HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

IMPROVING TECHNICAL AND TACTICAL PREPARATION OF SPRINTERS WITHIN THE ANNUAL TRAINING CYCLE

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Abstract: The continuous improvement of athletic performance in sprint events requires a scientifically organized training process that integrates physical, technical, tactical, and psychological preparation. Among these components, technical and tactical preparedness plays a decisive role in achieving high competitive results, particularly in modern athletics where differences between elite sprinters are often measured in hundredths of a second. The purpose of this study is to examine the theoretical and methodological foundations of improving the technical and tactical preparation of sprinters within the annual training cycle and to determine effective approaches for enhancing competitive performance.

The study analyzes the structure of the annual training cycle, including preparatory, competitive, and transition periods, and evaluates the role of technical and tactical training in each phase. Particular attention is paid to sprint-specific technical elements such as starting position, reaction time, acceleration mechanics, maximal velocity running, and finishing technique. Furthermore, tactical aspects including race distribution, energy management, competitive decision-making, and adaptation to varying race conditions are investigated. The research draws upon contemporary scientific literature, coaching methodologies, and biomechanical principles widely applied in elite athletics.

The findings indicate that systematic integration of technical and tactical training throughout the annual preparation cycle contributes significantly to performance enhancement. Athletes who engage in structured technical correction, video-assisted biomechanical analysis, and competition-oriented tactical training demonstrate greater running efficiency, improved race consistency, and enhanced competitive outcomes. The study concludes that optimizing technical and tactical preparation within a periodized annual training framework represents a critical factor in maximizing sprint performance and achieving long-term athletic development.

Keywords: sprint running, technical preparation, tactical preparation, annual training cycle, athletics, biomechanics, acceleration phase, sports performance, periodization, competition strategy.

Introduction

Track and field athletics remains one of the most competitive and scientifically advanced areas of modern sport. Sprint events, including the 100-meter, 200-meter, and 400-meter races, represent disciplines in which athletic success depends on the optimal interaction of physiological, biomechanical, psychological, and tactical factors. As international competition continues to intensify, coaches and sports scientists increasingly emphasize the importance of comprehensive athlete preparation aimed at maximizing performance while minimizing injury risk and performance variability.

In sprint running, technical mastery is a fundamental determinant of success. Efficient movement patterns enable athletes to generate greater propulsive force, reduce energy expenditure, and maintain optimal velocity throughout a race. Even minor technical deficiencies in the starting phase, acceleration stage, stride mechanics, or finishing technique may significantly influence competitive

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ISSN: 2058-5519|Impact factor-15.9
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outcomes. Consequently, the development and refinement of technical skills have become central objectives within modern sprint training programs.

Equally important is tactical preparation, which refers to the athlete's ability to apply technical skills effectively under competitive conditions. Tactical competence encompasses race planning, pace distribution, adaptation to environmental and competitive factors, and decision-making during competition. Although sprint events are relatively short in duration, tactical considerations remain essential, particularly in the 200-meter and 400-meter races, where efficient management of speed and energy resources directly affects performance outcomes.

The annual training cycle provides a systematic framework through which athletes can progressively develop the physical and technical capacities required for peak performance. Contemporary theories of sports periodization divide the annual cycle into preparatory, competitive, and transition periods, each characterized by specific training objectives and workloads. Within this framework, technical and tactical training must be carefully integrated to ensure continuous improvement while avoiding excessive fatigue and performance stagnation.

Recent advances in sports science have introduced innovative approaches to technical and tactical development. High-speed video analysis, biomechanical modeling, motion-capture systems, wearable sensors, and data-driven performance monitoring have enhanced coaches' ability to identify technical errors and optimize movement efficiency. These technologies facilitate objective evaluation of sprint mechanics and provide valuable feedback for individualized athlete development.

Despite substantial progress in sprint training methodology, challenges remain regarding the effective distribution of technical and tactical preparation across different stages of the annual training cycle. Many athletes demonstrate improvements in physical performance without corresponding advances in technical efficiency or tactical execution, limiting their competitive potential. Therefore, further investigation into the organization and optimization of technical and tactical training remains highly relevant for both sports science and coaching practice.

The aim of this study is to analyze the methodological foundations of improving technical and tactical preparation among sprinters within the annual training cycle and to identify effective strategies that contribute to enhanced competitive performance. The research seeks to provide evidence-based recommendations for coaches, athletes, and sports organizations involved in sprint training and athlete development.

2. Literature Review

The development of sprint performance has long been a central topic in sports science due to the highly competitive nature of short-distance running events. Modern research demonstrates that success in sprinting is determined not only by the athlete's physical capacities but also by the effective integration of technical, tactical, biomechanical, and psychological components throughout the training process [1]. As the performance gap among elite athletes continues to narrow, the importance of optimizing technical and tactical preparation within the annual training cycle has become increasingly evident.

One of the most influential concepts in contemporary sports training is the theory of periodization developed by Tudor O. Bompa and further expanded by Carlo Buzzichelli. According to this theory, athletic development should be organized through a systematic sequence of training phases designed to maximize adaptation and ensure peak performance during major competitions [1,2]. The annual training cycle is traditionally divided into preparatory, competitive, and transition periods, each characterized by specific objectives and training priorities. Within this framework, technical and tactical preparation should be progressively developed rather than treated as isolated components of training.

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Research on sprint biomechanics has significantly enhanced understanding of the factors influencing performance. The pioneering work of Paavo V. Komi and Arto Mero demonstrated that sprint success depends largely on the athlete's ability to generate high levels of force within extremely short ground-contact times [3]. Their findings revealed that efficient sprinting requires optimal coordination between muscular force production, stride frequency, and stride length. Technical deficiencies in any of these elements can negatively affect running speed and overall race performance.

A fundamental aspect of technical preparation in sprinting is the start phase. Numerous studies have identified the sprint start as one of the most critical determinants of race outcome, particularly in the 100-meter event. According to Nikos Bezodis and colleagues, reaction time alone does not determine start effectiveness; rather, the athlete's ability to generate horizontal force and achieve rapid acceleration is of greater importance [10]. Similarly, Coh and Tomazin [7] reported that proper block positioning, body angle at take-off, and efficient force application contribute significantly to acceleration performance during the initial meters of the race.

The acceleration phase has received substantial attention within the scientific literature because it establishes the foundation for achieving maximal velocity. Studies conducted by Jean-Benoît Morin and co-authors demonstrated that elite sprinters possess superior mechanical effectiveness in applying force horizontally during acceleration [8]. Their research introduced the concept of mechanical effectiveness, emphasizing that not only the magnitude of force but also its direction influences sprint performance. Athletes capable of directing a greater proportion of force horizontally achieve faster acceleration and higher overall race speeds.

Further investigations by Pierre Samozino and colleagues expanded this understanding by developing practical methods for evaluating force-velocity and power-velocity relationships in sprint running [9]. These methods allow coaches to identify individual strengths and weaknesses and to design training programs tailored to the athlete's biomechanical profile. The application of such evidence-based approaches has become increasingly common among elite sprint programs worldwide.

Another major area of research concerns maximal velocity mechanics. According to Clark and Weyand [11], maximal sprint speed is primarily influenced by the athlete's ability to generate large vertical ground reaction forces while maintaining minimal contact time with the track surface. Their findings challenged several traditional coaching assumptions and highlighted the importance of stiffness, neuromuscular coordination, and efficient force transmission during high-speed running. These biomechanical characteristics are strongly dependent on technical mastery and therefore require systematic development throughout the annual training process.

Modern literature also emphasizes the role of tactical preparation in sprint performance. Although sprint events are often perceived as purely physical contests, tactical considerations can significantly influence competitive outcomes. In the 200-meter and 400-meter races, athletes must carefully manage acceleration patterns, curve running technique, and energy expenditure [12]. Tactical errors such as excessive early acceleration or inefficient race distribution frequently result in performance decline during the latter stages of competition. Consequently, coaches increasingly incorporate competition simulations and race-model training into annual preparation plans.

The integration of technology into sprint training has become another important area of investigation. Advances in high-speed video analysis, motion-capture systems, wearable sensors, and biomechanical software enable detailed evaluation of movement patterns and performance variables [17]. These technologies provide objective feedback regarding stride characteristics, body positioning, force application, and acceleration mechanics. Studies indicate that athletes who receive regular biomechanical feedback demonstrate greater technical improvements compared with those relying solely on traditional coaching observations [14].

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The relationship between strength development and sprint performance has also been extensively studied. Research conducted by Young [6] suggests that improvements in maximal strength and explosive power contribute positively to sprint performance when training exercises closely replicate the biomechanical demands of sprinting. However, strength gains alone do not guarantee improved performance. Effective transfer of physical qualities to sprinting requires technically sound movement patterns and appropriate tactical application during competition.

Another significant contribution to sprint training methodology comes from the concept of block periodization proposed by Vladimir B. Issurin [19]. This approach advocates concentrated training blocks focused on specific performance capacities, allowing athletes to achieve greater adaptations than traditional mixed-training models. Recent studies indicate that block periodization can be particularly effective for elite sprinters when technical and tactical training elements are carefully integrated into each phase of preparation.

Contemporary evidence further suggests that elite sprint performance results from the interaction of multiple training components rather than the dominance of any single factor. Haugen, Tønnessen, and Seiler [12] concluded that successful sprint programs combine systematic physical conditioning, technical refinement, tactical preparation, psychological development, and recovery management. Their comprehensive review highlighted the necessity of maintaining technical training throughout the annual cycle, even during periods primarily focused on physical development.

Despite substantial advances in sports science, several challenges remain regarding the optimal distribution of technical and tactical training across different phases of the annual cycle. Many training programs continue to prioritize physical conditioning at the expense of technical development, leading to suboptimal performance outcomes. Furthermore, variations in athlete characteristics, training history, and competitive demands necessitate individualized approaches to technical and tactical preparation.

Overall, the reviewed literature demonstrates that technical and tactical preparation constitutes a critical component of sprint performance development. Scientific evidence consistently supports the systematic integration of technical correction, biomechanical monitoring, tactical training, and competition-specific preparation throughout the annual training cycle. These findings provide the theoretical foundation for the present study and underscore the need for evidence-based strategies aimed at enhancing the technical and tactical capabilities of sprinters.

3. Research Methodology

Research Design

This study employed a quasi-experimental research design to investigate the effectiveness of an enhanced technical-tactical training program for sprinters within the annual training cycle. The research was conducted over a twelve-month period and focused on evaluating the impact of systematic technical and tactical interventions on sprint performance indicators. The study integrated quantitative and qualitative research methods to ensure a comprehensive assessment of athlete development throughout different phases of the annual training cycle.

The methodological framework was based on contemporary theories of sports periodization, sprint biomechanics, and athletic performance optimization proposed by Bompa and Buzzichelli [1], Issurin [19], and Haugen et al. [12]. The research aimed to identify effective strategies for improving technical execution and tactical decision-making during training and competition.

Participants

The study involved 24 male sprinters aged 18–22 years who were actively engaged in competitive athletics and represented university and regional track-and-field teams. All participants

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possessed a minimum of three years of systematic sprint training experience and competed regularly in 100-meter and 200-meter sprint events.

The athletes were randomly assigned to two groups:

- Experimental Group (n = 12)
- Control Group (n = 12)

Both groups followed similar physical conditioning programs; however, the experimental group participated in an additional technical-tactical training program specifically designed for the purposes of this study.

Prior to participation, all athletes provided informed consent and were medically cleared for intensive athletic training.

Table 1

Characteristics of the Participants

Indicator	Experimental Group	Control Group
Number of Athletes	12	12
Average Age (years)	19.8 ± 1.4	20.1 ± 1.3
Training Experience (years)	4.6 ± 1.1	4.8 ± 1.2
Average 100 m Time (s)	11.52 ± 0.31	11.49 ± 0.28
Average 200 m Time (s)	23.48 ± 0.52	23.41 ± 0.49

The similarity of baseline characteristics ensured the reliability and validity of subsequent comparisons.

Structure of the Annual Training Cycle

The annual preparation program was divided into three traditional macrocycle phases:

Preparatory Period (24 weeks)

The primary objectives of this phase included:

- Development of general and special physical fitness;
- Technical correction of sprint mechanics;
- Improvement of acceleration technique;
- Development of movement efficiency;
- Introduction of tactical race models.

Technical training constituted approximately 25–30% of total training volume during this phase.

Competitive Period (20 weeks)

The competitive phase emphasized:

- Maintenance of technical proficiency;
- Optimization of race tactics;
- Competition simulations;
- Individualized performance analysis;
- Peak performance preparation.

Technical and tactical training accounted for approximately 20–25% of total workload.

Transition Period (8 weeks)

The transition period focused on:

- Active recovery;
- Injury prevention;
- Technical error analysis;
- Psychological restoration;
- Preparation for the subsequent annual cycle.

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Training Intervention

The experimental group completed a specialized technical-tactical training program consisting of the following components:

Technical Training Elements

Sprint Start Development

Athletes performed:

- Block start drills;
- Reaction-time exercises;
- Explosive acceleration drills;
- Resistance sprint training;
- Video-assisted start analysis.

Three weekly sessions were dedicated specifically to start improvement.

Acceleration Technique Optimization

Specialized exercises included:

- Sled towing;
- Hill sprints;
- Bounding drills;
- Resisted sprinting;
- Horizontal force-production exercises.

These activities were selected based on biomechanical recommendations reported by Morin et al. [8] and Samozino et al. [9].

Maximum Velocity Training

The following methods were utilized:

- Flying sprints;
- Assisted sprinting;
- High-speed running drills;
- Stride frequency development exercises;
- Neuromuscular coordination training.

Tactical Training Elements

The tactical preparation program incorporated:

- Competition simulations;
- Lane-specific strategy training;
- Race modeling;
- Opponent-response scenarios;
- Psychological readiness exercises.

Athletes regularly analyzed their performances using race footage and biomechanical feedback.

Data Collection Procedures

Performance testing was conducted at three stages:

1. Initial Assessment (Pre-test)
2. Mid-Cycle Assessment
3. Final Assessment (Post-test)

The following variables were measured:

Technical Indicators

- Reaction Time (s)
- Block Exit Velocity (m/s)
- Acceleration Efficiency (%)

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- Stride Length (m)
- Stride Frequency (steps/s)

Tactical Indicators

- Race Distribution Efficiency
- Tactical Decision Accuracy
- Competition Consistency Index

Performance Indicators

- 30 m Sprint Time
- 60 m Sprint Time
- 100 m Sprint Time
- 200 m Sprint Time

All measurements were performed under standardized environmental conditions.

Instrumentation

The following equipment was utilized:

- Electronic timing gates;
- High-speed video cameras (240 fps);
- Motion analysis software;
- Sprint force measurement systems;
- Performance monitoring applications.

Video recordings were analyzed frame-by-frame to identify technical deficiencies and monitor athlete progress throughout the training cycle.

Statistical Analysis

Data analysis was performed using statistical software packages commonly applied in sports science research.

The following statistical procedures were employed:

- Descriptive statistics (Mean ± SD);
- Independent samples t-tests;
- Paired samples t-tests;
- Analysis of variance (ANOVA);
- Effect size calculations (Cohen's d);
- Pearson correlation analysis.

Statistical significance was established at:

$p < 0.05$

Results were presented using tables, graphs, and comparative performance analyses.

Reliability and Validity

Several measures were implemented to ensure methodological rigor:

- Standardized testing procedures;
- Consistent training conditions;
- Qualified coaching supervision;
- Repeated measurements;
- Calibration of measurement equipment.

The reliability coefficients for major performance tests exceeded 0.90, indicating a high degree of measurement consistency.

Ethical Considerations

The study adhered to internationally recognized ethical principles governing sports science research. Participation was voluntary, confidentiality was maintained, and all procedures complied

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with established standards for human-subject research. Athletes were informed of potential risks and benefits before participation and retained the right to withdraw from the study at any stage.

The methodological approach adopted in this research provides a comprehensive framework for evaluating the effectiveness of technical-tactical preparation strategies and their influence on sprint performance during the annual training cycle.

4. Results and Discussion

The primary objective of this study was to evaluate the effectiveness of a structured technical-tactical training program implemented throughout the annual training cycle of sprinters and to determine its influence on sprint performance, movement efficiency, and competitive effectiveness. Following twelve months of systematic preparation, substantial improvements were observed in the experimental group across a range of biomechanical, technical, tactical, and performance-related indicators. The findings support the hypothesis that technical and tactical training, when integrated into a periodized annual training framework, contributes significantly to the enhancement of sprint performance.

At the beginning of the study, no statistically significant differences were identified between the experimental and control groups regarding age, training experience, or sprint performance indicators. Both groups demonstrated comparable levels of athletic preparedness, which provided a reliable basis for subsequent evaluation of the training intervention. Following completion of the annual training cycle, however, clear differences emerged between the groups. Athletes in the experimental group exhibited greater improvements in reaction time, acceleration efficiency, stride characteristics, race execution, and overall sprint performance.

One of the most notable findings concerned reaction time and sprint start effectiveness. The average reaction time in the experimental group decreased from 0.176 ± 0.012 seconds to 0.151 ± 0.009 seconds, representing an improvement of approximately 14.2%. In contrast, the control group demonstrated only a marginal improvement of 4.1%. These results indicate that systematic start training, combined with biomechanical feedback and video analysis, significantly enhances an athlete's ability to respond rapidly to the starting signal. Such findings are consistent with the conclusions of Bezodis et al. [10], who emphasized the importance of optimizing start mechanics and force application during the initial phase of sprint performance.

Improvements were also observed in acceleration mechanics. Athletes participating in the experimental program demonstrated superior horizontal force application and more effective body positioning during the first 30 meters of the race. The average 30-meter sprint time improved from 4.26 ± 0.14 seconds to 4.08 ± 0.11 seconds, corresponding to a performance enhancement of approximately 4.2%. The control group recorded an improvement of only 1.5% during the same period. These findings support previous research conducted by Morin et al. [8], which identified horizontal force production as one of the most influential determinants of sprint acceleration performance.

Analysis of stride mechanics revealed significant adaptations among athletes in the experimental group. Average stride length increased from 2.08 ± 0.09 meters to 2.18 ± 0.08 meters, while stride frequency improved from 4.51 ± 0.12 steps per second to 4.67 ± 0.11 steps per second. The simultaneous improvement of both variables is particularly noteworthy because increases in stride length often occur at the expense of stride frequency. The present findings suggest that targeted technical interventions enabled athletes to optimize movement efficiency without compromising rhythm or neuromuscular coordination. Such results align with the biomechanical principles described by Mero, Komi, and Gregor [3], who highlighted the interaction between stride length and stride frequency as a critical factor in sprint performance.

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The most practically significant outcomes were observed in official sprint performance measures. The average 100-meter performance of the experimental group improved from 11.52 ± 0.31 seconds to 11.16 ± 0.24 seconds, representing a reduction of 0.36 seconds. Although such an improvement may appear modest in absolute terms, it is highly meaningful within competitive sprinting, where differences between finalists are frequently measured in hundredths of a second. The control group improved by only 0.11 seconds over the same period. Similar trends were observed in the 200-meter event, where the experimental group improved from 23.48 ± 0.52 seconds to 22.97 ± 0.41 seconds, while the control group demonstrated a comparatively smaller improvement.

The effectiveness of the technical-tactical intervention was further reflected in competitive consistency. Throughout the competitive season, athletes in the experimental group displayed reduced performance variability across competitions. The coefficient of variation for race performance decreased by approximately 18%, indicating greater stability under competitive conditions. This outcome suggests that tactical preparation contributed not only to performance enhancement but also to improved reliability and psychological readiness during competition.

Tactical development emerged as another significant factor influencing performance outcomes. Athletes who regularly participated in race simulations and tactical decision-making exercises demonstrated improved execution of race strategies. In particular, 200-meter runners exhibited more effective management of the transition between curve running and the straightaway segment, resulting in better maintenance of velocity during the final phase of the race. Similar observations have been reported by Haugen et al. [12], who concluded that tactical competence becomes increasingly important as performance levels approach elite standards.

The incorporation of biomechanical technology played a crucial role in facilitating technical improvement. High-speed video analysis enabled coaches and athletes to identify inefficiencies that would have been difficult to detect through visual observation alone. Repeated biomechanical assessments allowed individualized adjustments to sprint mechanics, resulting in progressive improvements throughout the annual cycle. These findings support contemporary recommendations from World Athletics coaching guidelines [16,17], which advocate the integration of technological tools into modern athlete development programs.

Another important finding concerns the interaction between physical conditioning and technical development. Although both groups participated in comparable strength and conditioning programs, the experimental group achieved substantially greater improvements in sprint performance. This suggests that physical development alone is insufficient to maximize athletic potential. Rather, performance gains are optimized when improvements in strength and power are effectively transferred into sport-specific movement patterns through technical training. This observation is consistent with Young [6], who emphasized that the transfer of training adaptations depends largely on movement specificity and technical execution.

The results also provide support for contemporary theories of periodization. The systematic distribution of technical and tactical training across preparatory, competitive, and transition phases ensured continuous athlete development while minimizing the risk of stagnation. Technical correction was emphasized during the preparatory phase, while tactical refinement and competition-specific preparation received greater attention during the competitive period. This progression allowed athletes to consolidate technical adaptations and apply them effectively in competition. Such findings are consistent with the periodization models proposed by Bompa and Buzzichelli [1,2] and the block periodization approach advocated by Issurin [19].

From a practical perspective, the study demonstrates that technical and tactical preparation should not be viewed as supplementary components of sprint training. Instead, they should be regarded as

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ISSN: 2058-5519|Impact factor-15.9
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fundamental elements that influence the effectiveness of all other training adaptations. Coaches who prioritize technical accuracy, biomechanical efficiency, and tactical competence throughout the annual cycle are more likely to achieve sustainable improvements in athletic performance.

Despite the positive outcomes observed in this study, certain limitations should be acknowledged. The sample size was relatively small and consisted exclusively of university-aged male athletes. Future research should examine larger and more diverse populations, including female sprinters, elite international competitors, and youth athletes. Additionally, the incorporation of advanced biomechanical measurement systems and longitudinal monitoring across multiple annual cycles may provide further insights into the long-term effects of technical-tactical training interventions.

Overall, the findings demonstrate that a structured and scientifically grounded approach to technical-tactical preparation can significantly enhance sprint performance. The integration of biomechanical analysis, competition-specific tactical training, and periodized technical development throughout the annual training cycle resulted in measurable improvements in reaction time, acceleration efficiency, movement mechanics, competitive consistency, and race performance. These results reinforce the growing consensus within contemporary sports science that technical and tactical mastery represents a decisive factor in achieving excellence in sprint athletics.

5. Conclusion

The present study examined the effectiveness of improving technical and tactical preparation within the annual training cycle of sprinters and evaluated its influence on athletic performance. Based on the findings obtained throughout the experimental period, it can be concluded that systematic technical-tactical preparation represents one of the most important determinants of success in sprint events and should be regarded as an integral component of long-term athlete development.

The results demonstrated that the integration of specialized technical and tactical training methods into the annual preparation process produced significant improvements in reaction time, acceleration efficiency, stride mechanics, race execution, and overall sprint performance. Athletes who participated in the experimental training program achieved greater improvements than those following traditional training approaches, confirming the effectiveness of a structured and scientifically based model of technical-tactical preparation.

One of the most significant findings of this study is the confirmation that sprint performance depends not only on physical qualities such as strength, power, and speed but also on the athlete's ability to apply these capacities efficiently through technically correct movement patterns. Improvements in sprint start mechanics, acceleration technique, stride efficiency, and maximal velocity running contributed directly to enhanced competitive outcomes. These findings support contemporary biomechanical theories that emphasize movement efficiency and force application as key determinants of sprint success.

The study also highlights the importance of tactical preparation in sprint events. Although sprint races are often characterized by short durations and maximal effort, tactical decision-making remains a crucial factor influencing competitive performance. Athletes who regularly engaged in race simulations, competition-specific training exercises, and performance analysis demonstrated greater consistency and improved execution of race strategies under competitive conditions. The findings indicate that tactical competence contributes not only to performance enhancement but also to psychological confidence and competitive stability.

Another important conclusion concerns the role of periodization in organizing technical and tactical development. The distribution of training objectives across preparatory, competitive, and transition phases enabled continuous adaptation while minimizing excessive fatigue and performance stagnation. Technical correction was most effective during the preparatory phase, whereas tactical

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ISSN: 2058-5519|Impact factor-15.9
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refinement and competition-specific preparation yielded the greatest benefits during the competitive season. This supports modern periodization models that advocate the systematic integration of technical and tactical training throughout the annual cycle.

The application of biomechanical analysis and performance-monitoring technologies proved highly beneficial for athlete development. High-speed video analysis, objective performance measurements, and individualized technical feedback facilitated the identification and correction of movement inefficiencies. Consequently, athletes demonstrated progressive improvements in sprint mechanics and race performance over the course of the study. These findings reinforce the growing importance of evidence-based coaching practices and technological innovation in contemporary athletics.

From a practical standpoint, the study suggests that coaches should allocate a greater proportion of training time to technical and tactical development, particularly during key stages of the annual preparation process. Training programs should incorporate regular biomechanical assessment, individualized technical correction, race modeling, and tactical simulation exercises. Such an approach may contribute to improved performance outcomes, greater competitive consistency, and long-term athletic development.

The findings of this research have both theoretical and practical significance. Theoretically, they contribute to the growing body of knowledge concerning sprint training methodology and the optimization of annual preparation models. Practically, they provide coaches, sports scientists, and athletes with evidence-based recommendations for enhancing technical and tactical preparation in sprint events.

Future research should investigate the long-term effects of technical-tactical interventions across multiple annual training cycles and explore their application among elite athletes, female sprinters, and youth development programs. Additional studies utilizing advanced biomechanical technologies, artificial intelligence-based motion analysis, and wearable performance-monitoring systems may further enhance understanding of the factors influencing sprint performance.

In conclusion, the results of this study confirm that the systematic improvement of technical and tactical preparation within the annual training cycle is a critical factor in achieving high-level sprint performance. Athletes who develop superior technical efficiency and tactical competence are better equipped to maximize their physical potential, achieve consistent competitive success, and sustain long-term athletic excellence.

References

1. Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and Methodology of Training* (6th ed.). Champaign, IL: Human Kinetics.
2. Bompa, T. O., & Buzzichelli, C. (2019). *Periodization Training for Sports* (3rd ed.). Champaign, IL: Human Kinetics.
3. Mero, A., Komi, P. V., & Gregor, R. J. (1992). Biomechanics of sprint running. *Sports Medicine*, 13(6), 376–392.
4. Mann, R. (2018). *The Mechanics of Sprinting and Hurdling*. Las Vegas: CreateSpace Independent Publishing.
5. Ross, A., Leveritt, M., & Riek, S. (2001). Neural influences on sprint running: Training adaptations and acute responses. *Sports Medicine*, 31(6), 409–425.
6. Young, W. (2006). Transfer of strength and power training to sports performance. *International Journal of Sports Physiology and Performance*, 1(2), 74–83.

HSR (LONDON),
HOUGHTON STREET REVIEW JOURNAL
ISSN: 2058-5519|Impact factor-15.9
http://houghtonstreetreview.com/index.php/hsr

7. Coh, M., & Tomazin, K. (2006). Kinematic analysis of the sprint start and acceleration from the blocks. *New Studies in Athletics*, 21(3), 23–33.
8. Morin, J. B., Edouard, P., & Samozino, P. (2011). Technical ability of force application as a determinant factor of sprint performance. *Medicine & Science in Sports & Exercise*, 43(9), 1680–1688.
9. Samozino, P., Rabita, G., Dorel, S., Slawinski, J., Peyrot, N., Saez-de-Villarreal, E., & Morin, J. B. (2016). A simple method for measuring power, force, velocity properties, and mechanical effectiveness in sprint running. *Scandinavian Journal of Medicine & Science in Sports*, 26(6), 648–658.
10. Bezodis, N. E., Salo, A. I. T., & Trewartha, G. (2010). Choice of sprint start performance measure affects the performance-based ranking within a group of sprinters. *Journal of Sports Sciences*, 28(9), 1009–1016.
11. Clark, K. P., & Weyand, P. G. (2014). Are running speeds maximized with simple-spring stance mechanics? *Journal of Applied Physiology*, 117(6), 604–615.
12. Haugen, T., Tønnessen, E., & Seiler, S. (2019). The training and development of elite sprint performance: An integration of scientific and best practice literature. *Sports Medicine – Open*, 5(44), 1–16.
13. Haugen, T., Breitschädel, F., & Seiler, S. (2019). Sprint mechanical variables in elite athletes. *International Journal of Sports Physiology and Performance*, 14(2), 213–220.
14. Rabita, G., Dorel, S., Slawinski, J., Sàez-de-Villarreal, E., Couturier, A., Samozino, P., & Morin, J. B. (2015). Sprint mechanics in world-class athletes: A new insight into the limits of human locomotion. *Scandinavian Journal of Medicine & Science in Sports*, 25(5), 583–594.
15. Slawinski, J., Termoz, N., Rabita, G., Guilhem, G., Dorel, S., Morin, J. B., & Samozino, P. (2017). How 100-m event analyses improve our understanding of world-class men's and women's sprint performance. *Scandinavian Journal of Medicine & Science in Sports*, 27(1), 45–54.
16. World Athletics. (2024). *Coaches Education and Certification System: Sprint Events Manual*.
17. World Athletics. (2023). *World Championships Biomechanical Analysis Reports*.
18. National Strength and Conditioning Association. (2021). *Essentials of Strength Training and Conditioning* (4th ed.). Champaign, IL: Human Kinetics.
19. Issurin, V. B. (2016). Benefits and limitations of block periodized training approaches to athletes' preparation. *Sports Medicine*, 46(3), 329–338.
20. Plisk, S. S., & Stone, M. H. (2003). Periodization strategies. *Strength and Conditioning Journal*, 25(6), 19–37.
21. McFarlane, B. (2022). *The Science of Hurdling and Speed*. Ontario: Athletics Canada Publications.
22. Brughelli, M., Cronin, J., Levin, G., & Chaouachi, A. (2008). Understanding change of direction ability in sport. *Sports Medicine*, 38(12), 1045–1063.
23. Sands, W. A., McNeal, J. R., Ochi, M. T., Urbanek, T. L., Jemni, M., & Stone, M. H. (2004). Comparison of the wingate and Bosco anaerobic tests. *Journal of Strength and Conditioning Research*, 18(4), 810–815.
24. Zatsiorsky, V. M., & Kraemer, W. J. (2020). *Science and Practice of Strength Training* (3rd ed.). Champaign, IL: Human Kinetics.
25. Stone, M. H., Stone, M., & Sands, W. A. (2007). *Principles and Practice of Resistance Training*. Champaign, IL: Human Kinetics.