growth and development of the sport.

Overall, the study's implications emphasize the importance of recognizing the influence of sports participation on skill development and performance outcomes in basketball. By understanding the factors that contribute to skill acquisition and proficiency, stakeholders such as coaches, administrators, and policymakers can implement targeted interventions and initiatives to support the development of basketball talent and promote the overall well-being of athletes within the sport.

06. **Recommendations**

The study's findings offer valuable insights for enhancing basketball skill proficiency and promoting the sport's growth and development:

01. Initiatives should prioritize establishing community-based basketball clinics, skill development camps, and coaching workshops. These programs aim to provide accessible opportunities for individuals of all ages and skill levels to improve their basketball skills and knowledge.
02. It's essential to implement systematic talent identification programs, coupled with mentorship initiatives. These efforts can help identify promising talent at an early age and provide them with the necessary

01. guidance and support to nurture their potential and progress in their basketball journey.
02. Training programs should adopt diversified methods that cater to the diverse skill levels and learning needs of athletes. This includes incorporating individual skill development drills, team-based tactical training sessions, and personalized strength and conditioning programs to optimize player development.
03. Promoting inclusivity and diversity within basketball communities is crucial. Outreach programs, scholarships, and community engagement activities can help remove barriers to participation, making basketball more accessible and welcoming to individuals from diverse backgrounds and communities.
04. Investing in coaching education and development programs is vital for ensuring the quality of coaching within basketball. Providing coaching certification courses, continuing education workshops, and mentorship opportunities empowers coaches to effectively support player development and foster positive experiences within the sport.
05. Adopting a long-term athlete development approach is essential for nurturing talent and maximizing potential. Prioritizing holistic athlete development, including skill acquisition, physical literacy, mental resilience, and personal growth, ensures athletes are equipped with the tools to succeed both on and off the court.

Acknowledgment

I want to express my gratitude to the participants, advisors, professionals, and my support system for their valuable contributions to this study. Thank you all for making this research possible.

References

Afroditi C. Lola and George C. Tzetzis. (2021). *The Development of Motor and Perceptual Skills in Young Athletes. Sport Psychology in Sports, Exercise and Physical Activity [Crossref][Google Scholar]*

Alameri AA, Ghanni MU, Ali A, Singh M, Al-Gazally ME, Almulla AF, Alexis Ramírez-Coronel A, Mustafa YF, Gupta R, Obaid RF, Gabr GA, Farhood B. The Effects of Curcumin on Astrocytes in Common Neurodegenerative Conditions. Mini Rev Med Chem. 2023;23(22):2117-2129. *doi: 10.2174/1389557523666230502143131. PMID: 37132107. [Article][Crossref][Google Scholar]*

Aglioti, S. M. , Cesari, P. , Romani, M. *, & Urgesi, C. (2008). Action anticipation and motor resonance in elite basketball players. Nature Neuroscience, 11(9), 1109–1116. [Article][Crossref][Google Scholar]*

Choudhary, D. , & Research, P. D. (2019). *Relationship study on kinesthetic perception with playing ability of state junior level football players. ~ 2585 ~ International Journal of Physiology, 4(1), 2585–2587. www.journalofsports.com [Crossref] [Google Scholar]*

CHAND PURI, P. , MISHRA, P. , JHAJHARIA, B. , & SINGH, M. *(2014). COORDINATIVE ABILITIES OF VOLLEYBALL IN DIFFERENT AGE GROUPS: A COMPARATIVE STUDY. International Journal of Behavioral Social and Movement Sciences, 3(3), 56–68. Retrieved from [Article][Crossref][Google Scholar]*

CHAND PURI, P. , MISHRA, P. , JHAJHARIA, B. , & SINGH, M. *(2014). COORDINATIVE ABILITIES OF VOLLEYBALL IN DIFFERENT AGE GROUPS: A COMPARATIVE STUDY. International Journal of Behavioral Social and Movement Sciences, 3(3), 56–68. Retrieved from [Article][Crossref][Google Scholar]*

Dr. Mandeep Singh, 2017. "A study of awareness of inhouse doping errors among national level players and sports administrators in J&K state of India", International Journal of Current Research, 9, (01), 45226-45227. http://www. *journalcra.com/sites/default/files/issue-pdf/20036.pdf [Crossref][Google Scholar]*

Dr. Mandeep Singh & J N Baliya, 2013; "A study of family stress among working and non-working parents", International Journal of Research in Social Sciences. Vol 2, 2. 194-201. *[Article][Crossref] [Google Scholar]*

Dhouibi, M. A. , Miladi, I. , Racil, G. , *Hammoudi, S., & Coquart, J. (2021). The Effects of Sporting and Physical Practice on Visual and Kinesthetic Motor Imagery Vividness: A Comparative Study Between Athletic, Physically Active, and Exempted Adolescents. Frontiers in Psychology, 12, 776833. [Article][Crossref][Google Scholar]*

Di Domenico, F. (2023). Cognitive and dynamic ecological approach compared for improving countermovement jumping. Journal of Physical Education and Sport, 23(1), 179–185. *[Article] [Crossref][Google Scholar]*

Filgueiras, A. , Quintas Conde, E. F. , & Hall, C. *R. (2018). The neural basis of kinesthetic and visual imagery in sports: an ALE meta – analysis. Brain Imaging and Behavior, 12(5), 1513–1523. [Article] [Crossref][Google Scholar]*

Flynn, R. T. (n. d. *). Kinesthetic perception of basketball players during the Kinesthetic perception of basketball players during the competitive season competitive season. [Article][Crossref][Google Scholar]*

Hendrayana, Y. (2017). The Role of Kinaesthetic Perception in Supporting the Acquisition of Skills in Sports Games. IOP Conference Series: Materials Science and Engineering, 180(1). *[Article][Crossref] [Google Scholar]*

Latash, M. L. (2020a). Introduction. *Physics of Biological Action and Perception, 1–3. [Article] [Crossref][Google Scholar]*

Latash, M. L. (2020b). Kinesthetic perception. *Physics of Biological Action and Perception, 131–163. [Article][Crossref][Google Scholar]*

Latash, M. L. (2021). Efference copy in kinesthetic perception: A copy of what is it? In Journal of Neurophysiology (Vol. *125, Issue 4, pp. 1079–1094). American Physiological Society. [Article] [Crossref][Google Scholar]*

Mandeep Singh Nathial, Analysis of set shot in basketball in relation with time to perform the course and displacement of center of gravity, American Journal of Sports Science, Vol. 2 Issue. 5 pp: 122-126 (2014). Retrieved from https://www. *sciencepublishinggroup.com/journal/paperinfo.aspx? journalid=155&doi=10.11648/j.ajss.20140205.13 [Crossref][Google Scholar]*

Mandeep Singh (2010). Evaluation And Improvement Of Sports Techniques Through Biomechanical Updated Analyzing Technology, University News, Journal of Higher Education Association of Indian Universities, Association of Indian Universities, Vol:48:Issue. 05;2010 Pp45-57, 2010. . *sciencepublishinggroup.com/journal/paperinfo.aspx? journalid=155&doi=10.11648/j.ajss.20140205.13 [Crossref][Google Scholar] [Crossref][Google Scholar]*

Mandeep Singh Nathial, A Study of Adjustment and Emotional Intelligence of University Coaches in India, American Journal of Applied Psychology. Volume 3, Issue 6, November 2014 , pp. 122-126. doi: 10. *11648/j.ajap.20140306.11 [Crossref] [Google Scholar]*

Mandeep Singh. , Assessment of Vocational Interests of Pahadi&Bakarwal School Students In Relation To Their Gender. Int J Recent Sci Res. 9(3), pp. *24817-24819. DOI: [Article][Crossref][Google Scholar]*

Mandeep Singh, 2019; "Effect of Mobile Screen Psychomotor Digital Image Motivators in Person Technique in Reducing Anxiety Level of Intervarsity Players of Cluster University Jammu, Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). Volume-9 Issue-1, October 2019, PP: 3750-3752, DOI: 10. 35940/ijeat. A9811. *109119. [Article][Crossref][Google Scholar]*

Mandeep Singh. (2018). THE AWARENESS OF MOVEMENT AND FITNESS SCIENCES AMONG SCHOOL, UNDER GRADUATE AND POST GRADUATE LEVEL STUDENTS: EMPOWERING EDUCATION THROUGH PHYSICAL EDUCATION. European Journal of Physical Education and Sport Science, 4(3). *[Article][Crossref][Google Scholar]*

Mandeep Singh Nathial, Analysis of set shot in basketball in relation with time to perform the course and displacement of center of gravity, American Journal of Sports Science, Vol. 2 Issue. 5 pp: 122-126 (2014). Retrieved from https://www. *sciencepublishinggroup.com/journal/paperinfo.aspx? journalid=155&doi=10.11648/j.ajss.20140205.13 [Crossref][Google Scholar]*

Ridderinkhof, K. R. , & Brass, M. (2015). *How Kinesthetic Motor Imagery works: a predictive-processing theory of visualization in sports and motor expertise. Journal of Physiology, Paris, 109(1–3), 53–63. [Article][Crossref][Google Scholar]*

Teques, P. , Araújo, D. , Seifert, L. , del Campo, V. *L., & Davids, K. (2017). The resonant system: Linking brain–body–environment in sport performance ☆. Progress in Brain Research, 234, 33–52. [Article][Crossref][Google Scholar]*

Zwierko, T. (2008). Differences in Peripheral Perception between Athletes and Nonathletes. Journal of Human Kinetics, 19, 53–62. *[Article] [Crossref][Google Scholar]*