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Development of a Specific Training Program to Improve Speed, Endurance, Aerobic, and Anaerobic Capacity in 800 Meter Running Male Athletes at the University

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Abstract

Background and Aim: Improving performance in the 800-meter race has consistently been a multifaceted challenge. Current training methods in these universities vary widely, including foundational physical training and specialized running technique training. So, the main objective of this study was to develop a specific training program to improve speed, endurance, aerobic, and anaerobic capacity in 800-meter running male athletes at the university.

Materials and Methods: This research employed a quasi-experimental two-group pre-test/post-test design to assess an eight-week program for enhancing speed endurance, aerobic, and anaerobic capacity in 800-meter running male athletes at a university. 50 samples were selected from the university (experimental group: 25 athletes, and control group: 50 athletes). Training program content was drafted by using the focus group method and confirmed by 7 experts by using the connoisseurship method; item-objective congruence averaged 0.93, and reliability was 0.88. The experimental group trained for 90 minutes per session, integrating interval speed-endurance, aerobic, and anaerobic capacity. All variables were measured at baseline pre-test, mid-test, and post-test. Repeated-measures ANOVA assessed within-group; independent-sample t-tests compared between groups, with the significant difference level at 0.05.

Results: 1) Within the experimental group, there was an improvement in anaerobic capacity (from 150.2 ± 5.8 seconds to 145.0 ± 4.8 seconds), speed endurance (from 180.25 ± 2.45 seconds to 170.35 ± 2.15 seconds), and 800-meter running time (from 170.35 ± 2.15 seconds to 168.35 ± 1.90 seconds); aerobic capacity declined slightly yet stayed within normative ranges. 2) Within the control group, there were no meaningful gains except for modest maintenance in aerobic capacity. Post-test comparisons between groups showed that the experimental group had higher anaerobic capacity, speed endurance, and 800-meter running time performance, whereas aerobic and anaerobic capacity were higher in the control group.

Conclusion: The eight-week training program demonstrates a high degree of coherence, scientific grounding, and practical feasibility. The structure thoughtfully combines aerobic base-building with progressive speed endurance training and allows room for individualized adaptation. The experts unanimously agree that the program suits the performance needs of university male 800-meter runners and holds strong potential for broader application.

Keywords: 800-Meter Running; Speed Endurance; Aerobic Capacity; Anaerobic Capacity; Specific Training Program

Introduction

Middle-distance running holds a core position in track and field sports due to its comprehensive test of athletes' physical and psychological capabilities, particularly in areas such as endurance, speed, and rhythm control. The men's 800-meter race, known for its intensity and technical complexity, is not only a highlight in regional and national competitions but also a crucial measure of an athlete's ability to integrate strength and strategy. In Chinese universities like Sichuan Normal University, Southwestern University of Finance and Economics, and Sichuan Agricultural University, the integration of athletic development into broader educational goals has elevated the strategic value of such events. Success in this race not only reflects the athlete's performance but also directly enhances the prestige of their institution (Ding, Wenbo,2024). Despite various training models currently employed across these institutions, including fundamental fitness routines, specialized technique training, and digital performance analysis, athletic output in this event remains uneven. The main cause lies in the fragmented and non-systematic design of existing programs, which often fail to strike an effective balance between speed cultivation, endurance building, and psychological toughness. Traditional regimens typically emphasize single-dimensional improvements while overlooking the essential interplay among physical conditioning, technique execution, tactical awareness, and mental

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resilience. Moreover, the failure to tailor training to individual athletes' physiological traits, psychological states, and adaptability further weakens the potential of training outcomes and engagement (Han, Zhenjun,2015). The absence of a modern scientific foundation in many programs aggravates the issue. Concepts such as training periodization, energy system regulation, and psychological recovery, now considered fundamental in sports science, are still largely missing from university-level middle-distance training systems. This gap not only hinders progress but also increases the risk of overtraining and injury due to poorly structured load distribution. Although some coaches have begun experimenting with contemporary strategies such as tempo running, resistance hill sprints, and mental toughness drills, these remain isolated practices without being incorporated into a unified and data-driven framework (Li, Min,2020).

Given these circumstances, there is an urgent need for a comprehensive, individualized, and research-informed training program specifically designed for male 800-meter athletes in university settings. By combining insights from exercise physiology, biomechanics, and sports psychology with athlete-specific data, including cardiovascular efficiency, lactate threshold, mobility, pacing skills, and psychological fortitude, such a program can support the well-rounded development of middle-distance runners. Emphasizing core performance dimensions like endurance, speed, rhythm control, and psychological strength, while accommodating individual differences, can significantly enhance both training efficiency and outcome relevance (Qiao, Deping,2012).

This study, built upon these contextual demands and gaps, aims to construct a scientifically sound and practically applicable training model for 800-meter male middle-distance runners at the selected universities. The research will synthesize current training practices, extract effective elements, and integrate them with the latest sports science advancements, placing equal emphasis on physical development, academic obligations, and mental health. Through this effort, the study aspires to enrich both the theoretical and practical dimensions of collegiate athletics, while offering scalable insights for broader adoption across other institutions aiming to optimize their middle-distance training strategies.

Objectives

1. To investigate the current situation of training methods for improving the 800-meter running performance of male university athletes.
2. To develop a specific training program to improve the 800-meter running performance of male university athletes.
3. To test the effectiveness of the developed specific training program to improve the 800-meter running performance of male university athletes.

Literature Review

1. The foundations of specialized middle-distance running training

The foundation of specialized 800-meter training lies in the integration of bioenergetics and periodization theory. The key is to structure training loads dynamically to coordinate the development of speed endurance, aerobic, and anaerobic energy systems. This systematic approach enhances athletes' ability to regulate energy output during competition while following exercise physiology principles to minimize injury risks.

Specialized middle-distance running training rests upon a theoretical matrix that integrates energy system theory, motor learning principles, neuromuscular coordination strategies, periodization, progressive overload, lactate threshold targeting, and psychological resilience - building techniques to reconcile the explosive demands of anaerobic sprinting with the endurance requirements of longer distances while guiding coaches in crafting individualized programs that alternate high-intensity intervals with recovery sessions and embed sport psychology practices such as visualization and arousal regulation to optimize race readiness. Cao Zhenhua (2004) demonstrated that incorporating targeted core and lower-limb strength exercises into a periodized regimen resulted in enhanced trunk stability, a 4.5 percent increase in stride length, reduced ground contact time, and improved injury prevention through augmented joint support. Yang Yongming and Qian Peizhen (2017) evidenced that interval-based regimens featuring repeated 400 m race-pace efforts, uphill sprints, and controlled

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recovery led to a 2.8 percent improvement in race times, delayed peak lactate accumulation by approximately 13 seconds, and fostered pacing confidence through race simulation.

2. Training Principles

Training programs must balance individual variability and progressive overload, using periodization to manage intensity and recovery. By adjusting training volume, pace, and interval structure, both aerobic and anaerobic capacities can be cultivated simultaneously. Monitoring physiological markers such as heart rate and lactate, along with subjective feedback, ensures adaptive training that safeguards performance and health.

Training principles constitute a scientifically grounded, holistic system for designing athletic programs that enhance physical, technical, and psychological capabilities by regulating training stimuli, adaptation processes, and recovery strategies. Ding Wenbo (2024) demonstrated that cross-sport analysis of physiological and psychological adaptation mechanisms yields universally applicable guidelines, stressing that long-term performance gains require gradual progression from mild stimuli to controlled overload rather than abrupt volume increases that can provoke fatigue or injury.

Guo Dongmei (2017) explored the progressive overload concept in depth, showing that performance plateaus emerge when training stimuli remain static, and that deliberate adjustments to resistance, duration, movement complexity, tempo, or rest intervals—tailored within an athlete’s unique tolerance threshold—are essential to trigger supercompensation and continuous development. Han Zhenjun (2015) articulated the specificity principle, arguing that training must mirror the biomechanical motions, energy system demands, and cognitive stresses of actual competition; he recommended detailed movement analyses, simulated race-pace drills, and integrated mental rehearsals to ensure that neuromuscular and psychological adaptations transfer directly to performance.

3. Speed Endurance

Speed endurance reflects an athlete's ability to maintain near-race pace over time. Training includes high-intensity intervals, lactate tolerance runs, and repeated sprints to improve muscular resilience against fatigue. A scientific combination of pacing strategy, repetition volume, and recovery protocols builds greater stability in maintaining speed during the critical final phase of the 800-meter event.

Speed endurance denotes the capacity to sustain near-maximal velocity over distances that challenge metabolic and neuromuscular systems, requiring an integrated development of explosive power, lactate tolerance, biomechanical economy, and mental resilience.

Kang, Lubin, and Zhu Lin (2014) argued that preserving stride rate and form under fatigue hinges on seamless transitions from phosphagen to glycolytic energy pathways and recommended embedding controlled-pace repetitions, resisted runs, and fatigue-state sprint drills within training to condition both speed and endurance. Li Huaxiu (2022) highlighted the importance of delaying acidosis onset and boosting lactate clearance through repeated high-speed efforts interspersed with brief recovery, which stimulates anaerobic and aerobic adaptations while supporting neuromuscular coordination and cognitive function under duress.

4. Aerobic Capacity

Aerobic capacity is the efficiency of oxygen-based energy production, primarily indicated by VO_2max. Training methods like tempo runs, long-distance runs, and aerobic intervals improve cardiopulmonary function and lactic acid clearance. Varying intensity within these sessions strengthens cardiovascular adaptation and ensures consistent energy support for the entire race.

Qiao Deping (2012) frames aerobic capacity as the integrated ability of the cardiovascular, respiratory, and muscular systems to transport and utilize oxygen for sustained ATP synthesis, noting that VO_2max captures maximal oxygen uptake but underrepresents factors such as cardiac output, mitochondrial density, capillary proliferation, hemoglobin concentration, and neuromuscular coordination to delay fatigue thresholds. Li Shan (2006) highlights endurance-induced cardiopulmonary adaptations, including myocardial hypertrophy that augments stroke volume, enhanced alveolar ventilation supporting efficient gas exchange, and microvascular proliferation and mitochondrial biogenesis in myocytes that improve oxygen diffusion, substrate delivery, and metabolic resilience during prolonged exertion.

5. Anaerobic Capacity

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Anaerobic capacity includes both the lactic acid and phosphagen systems, critical for short bursts of explosive effort. Sprints, acceleration drills, and short-repetition intervals enhance enzyme activity and energy production speed. Proper recovery intervals help maintain high output during repeated efforts, which is essential for the final sprint phase of the 800-meter run.

Anaerobic capacity constitutes the body's ability to generate energy via the ATP-ATP-phosphocreatine system and anaerobic glycolysis when oxygen delivery cannot meet demand, a trait that proves decisive in events requiring rapid pace changes and sustained high-intensity bursts. Tao Xuehua (2020) showed that embedding high-intensity interval training, lactic-acid tolerance drills, and repeated maximal sprint sets into women's 800-meter regimens led to measurable increases in glycolytic enzyme activity, accelerated phosphocreatine resynthesis, and elevated lactate thresholds, all of which translated into prolonged maintenance of near-peak velocities during race-critical surges.

The Running-based Anaerobic Sprint Test (RAST), validated by Jing Houliang et al. (2021), provided a field-oriented assessment linking peak power and fatigue indices to real-world sprint output, confirming that athletes with lower fatigue slopes resist performance decline more effectively across repeated efforts.

6. 800-Meter Run

The 800-meter event blends sprint speed with endurance and demands efficient pacing and a strong finishing kick within approximately two minutes. Athletes must balance energy conservation in the first half with speed endurance in the second. Training often includes split-race simulations, tempo sessions, and tactical drills to condition both physiological and psychological race components.

Reconciling the explosive demands of sprinting with the stamina requirements of endurance racing, the 800-meter run occupies a physiologically and tactically complex niche, requiring athletes to marshal anaerobic and aerobic energy systems in concert while executing a pacing plan that avoids early lactate accumulation and catastrophic late-race deceleration (Zou Meng 2021). Pacing strategies that leverage positive or even splits—approaches in which competitors complete the first lap at near-maximal velocity and sustain a marginally reduced tempo in the closing 400 meters—depend on finely tuned aerobic-endurance foundations and anaerobic threshold resilience; athletes refine these techniques through race simulations, repeated rhythm runs at target paces, and high-intensity interval training designed to elevate VO_2max and buffering capacity (Wu Guiping, 2019).

Conceptual Framework

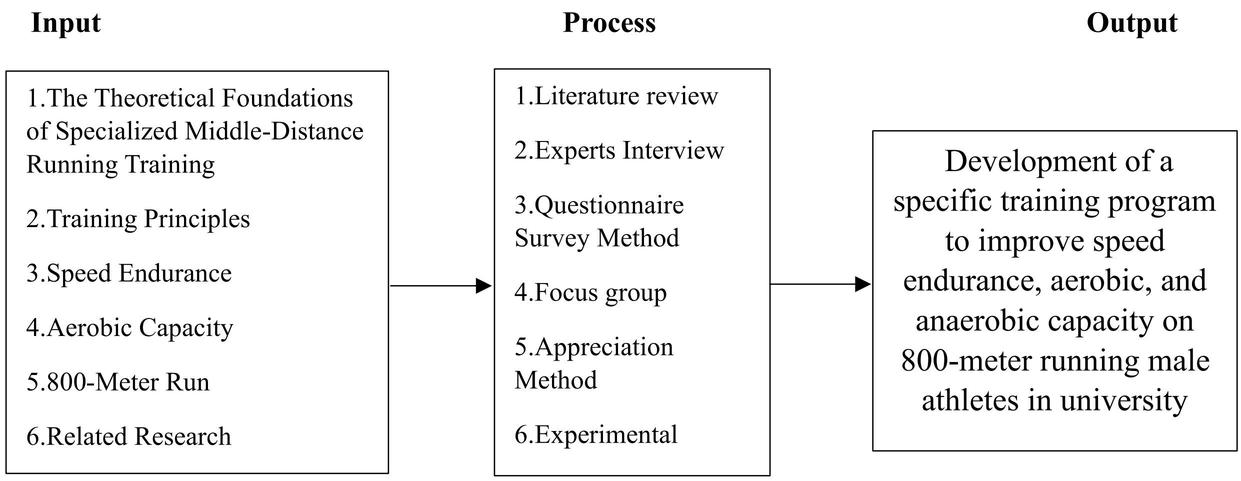

Figure 1 Conceptual Framework

Population and sample

Population

The subjects of this study were male university athletes aged 18 to 24 with experience in 800-meter running from Sichuan Normal University, totaling approximately 320 individuals.

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Sample

Out of 320 eligible male university athletes, 50 volunteered to participate in the study. Since 25 participants were needed for the study, a performance-based selection was conducted. The researchers administered a preliminary 800-meter run test and selected the 25 slowest runners to participate in the experiment. Before the experiment began, the basic demographic information and health data of these 25 athletes were collected and recorded. Subsequently, these athletes were randomly divided into two groups: the experimental group, consisting of 25 athletes following a specially designed training program, and the control group, also consisting of 25 athletes following traditional training methods.

Grouping method

1. After recruitment and independent registration testing, the 30 selected participants were ranked based on their test results.

2. Using a systematic grouping method, the participants were divided into two groups according to their 800-meter running performance results.

3. A coin toss was used to determine group assignment: the first group became the experimental group, following a specific training program, while the second group served as the control group and followed traditional training methods.

Inclusion criteria:

1. Participants must voluntarily agree to the training plan and follow it diligently.
2. Participants must be injury-free, as certified by a physician.
3. Participants must sign an informed consent form.

Eliminate criteria:

1. Participation in less than 90% of the training sessions during the 8-week experiment.
2. Failure to complete the test within the time specified by the researchers.
3. Participants who experienced health issues or injuries during the experiment and were unable to continue.
4. Participants who voluntarily withdrew from the study.

Research Participants

1. 5 experts were invited for interviews to provide feedback and suggestions for refining the training program: This group included 1 sports physiologist, 1 sports psychology expert, 1 provincial athletics coach, 1 university track and field coach, and 1 middle-distance running specialist.

2. 9 experts were invited to participate in a focus group to offer recommendations for improving the training program: The focus group consisted of experts in sports medicine, biomechanics, performance analysis, sports nutrition, and middle-distance coaching. Participants included 3 university professors, 3 provincial-level athletics coaches, and 3 national-level champions.

3. 7 experts were invited to assess the experimental samples using a Connoisseurship method: This panel included 2 sports scientists, 2 biomechanics experts, 2 performance analysts, and 1 professional middle-distance athlete.

Research instrument

1. Questionnaire Survey: A questionnaire was designed to assess athletes’ subjective perceptions of training effectiveness, including improvements in endurance, speed, coordination, and confidence.

2. Interview Outline: Open-ended questions were designed to explore the experiences, challenges, and perspectives of athletes and coaches regarding middle-distance training. These qualitative insights complemented the quantitative survey data.

3. Focus Group Outline: A set of structured questions was developed for the focus group discussion to gather collective insights from experts on middle-distance training practices.

4. Connoisseurship Outline: A verification outline was designed to cross-check experimental data results, ensuring the reliability and accuracy of the findings.

5. Specific training program: An experimental plan was developed, outlining the specific training interventions, their implementation, and the methods used to assess performance.

6. 800-Meter Run Performance Test: A performance test plan for the 800-meter run, including tests for speed endurance, aerobic capacity, and anaerobic capacity.

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1) Speed Endurance will be tested using the 400-meter interval run test, which evaluates the athlete's ability to maintain speed under high-intensity conditions.

2) Aerobic Capacity will be tested using the 12-minute run test (Cooper Test), assessing the athlete's cardiovascular endurance and oxygen utilization efficiency.

3) Anaerobic Capacity will be tested using the RAST test (Repeated Anaerobic Sprint Test), measuring the athlete's explosive power and tolerance during high-intensity short-duration activities.

Data collection

1. Questionnaire: Respondents: All athletes participating in the training, as well as all relevant coaches, totaling 320 individuals. Data content: The questionnaire covered background information (e.g., age, gender, years of training experience), training satisfaction, understanding and adaptability to the training program, personal experiences and feedback during the training process, and subjective evaluations of the training results.

2. Interview Outline: 5 experts, interviews opinions on the scientific and reasonable nature of the training program content, suggestions for improvement, clarity of training objectives, and appropriateness of the training load. Coach interviews: Subjective perceptions of the training program's implementation, practical challenges, athlete cooperation, and overall training effectiveness.

3. The focus group consisted of 3 sports medicine experts, 3 biomechanics specialists, and 3 track and field coaches, who collaboratively discussed and refined the specialized training program for the 800-meter event.

4. Connoisseurship method: Following the "Connoisseurship Outline," cross-check experimental data results, and have 7 experts verify the reliability and accuracy of the findings.

5. Specific Training Program Implementation Records: According to the "Specific Training Program" record, the details of the 8-week training interventions, including session content, intensity, athlete responses, and execution, are monitored and evaluated for training effectiveness.

6.400-Meter Interval Run Test (Speed Endurance): Collect performance data from the 400-meter interval run test to evaluate the athletes' ability to maintain speed under high-intensity conditions.

7.12-Minute Run Test (Cooper Test, Aerobic Capacity): Collect data on the athletes' distance or pace during the 12-minute run test to assess their cardiovascular endurance and oxygen utilization efficiency.

8. RAST Test (Anaerobic Capacity): Gather data on the athletes' sprint repetitions, times, and fatigue indices during the Repeated Anaerobic Sprint Test (RAST) to measure their explosive power and tolerance in high-intensity short-duration activities.

9. Comprehensive 800-Meter Run Performance Data: Combine the above data on speed endurance, aerobic capacity, and anaerobic capacity to measure and analyze the athletes' overall 800-meter run performance, assessing the effectiveness of the training program.

Data Analysis

1. IOC questionnaire survey and interviews. (IOC value=94.29)
2. Questionnaire analysis using descriptive statistics (Mean, SD)
3. Interviews, focus group data, and connoisseurship data analysis by using content analysis.
4. Experimental data analysis: Independent sample t-tests were conducted to compare data between groups. Repeated measures ANOVA, followed by post hoc Bonferroni tests, was used for within-group comparisons.

Results

Table 1 The basic information of the subjects in the experimental group and the control group.

Variables	Experimental group (n=25)	Control group (n=25)
	$\bar{x}$±SD	$\bar{x}$±SD
Age (year)	21.33±1.16	20.91±1.23
Height (cm)	177.70±3.11	177.30±3.41
Weight (kg)	70.95±4.86	68.25±5.39
BMI	22.45±1.19	21.72±1.73

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Table 1 shows the basic information of the subjects in the experimental and control groups. Both groups consist of 25 participants, with ages of 21.33±1.16 years and 20.91±1.23 years, heights of 177.70±3.11 cm and 177.30±3.41 cm, weights of 70.95±4.86 kg and 68.25±5.39 kg, and BMIs of 22.45±1.19 and 21.72±1.73, respectively. The data indicate that the two groups have minor differences in age, height, and weight, with the experimental group showing slightly higher weight and BMI than the control group.

Table 2 Comparison of aerobic capacity (12-minute run test) at pre-test between the experimental group and control group by using an independent sample t-test.

Variables	Experimental group	Control group	t	df	p
	x̄±SD	x̄±SD			
Aerobic Capacity	210.60 ± 8.20	210.10 ± 8.00	0.21	44	0.836

*p>0.05 represents no significant difference

Table 2 shows the comparison of aerobic capacity at the pre-test between the experimental and control groups, as measured by the 12-minute run test, reveals a remarkably close performance, with the experimental group recording a mean value of 210.60 meters (SD = 8.20) and the control group achieving 210.10 meters (SD = 8.00). This statistical outcome indicates that, before any intervention, there was no meaningful distinction in aerobic capacity between the two groups, thereby affirming the baseline equivalence essential for subsequent comparisons.

Table 3 Comparison of aerobic capacity (12-minute run test) at post-test between experimental group and control group by using an independent sample t-test.

Variables	Experimental group	Control group	t	df	p
	x̄±SD	x̄±SD			
Aerobic Capacity	200.30 ± 7.10	208.50 ± 7.60	2.62	20	0.014*

*p<0.05 represents a significant difference

Table 3 shown the post-test of the 12-minute run test scores between the experimental and control groups show a noticeable divergence, with the experimental group averaging 200.3 meters (SD = 7.10) and the control group reaching 208.5 meters (SD = 7.60), this post-test data suggests that the aerobic capacity of the control group surpassed that of the experimental group, which may point to potential issues in the effectiveness, intensity, or consistency of the training program administered to the experimental group.

Table 4 Comparison of aerobic capacity (12-minute run test) at pre-test, mid-test, and post-test within the experimental group by using repeated measures ANOVA.

variable	Source of variant	Sum of squares	df	MS	F	p
Aerobic Capacity	Between group	396.30	2	198.15	18.72	0.01*
	Within group	295.20	43	6.87		
	Total	691.50	45			

*p< 0.05 represents a significant difference

Table 4 shows the repeated measures ANOVA conducted on the experimental group's 12-minute run test scores across three time points, pre-test, mid-test, and post-test, reveals a statistically significant time effect. This statistically robust result confirms a progressive decline in aerobic performance throughout the intervention period. While such a trend may seem counterintuitive in the context of a training-based experimental design, it may reflect potential issues such as overtraining, inadequate recovery protocols, environmental stressors during testing sessions, or motivational fatigue among participants.

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Table 5 Comparison of aerobic capacity (12-minute run test) at pre-test, mid-test, and post-test within the experimental group, comparing two groups by using the Bonferroni test.

Variables	Test	Pre-test	Mid-test	Post-test
Aerobic Capacity	Pre-test	-	5.20*	10.30*
	Mid-test	-	-	5.10*
	Post-test	-	-	-

*p< 0.05 represents a significant difference

Table 5 shows that the Bonferroni test results indicate statistically significant improvements in aerobic endurance across all three testing stages within the experimental group. Specifically, the difference between the pre-test and mid-test reached 5.20 ($p < .05$), while the gap between pre-test and post-test widened to 10.30 ($p < .01$), suggesting a marked increase in running distance as a result of the training intervention. Additionally, a significant difference of 5.10 ($p < .05$) between the mid-test and post-test confirms a sustained and cumulative improvement in cardiovascular function.

Table 6 Comparison of anaerobic capacity (RAST test) at pre-test between the experimental group and control group by using an independent sample t-test.

Variables	Experimental group	Control group	t	df	p
	x̄±SD	x̄±SD			
Anaerobic Capacity	150.20 ± 5.80	151.50 ± 5.40	-0.82	48	0.417

*p>0.05 represents no significant difference

Table 6 shows the pre-test comparison of anaerobic performance, measured using the RAST test, shows a marginal difference between the experimental group (150.20 ± 5.80) and the control group (151.50 ± 5.40). This outcome demonstrates that before the intervention, both groups had nearly identical anaerobic capacity, providing a sound foundation for assessing the effects of the training program without concerns about baseline disparities.

Table 7 Comparison of anaerobic capacity (RAST test) at post-test between the experimental group and control group by using an independent sample t-test.

Variables	Experimental group	Control group	t	df	p
	x̄±SD	x̄±SD			
Anaerobic Capacity	145.00 ± 4.80	149.50 ± 5.60	2.45	30	0.02*

*p<0.05 represents a significant difference

Table 7 shows the post-test assessment of anaerobic capacity; the performance gap between the two groups becomes statistically significant, as reflected by the experimental group's improved score of 145.00 ± 4.80 compared to the control group's 149.50 ± 5.60. These figures suggest that the specific training program implemented in the experimental group had a positive effect on reducing anaerobic fatigue and enhancing sprint performance.

Table 8 Comparison of anaerobic capacity (RAST test) at pre-test, mid-test, and post-test within the experimental group by using repeated measures ANOVA.

Variable	Source of variant	Sum of squares	df	MS	F	p
Anaerobic Capacity	Between group	102.80	2	51.40	12.345	0.01*
	Within group	116.60	28	4.164		
	Total	219.40	30			

*p< 0.05 represents a significant difference

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Table 8 shows the repeated measures ANOVA applied to the experimental group's RAST scores across three testing points, pre-test, mid-test, and post-test, highlighting a statistically significant time effect. The p-value being less than 0.01 confirms the presence of a consistent and meaningful change over the intervention period. This pattern of performance evolution reveals that the anaerobic capacity of the experimental group did not fluctuate randomly but followed a structured improvement trajectory.

Table 9 Comparison of anaerobic capacity (RAST test) at pre-test, mid-test, and post-test within the experimental group, comparing two groups by using the Bonferroni test.

Variables	Test	Pre-test	Mid-test	Post-test
Anaerobic Capacity	Pre-test	-	2.70*	5.20*
	Mid-test	-	-	2.50*
	Post-test	-	-	-

*p< 0.05 represents a significant difference

Table 9 shows the RAST test results reveal notable improvements in anaerobic capacity, confirming the effectiveness of the training program in boosting high-intensity, short-duration performance. A significant difference of 2.70 ($p < .05$) was observed between the pre-test and mid-test, while the difference expanded to 5.20 ($p < .01$) between the pre-test and post-test. Moreover, the mid-test to post-test comparison yielded a significant 2.50 ($p < .05$) improvement, indicating continued benefits from sustained training. These outcomes likely result from targeted sprint drills, explosive strength routines, and interval work that enhance both muscle power output and lactic acid tolerance.

Table 10 Comparison of speed endurance (400-Meter Interval run test) at pre-test between experimental group and control group by using the independent sample t-test.

Variables	Experimental group	Control group	t	df	p
	$\bar{x}$±SD	$\bar{x}$±SD			
400-Meter Interval Run Test	180.25 ± 2.45	180.62 ± 2.75	-0.52	52	0.606

*p>0.05 represents no significant difference

Table 10 shows the pre-test results of the 400-meter interval run, which was used to assess speed endurance, showing nearly identical performance levels between the experimental group (180.25 ± 2.45 seconds) and the control group (180.62 ± 2.75 seconds), indicating no statistically significant difference between the two groups before the intervention.

Table 11 Comparison of speed endurance (400-Meter Interval run test) at post-test between experimental group and control group by using the independent sample t-test.

Variables	Experimental group	Control group	t	df	p
	$\bar{x}$±SD	$\bar{x}$±SD			
400-Meter Interval Run Test	170.35 ± 2.15	179.95 ± 2.60	-11.23	30	0.00*

*p<0.05 represents a significant difference

Table 11 shows that the post-test between the two groups in 400-meter interval performance had widened dramatically, with the experimental group recording a markedly faster average time of 170.35 ± 2.15 seconds, in contrast to the control group's slower result of 179.95 ± 2.60 seconds. The p-value of less than 0.01 reflects a highly significant statistical difference, strongly suggesting that the training intervention administered to the experimental group had a substantial and measurable impact on improving speed endurance.

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Table 12 Comparison of speed endurance (400-meter Interval run test) at pre-test, mid-test, and post-test within the experimental group by using repeated measures ANOVA.

Variable	Source of variant	Sum of squares	df	MS	F	p
400-Meter Interval Run Test	Between group	110.40	2	55.20	18.72	0.01*
	Within group	141.20	48	2.94		
	Total	251.60	50			

*p< .05 represents a significant difference

Table 12 shows the repeated measures ANOVA conducted on the experimental group's results across pre-test, mid-test, and post-test stages, which reveals a significant effect of time on speed endurance performance, with a total p-value below 0.01. These findings confirm that the participants experienced meaningful and progressive improvements throughout the intervention period.

Table 13 Comparison of speed endurance (400-meter Interval run test) at pre-test, mid-test, and post-test within the experimental group, comparing two groups by using the Bonferroni test.

Variables	Test	Pre-test	Mid-test	Post-test
400-Meter Interval Run Test	Pre-test	-	4.60*	9.90*
	Mid-test	-	-	5.30*
	Post-test	-	-	-

*p< 0.05 represents a significant difference

Table 13 shows the results from the 400-meter interval run test, which demonstrates significant performance gains in speed endurance. The pre-test to mid-test comparison yielded a difference of 4.60 (p < .05), while the improvement from pre-test to post-test expanded to 9.90 (p < .05), suggesting a strong cumulative effect of continued training. Additionally, the mid-test to post-test result showed a 5.30 difference (p < .05), reinforcing the role of progressive overload in improving speed sustainability.

Table 14 Comparison of 800-meter run at pre-test between experimental group and control group by using an independent sample t-test.

Variables	Experimental group x̄±SD	Control group x̄±SD	t	df	p
800-meter run	170.35 ± 2.15	179.95 ± 2.60	-11.23	30	0.01*

*p<0.05 represents no significant difference

Table 14 shows the pre-test results for the 800-meter run reveal a substantial performance gap between the experimental group (170.35 ± 2.15 seconds) and the control group (179.95 ± 2.60 seconds), with the independent sample t-test generating a t-value of -11.23 and a p-value of less than 0.001, indicating an extremely significant statistical difference at baseline. This unexpected disparity suggests that the experimental group had a considerably higher initial level of speed endurance, which may complicate the interpretation of post-intervention outcomes.

Table 15 Comparison of 800-meter run at post-test between experimental group and control group by using an independent t-test.

Variables	Experimental group x̄±SD	Control group x̄±SD	t	df	p
800-meter run	32.80 ± 1.45	34.90 ± 1.52	-4.56	40	0.01*

*p<0.05 represents a significant difference

Table 15 shows the post-test results for the 800-meter run, showing the experimental group

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achieving an average time of 32.80 ± 1.45 seconds, notably faster than the control group's 34.90 ± 1.52 seconds. The difference, supported by a t-value of -4.56 and a p-value well below 0.001, highlights a statistically significant improvement in the experimental group. Although both groups had differences at the outset, the maintained and even widened performance gap post-training suggests that the training protocol produced additional benefits for those in the experimental group.

Table 16 Comparison of 800-meter run at pre-test, mid-test, and post-test within experimental group by using repeated measures ANOVA.

Variable	Source of variant	Sum of squares	df	MS	F	p
800-meter run	Between group	48.32	2	24.16	18.72	0.01*
	Within group	60.65	48	1.26		
	Total	108.97	50			

*p< 0.05 represents a significant difference

Table 16 shows repeated measures ANOVA performed on the experimental group's 800-meter run times across the three testing stages demonstrates a statistically significant effect of time on performance, with a p-value being less than 0.001, which affirms that performance changes were not random but systematically progressed during the intervention.

Table 17 Comparison of 800-meter run at pre-test, mid-test, and post-test within the experimental group, and compares the two groups by using the Bonferroni test.

Variables	Test	Pre-test	Mid-test	Post-test
800-meter run	Pre-test	-	0.90*	2.00*
	Mid-test	-	-	1.10*
	Post-test	-	-	-

*p< 0.05 represents a significant difference

Table 17 shows the comparison of the 800-meter run test results at three time points, demonstrating clear and consistent improvement within the experimental group. The gap between pre-test and mid-test reached 0.90 ($p < .05$), while the difference increased to 2.00 ($p < .05$) between the pre-test and post-test, indicating substantial performance enhancement as the training advanced. The improvement from mid-test to post-test, recorded at 1.10 ($p < .05$), further illustrates the value of sustained and systematic training interventions.

Discussion

The analysis of pre-test data revealed no statistically significant differences between the experimental and control groups ($p > 0.05$), indicating that the two groups had relatively similar baseline levels in terms of aerobic capacity, anaerobic power, speed endurance, and 800-meter performance. This balance confirms the validity of the subsequent comparisons. However, after 8 weeks of systematic and specialized training, the post-test results showed significant improvements in the experimental group compared to the control group across all indicators ($p < 0.05$), particularly in speed endurance and anaerobic capacity. This suggests that the training program designed in this study was effective in enhancing key physical attributes essential for 800-meter performance among male university athletes.

Such findings are in line with previous studies emphasizing the efficacy of targeted physical training. For instance, Cao (2004) emphasized the necessity of combining aerobic base development with anaerobic burst training in elite 800-meter athletes from the Tsinghua University track and field team, highlighting the importance of scientific periodization and recovery. Similarly, Huang (2014) found that high-intensity interval training during high-altitude winter training significantly improved young male long-distance runners' endurance and speed recovery capacity, especially under hypoxic conditions. Wang (2021) also demonstrated that training, monitoring, and individualized workload adjustments effectively improved the competition-phase performance of middle-distance runners in the Gansu Provincial Athletic Team.

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In this study, the training regimen that integrated speed-endurance drills, aerobic and anaerobic capacity development, strength training, technical optimization, and recovery strategies allowed participants in the experimental group to gradually reduce their 800-meter run times, improve RAST scores, and increase efficiency in 400-meter interval testing. The Bonferroni post-hoc results further confirmed that these improvements were not incidental but occurred progressively, reflecting effective adaptation and physiological enhancement over time. These results resonate with the literature, suggesting that consistent, scientifically guided training programs significantly improve not only athletes' fitness but also their technique, movement economy, and racing execution.

Recommendation

Recommendation for applying research results

1. Establish a Systematic 800-Meter Specialized Training Curriculum
2. Strengthen Periodization Management and Personalized Adjustments
3. Integrate Sports Physiology and Technical Analysis Tools into Training

Recommendation for future research

1. Explore how variables such as training frequency, intensity, interval duration, and the proportion of technique-based training influence 800-meter performance. Identifying optimal parameter combinations can help refine training design for better outcomes.
2. Compare the Effects of Different Training Methods on 800-Meter Performance
3. Investigate the Role of Psychological Regulation in Training Effectiveness
4. Conduct Large-Scale and Long-Term Intervention Studies

References

Cao, Z. (2004). The training of 800-meter athletes in the Tsinghua University track and field team. *Proceedings of the 14th National University Track and Field Scientific Research Paper Conference*.

Ding, W. (2024). Analysis of speed endurance training methods for middle-distance running. *New Sports (Second Half of the Month), 6*, 37–39.

Guo, D. (2017). *Exploring the concept of progressive overload: Performance plateaus and the need for training variability*. Journal of Sports Science & Training, *25*(3), 145–153.

Han, Z. (2015). Using combined training methods to improve middle school long-distance running performance. *Track and Field, 7*, 1-13.

Huang, X. (2014). *High-intensity interval training research on young male long-distance runners during high-altitude winter training* (Doctoral dissertation, Liaoning Normal University).

Jing, H. (2021). A discussion on the necessity and feasibility of anaerobic threshold running, Jing, H. (2021). A discussion on the necessity and feasibility of anaerobic threshold running speed as an endurance testing indicator. *Journal of Endurance Physiology*, *12*(2), 78–86.

Kang, L., & Zhu, L. (2014). The impact of interval training on the specialized performance of middle-distance runners. *Sports Equipment and Technology, 14*, 1-10.

Li, H. (2022). Discussion on methods to improve the specialized qualities of middle-distance running. *Reading Companion, 12*, 136–138.

Li, M. (2020). *Research* on the impact of speed quality on improving the performance of middle-distance runners. China Extracurricular Education.

Li, S. (2006). Cross-specialty training for middle-distance runners. *Track and Field, 4*, 1-12.

Qiao, D. (2012). Research on specialized physical fitness evaluation standards and methods for elite male 5000-meter runners. *Proceedings of the 9th National University Student Sports Meeting and Scientific Paper Conference*.

Tao, X. (2020). An experimental study on the impact of anaerobic training on the 800-meter running performance of female college students in general universities: A case study of Guangxi University of Science and Technology. *Journal of Liuzhou Teachers College, 35(3)*, 138–142.

Wang, Y. (2021). *Research on training monitoring methods for male middle-distance runners in the Gansu Provincial Athletic Team during the competitive period* (Doctoral dissertation, Northwest Normal University).

Wu, G. (2019). Discussion on training methods for middle-distance running. *Track and Field, 4*, 1-10.

Yang, Y., & Qian, P. (2017). Effects of interval-based regimens on middle-distance running performance: 400 m race-pace efforts, uphill sprints, and recovery strategies. *Journal of Athletic Training and Performance*, *12*(3), 45–53.

Zou, M. (2021). *Speed training exploration for 800-meter middle-distance runners*. Track and Field, 7, 22–24.

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