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Systematic Versus Traditional Training: Effects on Explosive Strength, Reaction Time, Stride Efficiency, and Anaerobic Capacity in Male Sprinters

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ABSTRACT

This study explored the systematic and traditional training effects on strength, reaction time, stride length, and anaerobic power in male sprinters. A group of 30 male sprinters (15-25 years) were recruited and randomly assigned to the Systematic Training, Traditional Training and Control groups (n=10 each). The intervention has been implemented over a period of 10 weeks with the training taking place three times a week. Assessment was done using pre- and post-intervention tests to assess the change in the chosen performance variables. Paired-Sample t tests reflected a statistically significant positive change in strength, reaction time, stride length and anaerobic power of the Systematic Training Group (p < .001). The Traditional Training Group also showed a lot of improvements in all four variables (p < .001), the Control Group reported almost no changes. The extent of the increase was greater when they were systematically trained. The results indicate that the training method based on the structure, progression, and sprint-based training might prove more effective than that based on traditional training in developing various performance-related traits in sprinters among males.

Introduction

Sprint performance is a very complicated athletic skill which is based on interaction or interplay of neuromuscular, biomechanical, physiological and technical aspects. In short distance sprinting, especially in the 100 meter sprint, it is not a single physical quality that dictates performance but rather the capability of the athlete to produce high levels of force quickly, react quickly to the start signal, accelerate, reach high maximal speed and retain sprint speed without excessive technical decline. Modern sprint literature singles out explosive power, sprint technique, generation of horizontal forces, features of stride, and sprint-specific endurance as the factors that contributing to sprint performance (Haugen et al., 2019; Rabita et al., 2015).

Methods that used to be involved in developing sprint performance have been through repeated sprinting, running, general, weight, stretch, and coach-prescribed technical practice. Such methods can be said to be traditional training as they are used within the context of some defined coaching routines with no systemic individual monitoring or systematic control of the training variables. Conversely, systematic training can be viewed as a premeditated, evidence-based, systematic training method whereby training levels, training volumes, recovery, exercise choices, sprint biomechanics, and individual performance attributes are anonymously tracked and repurposed. Modern data stress progression, specificity, variation, periodization, and individualization as a key high-level sprint development principle (Haugen et al., 2019). In line with this, Moran et al. (2017), in a meta-analysis of sprint-training responses in male youth athletes, and Rumpf et al. (2012), comparing the various training methodologies on sprint times in male youth, both studies found that the format and specificity of a training modality meaningfully impact the extent of sprint-performance adaptation.

The systematic and traditional training especially this is important to sprinters since even small alterations in neuromuscular performance can make the difference between winning and losing in a race. Sprint distance (100 m) is a series of a series of acceleration, top velocity, and deceleration, with acceleration distance being the first part with reaction to the start signal, and block-exit and acceleration behaviour. The reaction times of the world-class sprinters typically range at 0.17-1.18 seconds though the reaction time is not the only measure of the sprint-start performance (Haugen et al., 2019). In addition, systematic reviews of sprint-start biomechanics also suggest the importance of rapid hip extension, effective force application against starting blocks, and high propulsive forces as the important parameters of sprint starts (Bezodis et al., 2019), and recent meta-analytical findings provide evidence that particular conditioning activities are also capable of improving sprint performance in elite sprinters (Loturco et al., 2024).

The other key constituent of sprint performance is explosive strength. Sprinting involves the concentration and use of force in the shortest contact periods on the ground in a very short duration. This ability to generate high force and power quickly is thus directly pertinent to acceleration and maximal-velocity running. Studies on elite sprinters have shown that there are close relations among the production of horizontal forces, mechanical power, and sprint accelerations (Rabita et al., 2015). On the same note, training modalities based on strength- and power-related concepts, such as resistance training, weightlifting and plyometric training, have been found to enhance key physical attributes linked to sprint performance. A meta-analysis and systematic review by Morris et al. (2022) identified that weightlifting might offer those extra benefits to more strength and power outcomes than traditional resistance training, though in general weightlifting and plyometric training achieved similar improvements in speed and power. In a more directly parallel experiment, Shuai et al. (2025) randomly balanced 40 male sprinters into a structured plyometric-training group or a traditional strength-training group in six weeks and discovered that the gains in squat-jump power and 30-m sprint time in the structured-training group were vastly higher, with a superior maintenance of the gains following a two-week detraining interval. This result was supported by Ullah et al. (2025), who found that plyometric training led to significant gains in explosive power and sprint-speed in track athletes, and by Liu et al. (2024, 2026), who reported that eccentric-overload and pressurized eccentric-resistance versions induced greater improvements in lower-limb explosive strength in sprint-trained populations, which, taken together, support the idea that systematically designed training leads to more enduring gains in explosive-strength measures as opposed to traditional ones.

Another key aspect of sprint performance is stride efficiency. Stride length and stride frequency determine the sprint velocity to a large degree, however increasing either of the variables does not always improve the performance. The studies on Sprint mechanics show that the relationship between step frequency, step length, ground-contact time, flight time, leg stiffness, and force application are complex (Monte et al., 2017; Rabita et al., 2015). In other cases, such as that of Monte et al. (2017) maximal running speed was maximized around the self-selected step frequency of an athlete, whereas large, imposed alterations in step frequency could modify step length and mechanical properties. Mackala et al. (2019) also discovered that a step-speed training program led to significant step kinemics and sprint ability enhancements, whereas Hussein Al-Saadi and Ameen Shalsh (2024) found that mechanical training to optimize stride length induced performance improvements in 400-m racing in male athletes. Therefore, systematic training need not be aimed at increasing the stride length or frequency but instead should attempt to make the best use of the individual stride characteristics of an athlete.

Sprint performance is also very pertinent to anaerobic capacity. Though 100-m sprint is short, the energy supplied mostly is by anaerobic pathways, mostly phosphagen and anaerobic glycolytic pathways. According to Haugen et al. (2019), the percentage of energy input during a 100-m sprint is, on average, 80 anaerobic. As a result, the development of training methods aimed at promoting anaerobic power and the capacity to repeatedly generate high-intensity workouts can lead to sprint performance. Scholarly literature also shows that sprint interval training has the potential to enhance anaerobic performance, with recent systematic reviews also proving that the extent of adaptation is dependent on the length of training, the distance of the sprints, the volume, and also the structure of the recovery (Boullosa et al., 2022; Hall et al., 2023). In line with this, one study by Jin et al. (2025) produced superior running-performance adaptations, in response to six weeks of sprint interval training, relative to traditional training, and a study by Noopayan et al. (2026) determined that structured resisted and bounding-based sprinting protocols enhanced muscular fitness and acceleration capacity in young male sprinters.

Regardless of this corpus of international evidence, relatively little empirical studies have directly contrasted an exhaustive, systematized training method versus conventional training in competitive male sprinters, especially beyond well-resourced sport systems in North America, Europe and East Asia. In Pakistan in particular, sprint research based on science of sport has started to show. As shown by Khan et al. (2021), circuit resistance training did lead to positive cardiorespiratory adaptations in an athletes with higher education level in Pakistan, and, more to the point, according to Khan et al. (2026), an integrated form of sprint-and-plyometric intervention did result in meaningful improvements in spatial and sprint-related performance in sprinters. Likewise, Marwat et al. (2026) investigated the functions of limb length, explosive power, and reaction time in sprint performance, and Malik et al. (2026) stated that cross-training resulted in increased flexibility, endurance and speed in sprinters and Mehmood and Iqbal (2025) and Mehmood et al. (2025) reported that cross-trained sprinters showed enhancement in performance during 100 m sprint events, when using integrated elastic-band, plyometric and resistance training, parachute and weighted-vest resisted training. All these studies have, however, not compared the effects on explosive strength, reaction time, stride efficiency, and anaerobic capacity as the result of a direct comprehensive systematic-vs. traditional training comparison. This deficiency in multidimensional evidence makes it impossible to ascertain whether systematic, evidence-based training imparts more extensively generalized adaptations to conventional training regimens in the entire range of parameters that ascertain sprint performance.

Consequently, a straight comparison between systematic and traditional training can give valuable evidence to coaches, physical education professionals, and sports scientists that must deal with competitive male sprinters. These studies can go beyond assessing sprint speed because they can assess several physiological, neuromuscular, and biomechanical outcomes simultaneously. The current study then deals with the implications of systematic training versus conventional training on explosive strength, reaction time, stride efficiency and anaerobic capacity on male sprinters to fill a gap created by prior studies that have considered these training methods either separately or with more limited outcome measures. The results can offer a viable evidence-based basis in the creation of more effective, multidimensional sprint-training regimens in sport academy, higher educational institutions, and limited sports-science integrated competitive athletics programs.

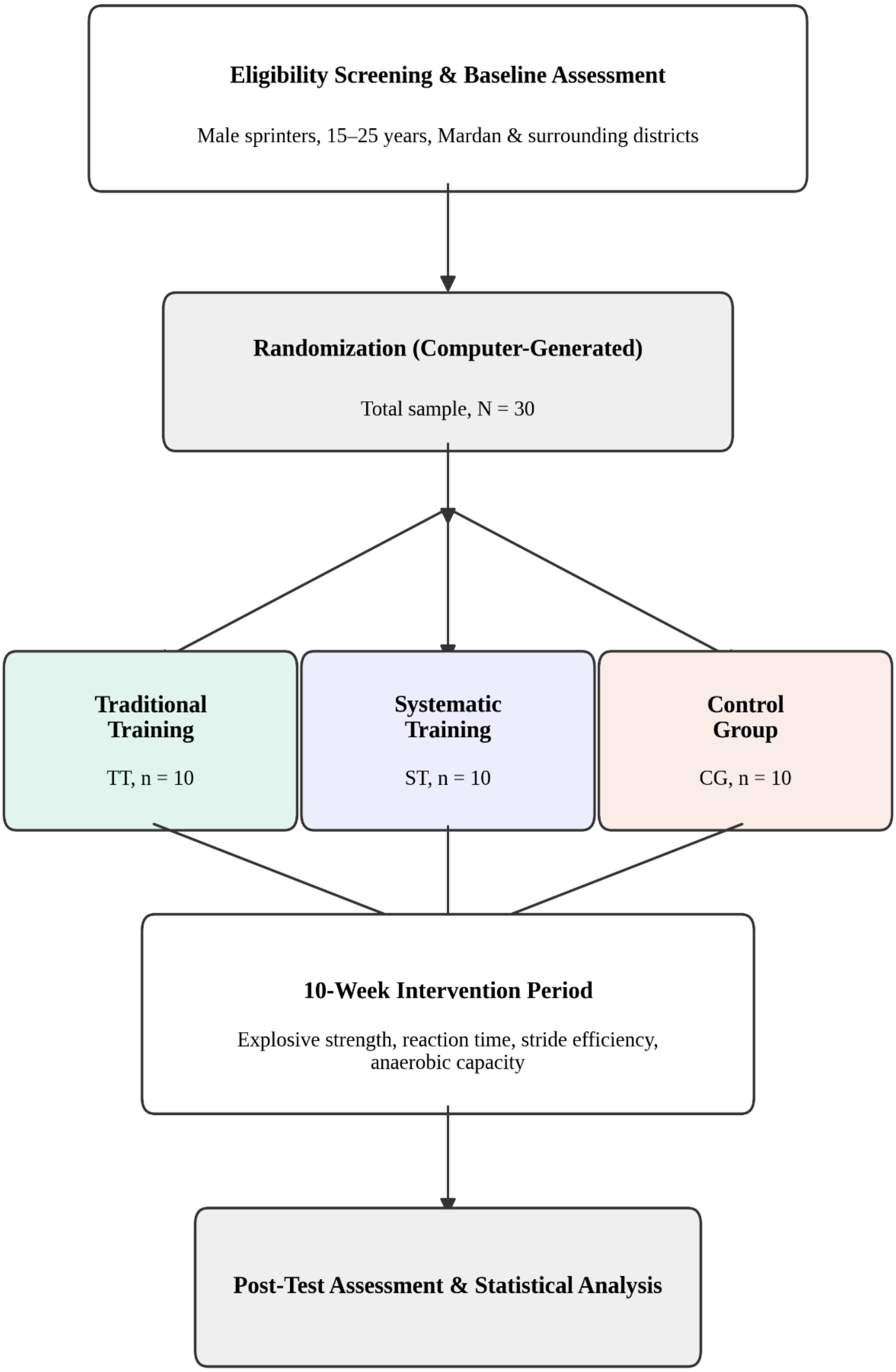
Research Methodology

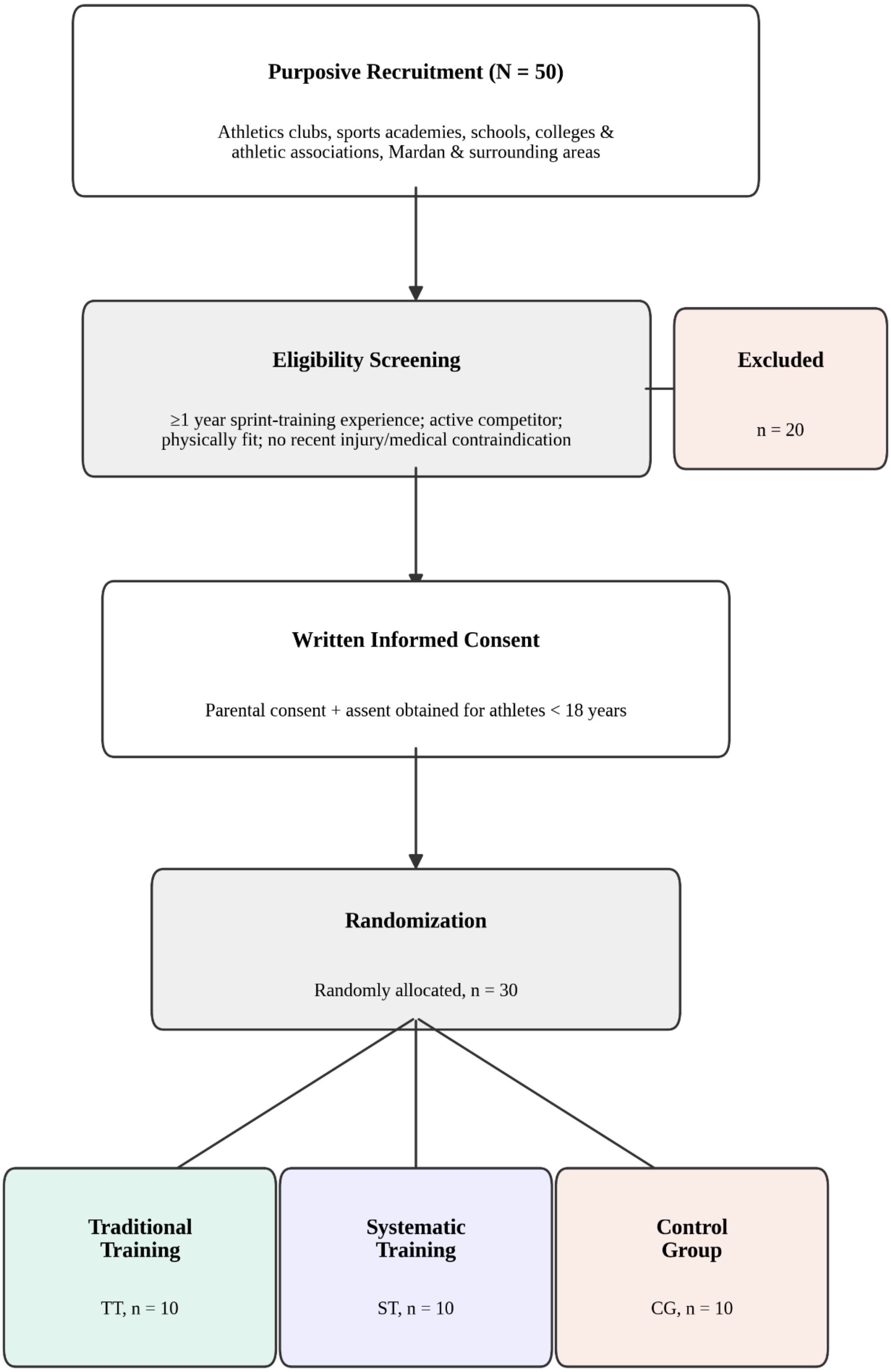
Research Design

The experimental design was randomized pre-test post-test controlled so that the study could compare the effect of traditional training and systematic training on the explosive strength, reaction time, stride efficiency and anaerobic capacity of male sprinters. The sample size of the study consisted of 30 male sprinters between the ages of 15–25 years of Mardan and the surrounding areas of Khyber Pakhtunkhwa, Pakistan. The subjects had to have at least one year of formal sprint-training experience and be medically capable of high-intensity exercise. Athletes who had sustained musculoskeletal injuries in the recent past, whose medical conditions conflict with vigorous activity, or poor response to therapy were not included. After the assessment of the baseline, each patient was assigned randomly to three categories, Traditional Training Group (TT, n = 10), Systematic Training Group (ST, n = 10) and Control Group (CG, n = 10). To provide similar group distribution, randomly assigned occurred with the help of the computer-generated procedure. There were pre-test measures that were made prior to the intervention, and the same post-tests were done following the 10-week intervention.

Participants

These participants were 30 male sprinters of age group 15 to 25 years with purposive sampling among athletics clubs, sport academies, schools, colleges, and athletic associations located in Mardan and nearby. Qualified athletes were those that had no less than one year of sprint-training experience, who were competing in sprint competitions, and who were physically fit to undergo strenuous training. Those who could not attend the event were excluded in case they had a recent injury, medical condition, which influenced their exercise performance, or the attendance needed not maintained. Once this baseline testing was conducted, the participants were randomly categorized into three sets namely Traditional Training (n = 10), Systematic Training (n = 10) and Control (n = 10). Informed consent was given to all the participants in written form and parental consent and participant assent was obtained among the athletes under the age of 18 years.


Eligibility Screening & Baseline Assessment
Male sprinters, 15–25 years, Mardan & surrounding districts
Randomization (Computer-Generated)
Total sample, N = 30
Traditional Training
TT, n = 10
Systematic Training
ST, n = 10
Control Group
CG, n = 10
10-Week Intervention Period
Explosive strength, reaction time, stride efficiency, anaerobic capacity
Post-Test Assessment & Statistical Analysis


Purposive Recruitment (N = 50)
Athletics clubs, sports academies, schools, colleges & athletic associations, Mardan & surrounding areas
Eligibility Screening
≥1 year sprint-training experience; active competitor; physically fit; no recent injury/medical contraindication
Excluded
n = 20
Written Informed Consent
Parental consent + assent obtained for athletes < 18 years
Randomization
Randomly allocated, n = 30
Traditional Training
TT, n = 10
Systematic Training
ST, n = 10
Control Group
CG, n = 10

Training Programs

The intervention was carried out over 10 weeks and three sessions a week. The Traditional Training Group adhered to the standard sprint training which included sprint drills, acceleration runs, 60-m sprints, bodyweight conditioning, and overall flexibility training, with moderate increases in training volume. The Systematic Training Group model was a progressive and systematic training plan which rested on the mechanics of sprint, acceleration development, maximal-velocity development, plyometric training, resisted sprinting, and strength/power training. Loads in training were then gradually varied based on performance and recovery and latest periods of recovery between high-intensity activities. Control Group resumed with their usual routine activities and did not undergo the specialized training program. Qualified personnel supervised all sessions of intervention and in the 10-week period, attendance, RPE and training logs were kept. The implementation of sprint-specific, resisted, plyometric and strength-based training measures are in line with the current evidence showing their use in sprint development.

Data Collection Tools

The standardized pre-test and post-test were used to collect the data. The testing procedures, instruments remained the same following the intervention as they were prior to the intervention to maintain consistency.

Variable	Data Collection Tool/Test	Unit of Measurement
Explosive Strength	Vertical Jump/Countermovement Jump Test	Cm
Reaction Time	Electronic Reaction-Time System	S
Stride Efficiency	Video/Motion Analysis System	Ratio / %
Anaerobic Capacity	30-s Wingate Anaerobic Test	W

Every measurement was conducted under the conditions of standardization and subsequently, the same equipment, test sequence and instructions were followed in both sessions of assessment. The data obtained were coded and ready to be analyzed statistically to establish the differences among and within the three groups.

Results

Introduction

This section summarizes the findings of the research which investigated the influence of systematic and traditional training on strength, reaction time, stride length and anaerobic power in male sprinters. It had 30 participants (each group comprised 10 participants): Systematic Training (ST), Traditional Training (TT) and Control Group (CG). Descriptive statistics and paired samples t tests were used to examine pre- to post-test changes.

Pre-Test Descriptive Statistics

Table 1: Pre-Test Descriptive Statistics of the Three Groups

Variable	ST (n = 10) M ± SD	TT (n = 10) M ± SD	CG (n = 10) M ± SD
Strength (kg)	43.46 ± 4.42	45.65 ± 5.34	42.22 ± 4.50
Reaction Time (s)	0.276 ± 0.019	0.294 ± 0.017	0.283 ± 0.023
Stride Length (cm)	80.13 ± 5.60	80.59 ± 6.56	78.64 ± 5.23
Anaerobic Power (W)	510.16 ± 31.60	514.41 ± 34.71	497.29 ± 28.73

The pre-test results indicate that the three groups had broadly similar baseline performance levels across the four variables.

Post-Test Descriptive Statistics

Table 2: Post-Test Descriptive Statistics of the Three Groups

Variable	ST (n = 10) M ± SD	TT (n = 10) M ± SD	CG (n = 10) M ± SD
Strength (kg)	50.09 ± 4.95	48.61 ± 5.29	42.22 ± 4.50
Reaction Time (s)	0.250 ± 0.022	0.285 ± 0.020	0.282 ± 0.023
Stride Length (cm)	87.55 ± 5.81	83.81 ± 7.21	78.63 ± 5.23
Anaerobic Power (W)	597.13 ± 30.96	554.82 ± 33.78	497.28 ± 28.73

According to the results of the post-test, the best performance was noted in the Systematic Training Group along all four variables. Improvement was also observed in the Traditional Training Group with almost no change in the Control Group.

Mean Changes from Pre-Test to Post-Test

Table 3: Pre- to Post-Test Mean Changes

Variable	ST Change	TT Change	CG Change
Strength (kg)	+6.63	+2.96	0.00
Reaction Time (s)	−0.027	−0.009	−0.001
Stride Length (cm)	+7.42	+3.22	−0.01
Anaerobic Power (W)	+86.97	+40.41	−0.01

The most positive changes were detected in the Systematic Training Group. Systematic Training led to greater gains in strength, longer stride length, and anaerobic power and a higher decrease in reaction time compared to Traditional Training.

Paired-Samples *t* Test: Systematic Training Group

Table 4: Pre- and Post-Test Comparison for the Systematic Training Group

Variable	Pre-Test M ± SD	Post-Test M ± SD	Change	t(9)	p
Strength (kg)	43.46 ± 4.42	50.09 ± 4.95	+6.63	12.280	< .001
Reaction Time (s)	0.276 ± 0.019	0.250 ± 0.022	−0.027	−6.229	< .001
Stride Length (cm)	80.13 ± 5.60	87.55 ± 5.81	+7.42	8.886	< .001
Anaerobic Power (W)	510.16 ± 31.60	597.13 ± 30.96	+86.97	24.736	< .001

The Systematic Training Group demonstrated statistically significant improvement in all four variables, with all p values below .001.

Paired-Samples *t* Test: Traditional Training Group

Table 5: Pre- and Post-Test Comparison for the Traditional Training Group

Variable	Pre-Test M ± SD	Post-Test M ± SD	Change	*t*(9)	*P*
Strength (kg)	45.65 ± 5.34	48.61 ± 5.29	+2.96	14.099	< .001
Reaction Time (s)	0.294 ± 0.017	0.285 ± 0.020	−0.009	−5.465	< .001
Stride Length (cm)	80.59 ± 6.56	83.81 ± 7.21	+3.22	10.002	< .001
Anaerobic Power (W)	514.41 ± 34.71	554.82 ± 33.78	+40.41	11.577	< .001

The Traditional Training Group also demonstrated statistically significant improvements in all four variables, with all *p* values below .001.

Paired-Samples *t* Test: Control Group

Table 6: Pre- and Post-Test Comparison for the Control Group

Variable	Pre-Test M ± SD	Post-Test M ± SD	Change	Result
Strength (kg)	42.22 ± 4.50	42.22 ± 4.50	0.00	No meaningful change
Reaction Time (s)	0.283 ± 0.023	0.282 ± 0.023	−0.001	No meaningful change
Stride Length (cm)	78.64 ± 5.23	78.63 ± 5.23	−0.01	No meaningful change
Anaerobic Power (W)	497.29 ± 28.73	497.28 ± 28.73	−0.01	No meaningful change

The Control Group demonstrated virtually no change from pre-test to post-test.

Discussion

This research was aimed at comparing the systematic and traditional training to measure the impact on strength, reaction time, stride length and anaerobic power in male sprinters. A total of 30 participants took part in the study (10 in the Systematic Training Group, 10 in the Traditional Training Group and 10 in the Control Group). The presentation of the research findings is dedicated to the alterations after the training interventions and whether it agrees with other prior research concerning sprint performance and training adaptations. The results can also be supported by the fact that the extent of sprint-performance adaptation depends on the structure and specificity of a training approach and not the exposure to training in a meaningful way (Moran et al., 2017; Rumpf et al., 2012).

The overall results showed that only the Systematic and the traditional training were correlated with the improvement of all the four performance variables, but the numerical changes were higher in the Systematic Training Group. The Systematic Training Group gained 6.63kg of strength, whereas the Traditional Training Group gained 2.96kg of strength. The Systematic Training Group had a reduction of 0.027 s in reaction time compared to the Traditional Training Group which was 0.009 s. There was an increase in stride length of 7.42 cm and 3.22 cm respectively and an increase in anaerobic power of 86.97 W in Systematic Training Group and 40.41 W in Traditional Training Group respectively. The Control Group was virtually the same in the measured variables. These results indicate that systematic training resulted in a more noticeable performance overall measure change compared to traditional training.

This could be due to the more systematic and gradual nature of the training that probably resulted in greater improvement of the Systematic Training Group. In contrast to the conventional training, the systematic program incorporated sprint mechanics, the acceleration, the maximal-velocity, the resisted sprint and the plyometrics and the strength exercises. This combination was repeated neuromuscular and mechanical stimulus which is directly related to sprint performance. Ramping up training loads could also have enabled the athletes to build on force generation and power without compromising on proper recovery. This trend agrees with Shuai et al. (2025), who observed that a six-week plyometric-training program yielded significantly more gains in explosive strength and sprint speed than a traditional control group of strength-training, and that gains were better maintained following a detraining phase - indicating that the organized stimulus, but not the volume, influences superior adaptations to explosive strength. It is also supported by Ullah et al. (2025), who have found significant gains in explosive power and sprinting speed after plyometric training in a group of track athletes, and by Liu et al. (2024, 2026), who have found out that the acute and pressurized versions of eccentric-overload resistance protocols can improve lower-limb explosive power in sprint-trained groups. Strength gains might also have led to better capability of athletes to exert force against the ground and plyometric and resisted-sprint exercise could have led to a more successful result of applying force during acceleration and high-speed running an interpretation that is consistent with Mehmood and Iqbal (2025) and Mehmood et al. (2025) who have found that combined elastic-band, plyometric, and resisted-implement training (with parachute and weighted-vest protocols) has been effective with regard to 100-m sprint.

The increased reaction time could relate to the repeated exposure to sprint-specific actions that needed to be performed with a fast neuromuscular reaction. The sprint start involves the athlete reacting to an external stimulus, and developing force very quickly. Neuromuscular coordination, force production, and technical factors (i.e. rapid extension of the hips and effective application of the force against the blocks) during sprint start were highlighted and the significance of such factors (Bezodis et al., 2019), and similar results have been shown by Loturco et al. (2024) who further established that specific conditioning activities could improve sprint-start and overall sprint performance in competitive sprinters. This observation is further supported by Marwat et al. (2026) who indicated a direct relationship between explosive power, reaction time and sprinting performance among athletes competing in sprinting. Likewise, the distance of stride could be increasing due to an enhancement in force generation and sprint biomechanics and not necessarily an attempt to increase the distance of stride. The performance of Sprint is contingent on the combination of the stride length and the frequency, and the benefits of one of these issues should be gained without interfering with running mechanics (Monte et al., 2017). This aligns with Mackala et al. (2019) who discover that a structured speed-training program enhanced step kinematics and sprint performance and with Hussein Al-Saadi and Ameen Shalsh (2024), who establish that mechanical training that focused on optimal stride length enhanced the performance of a sprint-event among male athletes.

The high-intensity systematic program could be assumed to be the reason behind the higher increase in anaerobic power. Maximal sprinting, resisted sprinting, plyometrics and strength exercises are very demanding to the anaerobic energy system and the neuromuscular system. Boullosa et al. (2022) may have reported that short sprint interval training resulted in non-trivial differences in the index of anaerobic performance, and Hall et al. (2023), in a meta-analysis of 55 studies, found that sprint interval training led to its greatest changes in anaerobic outcomes and larger changes in increase with longer training duration and higher volumes of sprints. This is aligned with Jin et al. (2025) that found 6 weeks of sprint interval training yielded better performance adaptations than conventional training and with Noopayan et al. (2026), who have stated that the level of muscle fitness and acceleration in male sprinters in their younger age groups were better using structured resisted and sloping bounding sprint protocols as compared to traditional training. The current results hence favor the position that repeat high intensity exercise regimens, in thumbs up progressively resistant and explosive exercises can help build more power.

The results of the current research just about align with the earlier studies that have stressed on world-ranking training of sprinting that should be integrated and progressive. Haugen et al. (2019) noted that effective sprint development doesn’t emerge without technical training, strength and power development, as well as the correct training progression. The current systematic program was also based on the similar principle of integrating some of the complementary training methods. One other study by Morris et al. (2022) also found that weightlifting and plyometric training resulted in similar, significant gains in strength, power, and speed compared to traditional resistance training alone, in favor of the greater changes noticed in the Systematic Training Group. These results, in the local context, follow those by Khan et al. (2021) who showed positive changes in cardiorespiratory adaptation in response to circuit resistance training in higher-education athletes in Pakistan, and is consistent with other findings reported by Khan et al. (2026) who found that an integrated sprint-and-plyometric training produced a meaningful effect on sprint-related performance in sprinters. The current findings were also widely in line with the Malik et al. (2026) who discovered that the benefits of structured cross-training in the areas of flexibility, endurance, and speed were found amongst sprinters, and it goes to further confirm the worth of multidimensional, systematized training methods as opposed to traditional training.

The biomechanical problem related to sprint is also associated with the enhancement in the past. Rabita et al. (2015) revealed that successful horizontal force production and mechanical power were the traits of world-class sprinters, and Monte et al. (2017) were able to show that the features of strikings were directly related to running mechanics and performance at the self-selected step rate of an athlete. Moreover, the results with resisted sprinting are also aligned with those of the Alcaraz et al. (2018) study presented in a systematic review and meta-analysis, demonstrating that resisted sled training can become a valuable practice of enhancing sprint performance, in relation to acceleration and maximal-velocity aspects.

The current results are generally in line with this second literature, but the study is different with most other research works, in that it has explored a relatively synergistic training strategy instead of concentrating on a particular training strategy. These results thus indicate that a combination of various sprint-based approaches to a systematic program can cause more generalized gains on strength, reaction-time, stride qualities, and power anaerobic.

These conclusions are especially applicable to the training of male sprinters since systematic training offers trainers a systematic approach to increasing training loads, volume, and choice of exercises and recovery. In environments where training habits might be heavily based on traditional sprint exercises, and overall conditioning, the current evidence implies that implementing more structured, progressive and sprint-specific training can be beneficial. The findings, however, can be considered as indicators of the current sample and not as the set of conclusions that can be made about all the sprinters.

There are various limitations that can be considered in the interpretation of the findings. To begin with, the sample size (30 male sprinters) is very small (10 subjects per group), which makes the results of the study less statistically powerful and generalizable. Second, the sample sizes were relatively and thus the sample might not be a true reflection of sprinters in different areas or grades. Third, male athletes were the only ones involved, and therefore, this cannot necessarily be applied to female sprinters. Fourth, the research was based on purposive selection, thus it could have created selection bias. Lastly, no individual participant-level data were stored such that a valid posttest ANCOVA could be conducted to statistically adjust differences at baseline. Thus, the differences between groups observed should be explained mostly based on the descriptive and within-group results.

In future research, it is necessary to consider bigger groups of sprinters with respect to regions and levels of competitions to enhance generalization of the results. They should also have individual participant-level data and the statistical analysis should be in the form of repeated measures or mixed-models to clearly compare training groups and adjusting baseline results. Future studies might research the topics of the long-term effects of systematic training, and whether there are any comparable reactions in female sprinters and professionals. Comparative studies of single elements of systematic training (resisted sprinting, plyometrics, and strength training) can also be useful, to determine which of these elements contributes most to improvements in sprint performance.

Conclusion

The results show an overall pattern that both systematic and traditional training were related to increased strength, reaction time, stride length and anaerobic power, but the Systematic Training Group showed higher numerical values in each case. The results correspond with the literature on progressive, combined sprint training, which is a combination of strength, plyometrics, resisted sprinting, and sprint-specific technical work. These findings imply that a more thorough stimulus to the growth of the physical and biomechanical attributes, necessary to sprint performance, can be achieved through a systematic and progressively structured training program.

Research Implications

The results of the current research have multiple implications in terms of sprint training and athletic development. The fact that the Systematic Training Group achieved a larger enhancing results point to the possibility that sprint coaches could use a systematic and progressive training methods instead of the traditional sprint discipline and overall conditioning. Sprint mechanics, acceleration training, maximal-velocity work, resisted sprinting, plyometrics, strength exercises can all be combined to offer an overall solution to creating strength, reaction time, stride characteristics, and anaerobic power.

The findings have implications to coaches and strength-and-conditioning practitioners to consider progression and specificity of training and proper rest in the preparation of sprints. The systematic observation of training load, perceived effort, attendance and athlete feedback could assist coaches to personalize training and minimize chances of applying wrong training loads. The findings can help especially in training sprinters in athletic club, school, college, sports academy, and in regional training programs in Pakistan.

The research also has a bearing on the sports institutions and the athletic development programmes. The results justify the consideration of evidence-based strength, plyometric, resisted sprint, and sprint-specific training as a part of systematic athlete-development programs. These results can be initial evidence which can be used by coaches and sports administrators in designing more structured sprint-training programs in young male athletes.

The study, in general, adds to the existing body of literature that backs the claim of structured, progressive, and sprint-specific training and offers a viable basis on how training models should be enhanced among emerging sprinters.

Conflict of Interest

The author states that there is no conflict of interest with this study.

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