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Analysis of a Multi-Day Fitness Program for Performance Enhancement in Competitive Tennis

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Abstract:
Tennis performance requires the integrated development of explosive power, reactive movement, upper-limb stability, grip strength, and wrist–forearm control. This article analyzes a variation-based fitness program designed for a competitive tennis player, with emphasis on its structure, functional logic, and relevance to tennis-specific conditioning. The study was conducted as an applied sport-science case analysis based on a four-part training program including explosive lower-body exercises, reactive footwork, grip- and ring-based upper-body work, and a specialized wrist–forearm circuit. Exercises were classified according to their main functional objectives and interpreted in relation to the kinetic-chain demands of tennis. The analysis showed that the program had a coherent multi-component structure and a strong sport-specific orientation. Its most distinctive feature was the systematic inclusion of wrist–forearm training targeting flexion-extension control, pronation-supination, rotational strength, grip-related pulling mechanics, and explosive distal action. The combination of lower-limb power drills, upper-limb stabilization, and distal segment specialization suggests an integrated conditioning model aligned with the biomechanical requirements of tennis. The program represents a practical and functionally relevant model for tennis-specific physical preparation. A structured variation-based approach may support the development of explosive power, coordination, grip robustness, and wrist–forearm function in competitive tennis players.

Keywords:
tennis performance; neuromuscular training; reactive strength; sport-specific conditioning; periodized training.

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Introduction

Modern competitive tennis imposes complex physiological and biomechanical demands that require the integrated development of strength, explosive power, coordination, reactive ability, and upper-limb control. Tennis performance depends on repeated short-duration, high-intensity efforts, frequent changes of direction, rapid accelerations and decelerations, and the ability to generate force efficiently through the kinetic chain during serves, groundstrokes, and net play. In this context, physical preparation must go beyond general conditioning and should be tailored to the sport's specific movement patterns and neuromuscular requirements (Fernandez *et al.*, 2006; Reid and Schneiker, 2008).

An important aspect of tennis conditioning is the interaction between lower-limb force production and upper-limb force transmission. Stroke execution relies on an efficient kinetic sequence in which force generated from the legs and trunk is transferred through the shoulder, forearm, wrist, and hand to the racket. For this reason, deficiencies in explosive lower-body action, trunk stabilization, grip strength, wrist control, or shoulder stability may reduce stroke efficiency and increase mechanical stress on the upper limb. Accordingly, sport-specific conditioning programs increasingly combine explosive drills, reactive exercises, shoulder stabilization, and forearm-wrist strengthening within the same training framework (Dines *et al.*, 2015; Shannon *et al.*, 2020; van der Hoeven and Kibler, 2006).

From a scientific perspective, there is growing interest in training models that integrate multiple physical qualities within a sport-specific framework. However, many existing studies still examine isolated training modalities, such as plyometric training alone, resistance training alone, or shoulder-prevention protocols alone. In applied high-performance settings, coaches often use hybrid programs that combine these elements in a highly specific and variation-based manner. Such programs may better reflect the real complexity of tennis preparation, but they are less frequently documented and analyzed in a structured scientific format. Therefore, examining a program that integrates explosive work, neuromuscular control, grip development, wrist-forearm specialization, and coordination drills may offer valuable practical and theoretical insights (Lambrich and Muehlbauer, 2023b).

The concept of exercise variation is also highly relevant. Variation-based programming may help maintain neuromuscular stimulus quality, reduce monotony, improve transfer across related motor tasks, and target complementary components of performance. In tennis, where performance depends on the interaction of strength, speed, coordination, stability, and precision, a varied yet coherent training structure may be more effective than narrowly focused routines. The program follows this logic by distributing different but functionally related exercise categories across several days, while preserving a consistent emphasis on tennis-specific physical qualities (Fernandez-Fernandez *et al.*, 2014; Reid and Duffield, 2014; Reinebo *et al.*, 2024).

The fitness program analyzed in this study reflects precisely this integrated perspective. The training includes a broad range of variations distributed across multiple training days, such as explosive lifts and jumps, BOSU-based unilateral lunges with swing actions, ladder drills, low rebounds, take-off drills, grip-intensive pulling exercises, rope climbing, ring-based bodyweight tasks, elastic-resistance exercises, and a specialized wrist-forearm circuit. Specifically, the program incorporates exercises such as split jerks, TRX squat jumps, 1-leg drop side lunges from BOSU, ladder split drills, low rebounds, towel-grip pull-ups, muscle-up progressions on rings, rope climbing, wrist push-ups, wrist curl pulley work, pronation exercises, hammer-grip internal-external wrist rotation, and explosive supination/internal-rotation actions. These elements indicate that the program was designed not as a conventional strength routine, but as a multi-component conditioning model targeting tennis-relevant neuromuscular capacities (Hansen *et al.*, 2025; Jacquier-Bret and Gorce, 2024; Lambrich and Muehlbauer, 2023a).

Among these components, wrist and forearm conditioning deserves special attention. Tennis strokes place substantial demands on grip function, forearm musculature, wrist stabilization, and rotational control, especially during topspin generation, serve acceleration, deceleration phases, and repeated high-velocity impacts. The training plan shows a strong emphasis on this segment through repeated inclusion of wrist push-ups, fist push-up press variations, wrist curls, pronation work, thumb press elastic drills, forearm biceps curls, and explosive internal/external rotational tasks. This concentration suggests a deliberate attempt to improve both performance-related force transfer and the structural robustness of the distal upper limb (Kibler *et al.*, 2012).

At the same time, the program does not isolate upper-limb development from global athletic performance. Lower-body and reactive components such as split jerks, squat jumps, BOSU drop lunges, skip drills, hip thrusts, ladder drop split-hop movements, and low rebounds indicate a strong focus on acceleration mechanics, elastic force utilization, and unilateral stability. These qualities are essential in tennis, where players must repeatedly produce force from open and semi-open stances, recover balance after strokes, and transition rapidly between offensive and defensive positions. The inclusion of coordination-based and unstable-surface drills further supports the idea that the program seeks to enhance movement control under sport-like constraints rather than merely increase isolated muscular strength (Chandler, 1995; Lambrich and Muehlbauer, 2023c).

Therefore, the present article aims to analyze and frame scientifically a multi-component tennis fitness program based on exercise variations targeting wrist-forearm strength, upper-limb stability, explosive lower-body performance, coordination, and reactive neuromuscular abilities. The working premise is that such an integrated program can provide a more complete support for tennis performance than isolated conditioning methods, particularly when designed around the functional demands of the sport. In this regard, the study seeks to contribute to the literature on sport-specific conditioning by proposing a structured interpretation of an applied training model with direct relevance for competitive tennis.

1. Materials and Methods

This study is structured as an applied sport-science case analysis centered on a variation-based tennis fitness program designed for a competitive player. The methodological approach is based on the scientific examination of a training plan, with emphasis on the internal logic of exercise selection, weekly distribution, functional targeting, and expected contribution to tennis-specific physical performance. Rather than treating the intervention as a generic strength routine, the present study interprets it as a multi-component conditioning model integrating explosive power, neuromuscular coordination, grip development, shoulder control, and wrist-forearm specialization. This analytical approach is consistent with contemporary tennis-conditioning literature, which advocates multidimensional profiling and sport-specific testing rather than single-capacity assessment.

The participant is a 19-year-old male professional tennis player competing on the ITF circuit. He has an approximate height of 183 cm and a body mass of around 75 kg, which are typical physical characteristics for players at this level. He plays right-handed, using a dominant forehand and a two-handed backhand. Having started tennis at the age of four, he has accumulated approximately 15 years of training experience. His injury history is clear, with no major injuries reported. Currently, he is in the competitive phase of his season, actively participating in ITF tournaments. The program was prepared specifically for this athlete and tailored to his physical preparation needs. The individualized nature of the program was not intended as a general fitness template, but as a player-specific training plan, in line with athlete profiling approaches reported for competitive tennis populations.

The program is organized into Day 1, Day 2, Day 3, and Day 4/Circuit (described in Table 1), with each day emphasizing partially distinct but complementary physical objectives. Across the week, the intervention combines explosive lower-body work, reactive drills, upper-body stabilization, grip-intensive pulling, ring and rope exercises, and specialized distal upper-limb strengthening. This type of microcycle organization is consistent with tennis-specific strength and conditioning models that combine force production, movement efficiency, and local segment robustness within the same weekly structure (Suchomel *et al.*, 2016).

Table 1. Functional organization of the weekly training program

Training day	Main exercise examples	Dominant physical focus	Tennis-related rationale
Day 1	Ride bike @ 90%, Split Jerk, Squat jump TRX, 1-leg BOSU side lunge + swing, ladder splits, one-knee take-off, low rebounds, shoulder shrug, frontal raises	Explosive power, reactive strength, unilateral stability, shoulder preparation	Supports acceleration, elastic force production, lateral movement control, and proximal stability before stroke transfer
Day 2	Fist push-up press, Wrist push-up, Muscle-up rings progression, False-grip rings stand, L-sit, Pull-up towel grip, Climb rope, Elastics	Grip strength, bodyweight upper-body control, forearm loading, scapular stability	Supports racket control, pulling robustness, upper-limb stiffness, and closed-chain stability
Day 3	Ladder drop split hop + take-off push, BOSU side lunge swing racket, Skips, Squat belt, Hip thrust, Back flys, Wrist press, Wrist curl pulley	Reactive movement, movement transfer, lower-body support strength, wrist reinforcement	Supports footwork reactivity, lateral stroke patterns, posterior-chain support, and distal reinforcement
Day 4 / Circuit	Thumb press elastic, ER wrist curl, Wrist push-up, Close-grip pull-up machine, Wrist pronation, Forearm bicep curl, Wrist INT-EXT rotation, Explosive supination, Explosive internal rotation	Wrist–forearm strength, rotational control, local endurance, distal explosiveness	Supports spin production, racket stability, distal control, and repeated stroke-related loading

Source: Compiled by Author.

Day 1 exercises target shoulder support and upper-limb control through one-hand shoulder shrug, frontal floor raises, and shoulder circles. From the methodological point of view, Day 1 can be interpreted as targeting explosive lower-limb power, reactive force production, unilateral balance and force redirection, dynamic coordination, and preparatory shoulder stabilization (Liang *et al.*, 2023; Sheppard and Young, 2006).

Day 2 emphasizes grip strength, pulling strength, scapular and shoulder control, ring-based neuromuscular stability, forearm loading, and bodyweight strength under tennis-relevant upper-limb stress. The presence of false-grip support, towel-grip pull-ups, rope climbing, and wrist push-ups strongly supports the interpretation that distal upper-limb robustness and functional grip transfer are central objectives of the program.

Day 3 combines reactive footwork, unilateral movement reactivity, lower-body force support, posterior-chain reinforcement, upper-body postural assistance, and supplemental wrist strengthening. The use of side-lunge swing-racket movement gives this day a particularly direct tennis-transfer character, since it links movement mechanics with stroke simulation and loading patterns described in contemporary biomechanical studies of serve and stroke execution (Touzard *et al.*, 2023).

Day 4 is presented as a circuit format performed for five rounds, with a 30 s work and 1 min rest. This section of the program is methodologically central to the article because it demonstrates a concentrated intervention specifically targeting wrist flexion-extension control, pronation-supination capacity, internal-external rotational function, forearm endurance, grip-related pulling mechanics, and explosive distal upper-limb action. The focus of this circuit is well aligned with current evidence on tennis-related upper-limb loading, scapular control, and injury-prevention frameworks (Schwank *et al.*, 2022).

The repeated and varied loading of the wrist-forearm complex suggests that the program was designed not only for strength development but also for functional stabilization and high-velocity control relevant to racket sports. In methodological terms, this supports interpreting the intervention through a kinetic-chain framework, in which distal segment function is inseparable from whole-stroke mechanics and cumulative shoulder-elbow-wrist loading (Martin *et al.*, 2014).

For analytical purposes, the exercises in the program were classified into the functional categories described in Table 2. This classification follows current recommendations for structuring tennis testing and training around discrete but interacting domains such as explosive power, reactive speed, segmental stability, and sport-specific transfer.

Table 2. Classification of exercises by functional objective

Functional category	Exercises from the program	Main adaptation target
Explosive lower-body power	Split Jerk, Squat jump TRX, Take off 1 knee floor, Low rebounds	Rate of force development, take-off ability, elastic response
Reactive and agility work	Splits on ladder, Ladder drop split hop, 100 skips cut time	Footwork speed, reactivity, rhythm, change-of-direction preparation
Unilateral stability and movement transfer	1 leg drop side lunge from BOSU + swing med, Drop from BOSU side lunge swing racket	Lateral balance, deceleration control, transfer to stroke mechanics
Grip and pulling strength	Pull up towel grip, Climb rope, Pull up/Lat Machine close grip	Grip endurance, pulling strength, forearm recruitment
Ring/bodyweight control	Muscle up rings progression, False grip rings stand, L-sit floor, Fist push up press	Closed-chain upper-body stability, scapular control, body tension
Shoulder support	1 hand shoulder shrug, Front floor frontal raises, Cercles shoulder, Back flys, Anteversion, Lateral raises high	Proximal support, shoulder balance, postural reinforcement
Wrist–forearm specialization	Wrist push up, Wrist press, Wrist curl pulley, Thumb press elastic, Wrist PRO, ER wrist curl, Wrist INT-EXT rotation, Explosive SUP move, Explosive INT ROTATION move	Distal strength, pronation-supination control, rotational robustness, local explosiveness

Source: Compiled by Author.

This classification was used to interpret the training logic and to connect exercise selection with the specific physical and biomechanical demands of tennis. In addition, the classification supports later linkage with tennis-specific outcome measures, including serve-related kinematics, stroke velocity, movement quality, and functional screening indices (Xiao *et al.*, 2024).

The program explicitly reports volume and, in many cases, intensity and recovery parameters. Volume is expressed as sets and repetitions or as time-based prescriptions, such as 5 × 30 s bike efforts, 4 × 5 repetitions, 4 × 10 repetitions, or 5 rounds of a circuit. Intensity is reported through bodyweight, medicine ball, elastic resistance, percentage-based loading, or maximal-speed/100% execution descriptors. Rest intervals are generally short, often around 0-1 min, indicating a substantial neuromuscular and metabolic density in several parts of the program.

From a methodological perspective, the intervention can therefore be characterized by multimodal loading, mixed contraction emphasis, short-to-moderate recovery, and high exercise variation across days with local specificity. For future implementation and monitoring, this type of intervention could be paired with a battery including jump and agility tests, closed kinetic chain upper-extremity stability assessments, functional movement screening, and return-to-sport decision frameworks (Smith et al., 2021; Tucci et al., 2014).

2. Results

The analyzed program revealed a **four-part weekly structure** organized around distinct yet complementary training objectives: Day 1, Day 2, Day 3, and Day 4/Circuit. The overall architecture was clearly multi-component, combining explosive lower-limb work, reactive and coordination-oriented drills, bodyweight and ring-based strength exercises, grip-intensive pulling tasks, elastic-resistance work, and a specialized wrist–forearm circuit. This confirms that the program was not designed as a conventional general-strength routine, but as a structured tennis-specific conditioning model emphasizing both proximal and distal performance factors. The proposed outcome measures for a full intervention study are presented in table 3.

Table 3. Proposed outcome measures for a full intervention study

Domain	Recommended measure	Why it fits this program
Grip and distal upper limb	Handgrip dynamometry	Matches towel-grip pull-ups, rope climbing, false-grip work
Wrist–forearm strength	Wrist flexion/extension dynamometry; pronation-supination testing	Matches wrist curl, pronation, rotation, explosive supination/internal rotation
Explosive lower body	Countermovement jump, squat jump, unilateral jump tests	Matches split jerk, squat jump, take-off drills, low rebounds
Reactivity and footwork	Reactive strength index, short agility test, 5–10 m sprint	Matches ladder drills, split-hop, skips, BOSU movement
Shoulder and upper-limb support	Closed-chain shoulder stability test	Matches ring support, push-up variations, shoulder support work
Tennis-specific transfer	Serve speed, medicine-ball throw, stroke accuracy under movement	Matches kinetic-chain emphasis and swing-racket drills

Source: Compiled by Author.

A central result of the analysis was the high degree of exercise variation embedded across training days. Rather than repeatedly stressing one physical capacity in isolation, the plan distributed performance demands across the week in a coordinated fashion. Explosive actions, unstable-surface drills, upper-limb stabilization, and distal forearm work were interwoven in a way that suggests deliberate targeting of the kinetic chain as a whole.

The first training block was dominated by exercises aimed at explosive strength, reactive force production, and dynamic coordination. This day included high-intensity bike efforts, split jerks performed explosively, TRX squat jumps, unilateral BOSU-based side lunges with swing movement, medicine-ball goalkeeper actions, ladder drills, take-off drills from kneeling position, and repeated low rebounds. In addition, the day ended with shoulder-support exercises such as one-hand shoulder shrug, frontal raises, and shoulder circles. From a performance-analysis perspective, Day 1 produced the following structural findings: a strong emphasis on lower-limb power generation; repeated stimulation of reactive and elastic neuromuscular actions; integration of unilateral stability and redirection mechanics; and inclusion of upper-limb preparatory support rather than isolated maximal strength work. This distribution suggests that Day 1 functioned as the main power and movement-efficiency session of the program.

The second training block showed a different profile, shifting the emphasis toward grip strength, bodyweight control, ring stability, and upper-limb robustness. This day included fist push-up press, wrist push-ups, muscle-up progression on rings, internal-rotation elbow floor work, false-grip ring standing holds, L-sit holds, towel-grip pull-ups, rope climbing, and a seven-exercise elastic-resistance block. The main result from this section of the program was the identification of a clear distal-to-proximal upper-limb conditioning theme. Several exercises required strong grip engagement, high forearm recruitment, scapular control, and stabilization under bodyweight conditions. Towel-grip pull-ups, false-grip ring work, and rope climbing in particular indicate a deliberate attempt to develop: grip endurance, forearm loading tolerance, pulling capacity, shoulder-girdle control, and closed-chain upper-limb stability. Thus, Day 2 appears to have served as the principal grip and upper-body control session within the weekly structure.

The third training block combined reactive footwork with lower-body support strength and additional wrist-oriented work. It included ladder drop split-hop actions with take-off push, BOSU side-lunge swing-racket drills, skip work under timed constraints, squat belt, hip thrust, back flys, anteversion, palm beats, high lateral raises, wrist press, and wrist curl pulley exercises. This session yielded several important findings. First, it reinforced the overall pattern of movement specificity, especially through the side-lunge swing-racket action, which closely approximates tennis-relevant lateral positioning and stroke transition. Second, it introduced posterior-chain support work through hip thrust and squat belt tasks, thereby complementing the more explosive loading of Day 1. Third, it maintained continuity in the distal upper-limb emphasis by including wrist press and wrist curl pulley exercises. As a result, Day 3 can be interpreted as a hybrid session, linking footwork reactivity, stroke-transfer movement, structural strength support, and continued wrist reinforcement.

The fourth training block, presented as a circuit repeated five times with timed work and rest, represented the most specialized and concentrated element of the entire program. It included thumb press elastic, external-rotation wrist curl, wrist push-up, close-grip pull-up or lat machine, wrist pronation, forearm biceps curl, hammer-grip wrist internal-external rotation, explosive elastic supination, and explosive weighted internal rotation. This was the clearest result of the program analysis: the intervention placed unusually strong and systematic emphasis on the wrist–forearm complex. The circuit targeted multiple mechanical functions of the distal upper limb: flexion-extension control, pronation-supination work, internal-external rotational control, grip-related pulling mechanics, and explosive terminal-segment action. The breadth of this circuit indicates that the program was designed not only to build strength, but also to improve functional resilience, rotational coordination, and force-transfer capacity in the wrist–forearm segment. This finding is especially relevant for tennis, where distal control is essential for racket handling, spin production, stroke acceleration, and impact stabilization.

A major result of the analysis was that the weekly program distributed its content across **five dominant performance domains**:

1. **Explosive lower-body power**, mainly represented by split jerks, squat jumps, take-off drills, and low rebounds.
2. **Reactive movement and agility**, represented by ladder drills, split-hop patterns, and BOSU-based drop-lunge actions.
3. **Grip and pulling strength**, represented by towel-grip pull-ups, rope climbing, and close-grip pull-up/lat machine work.
4. **Shoulder and upper-body stabilization**, represented by shrug, frontal raises, back flys, anteversion, lateral raises, ring support, and elastic work.
5. **Wrist–forearm strength and rotational control**, represented by wrist push-ups, wrist curl pulley, wrist pronation, hammer-grip wrist rotation, explosive supination, and weighted internal rotation.

These findings support the interpretation that the program was deliberately structured to cover the full chain of physical capacities required in tennis, from lower-limb force generation to distal upper-limb control.

Another important result was the identification of a kinetic-chain-oriented training philosophy. The program did not separate lower-body explosiveness from upper-body transfer or distal stabilization. Instead, exercises were sequenced and distributed to reflect the interaction among: force production, balance and unilateral control, upper-body support, grip engagement, and wrist–forearm execution.

For example, the combination of explosive lower-limb drills on Day 1, ring and rope-based grip work on Day 2, movement-transfer drills on Day 3, and a specialized wrist circuit on Day 4 suggests a coherent training rationale in which tennis performance is treated as an integrated motor output rather than a sum of isolated muscle actions.

The program also showed a relatively dense loading structure, with frequent use of short rest intervals, repeated sets, timed efforts, and circuit organization. This implies that the intervention combined not only strength and coordination demands, but also a meaningful conditioning component. At the same time, the exercises varied substantially in modality, including: bodyweight tasks, elastic resistance, medicine-ball drills, unstable-surface exercises, rings, rope climbing, and pulley-based wrist work.

This high variability constitutes an important result in itself, because it shows that the program was organized around functional diversity with sport relevance, rather than repetitive traditional gym loading. In summary, the analysis of the training program produced the results presented in table 4.

The present study examined a variation-based fitness program designed for a competitive tennis player and identified a coherent multi-component conditioning structure centered on explosive lower-limb work, reactive footwork, grip development, upper-limb stabilization, and extensive wrist–forearm specialization. The program was organized across four training blocks and included split jerks, squat jumps, BOSU-based unilateral actions, ladder drills, towel-grip pull-ups, rope climbing, ring-based exercises, elastic-resistance work, and a dedicated wrist circuit. Taken together, these elements support the interpretation that the intervention was designed around the integrated demands of tennis rather than around isolated gym-based strength development.

A primary finding of the program analysis is the strong alignment between exercise selection and the biomechanical logic of tennis performance. Tennis strokes depend on effective force generation from the lower limbs, transmission through the trunk and shoulder complex, and precise delivery through the forearm, wrist, and hand to the racket. In this context, the coexistence of explosive drills such as split jerk, TRX squat jump, one-knee take-off, and low rebounds with grip-intensive and wrist-specific exercises suggests a kinetic-chain-oriented model in which performance is viewed as a linked neuromuscular process. The inclusion of side-lunge swing actions from BOSU and swing-racket drills further reinforces the sport-specific orientation of the program, because these exercises approximate lateral loading, balance recovery, and stroke preparation patterns encountered in match play.

Table 4. Main interpretive findings from the program analysis

Finding	Evidence from the program	Interpretation
Multi-component design	Four distinct blocks combining explosive, reactive, grip, stabilization, and wrist work	The program is integrated rather than isolated by single capacity
Strong wrist–forearm specialization	Dedicated circuit and repeated wrist exercises across days	Distal upper-limb conditioning is a central design principle
Kinetic-chain logic	Lower-limb power coexists with upper-limb and wrist work	Force generation and transfer are trained as linked processes
High exercise variation	BOSU, rings, rope, elastics, ladder, pulley, bodyweight, medicine ball	Variation is used functionally to stimulate complementary adaptations
Tennis specificity	Swing-based drills, lateral lunge patterns, reactive movement blocks	Exercise selection is aligned with stroke and footwork demands

Source: Compiled by Author.

One of the most distinctive aspects of the program is the systematic emphasis on the wrist–forearm complex. The plan repeatedly includes wrist push-ups, wrist press, wrist curl pulley work, thumb press elastic, wrist pronation, forearm biceps curl, hammer-grip internal-external wrist rotation, explosive elastic supination, and explosive weighted internal rotation. This concentration is unusual when compared with many standard tennis conditioning programs, which often privilege general strength, lower-limb power, or shoulder-prevention exercises while treating the distal upper limb more indirectly. Here, by contrast, the wrist and forearm appear as a central target of training. From an applied perspective, this is highly relevant because racket control, spin generation, acceleration at ball contact, and deceleration after impact all place repeated demands on the distal segment. Therefore, the program may offer a useful model for integrating performance enhancement and structural protection of the upper limb within the same conditioning framework.

The grip-oriented content also deserves attention. Towel-grip pull-ups, rope climbing, close-grip pulling, false-grip ring support, and muscle-up progression indicate that the athlete was exposed to repeated gripping under unstable or bodyweight-dominant conditions. This type of loading may have two practical advantages. First, it can improve general grip endurance and pulling strength, both of which support racket handling and repeated upper-limb effort. Second, it may improve force transfer and segmental stiffness in closed-chain contexts, contributing to the overall robustness of the shoulder-elbow-wrist continuum. In tennis, where the upper limb is repeatedly subjected to high-velocity and often asymmetrical stress, this integrated approach may be more functionally meaningful than isolated machine-based strengthening alone.

Another important discussion point concerns the role of exercise variation. The program does not rely on one dominant training modality. Instead, it alternates explosive power work, reactive and ladder-based movement, unstable-surface unilateral drills, ring and rope exercises, elastic-resistance blocks, and specialized wrist circuits. This variation likely serves several purposes. It may maintain the quality of neuromuscular stimulation, reduce monotony, expose the athlete to multiple coordinative demands, and enhance transfer across related movement tasks. In tennis, where performance requires the integration of speed, force, stability, timing, and precision, such structured variation may be especially beneficial. The present program seems to use variation not as random diversity, but as a deliberate organizational principle supporting complementary adaptation.

The lower-body and reactive components of the program also contribute meaningfully to its scientific value. Day 1 and Day 3 contain numerous exercises targeting explosive or reactive performance, including split jerks, squat jumps, take-off drills, low rebounds, ladder drop split-hop actions, and skip-based movement tasks. These elements suggest that the athlete's preparation was not limited to maximal strength or hypertrophy but was oriented toward rate of force development, elastic utilization, and movement reactivity. This is consistent with the demands of tennis, in which players must accelerate over very short distances, decelerate efficiently, reposition laterally, and rapidly re-establish balance before stroke execution. The addition of hip thrust, squat belt, and postural support exercises on Day 3 suggests that the program also sought to provide structural support for these reactive demands.

From a coaching standpoint, the program's structure is particularly valuable because it shows how several training priorities can coexist within one weekly microcycle. Rather than separating "power day," "injury-prevention day," and "tennis-specific day" into disconnected compartments, the plan blends these objectives within an integrated conditioning model. This may reflect the realities of high-performance sport, where practitioners must work efficiently within limited training time and must prioritize transfer over isolation. The program therefore has practical value not only as an example of tennis-specific physical preparation, but also as a possible template for how coaches can combine explosiveness, coordination, grip work, and distal upper-limb conditioning in a coherent way.

In summary, the present discussion supports the interpretation that the analyzed program constitutes a highly specific and functionally rich model of tennis conditioning. Its most notable contribution is the integration of explosive lower-body training, grip and bodyweight upper-limb work, and an unusually comprehensive wrist–forearm specialization block within one coherent weekly structure. This combination appears well aligned with the kinetic-chain demands of tennis and may offer a useful applied framework for coaches, sport scientists, and performance practitioners working with competitive players.

3. Practical Applications

From an applied perspective, the analyzed program offers several useful directions for coaches, strength and conditioning specialists, and sport scientists working in tennis.

The program demonstrates that tennis conditioning should be organized around functional integration, not isolated strength categories. Coaches should aim to combine explosive lower-limb drills, reactive footwork, shoulder support, grip development, and wrist–forearm strengthening within the same weekly structure. This may improve transfer to match performance more effectively than programs based only on general resistance training.

The findings suggest that wrist–forearm training deserves a more central place in tennis preparation. The analyzed plan shows that distal upper-limb work can be developed systematically through multiple exercise types, including wrist push-ups, pronation-supination drills, rotational loading, and explosive forearm actions. For coaches, this means that wrist and forearm training should not be treated only as injury-prevention accessories, but also as performance-relevant elements linked to racket control, spin generation, and stroke stability.

The program highlights the value of grip-intensive exercises such as towel-grip pull-ups, rope climbing, ring support, and close-grip pulling. These exercises may be especially useful for improving forearm recruitment, shoulder-elbow-wrist integration, and upper-limb robustness under repeated loading. In practical programming, they can be introduced progressively according to athlete level and technical readiness.

The repeated use of ladder work, BOSU-based lateral drills, low rebounds, skip patterns, and take-off actions indicates that reactive and unilateral movement training should remain a constant feature of tennis preparation. These drills are valuable because they address short-distance acceleration, balance recovery, direction change, and stroke preparation mechanics under movement constraints similar to those encountered on court.

The study suggests that variation should be planned functionally. The usefulness of variation lies not in constantly changing exercises without logic, but in selecting different tasks that stimulate complementary capacities while preserving sport relevance. Coaches may therefore use exercise rotation to maintain neuromuscular quality, reduce monotony, and broaden adaptation, provided that the overall structure remains coherent.

The program may be adapted across several practical scenarios:

- **junior performance players**, with reduced load and simplified technical execution;
- **advanced competitive players**, with greater emphasis on explosive and grip-intensive work;
- **return-to-play phases**, with careful progression in wrist–forearm and shoulder loading;
- **pre-season periods**, with higher training density and broader physical emphasis;
- **in-season periods**, with lower volume but maintenance of reactivity, distal control, and grip robustness.

Finally, for applied monitoring, practitioners should consider tracking a combination of: grip strength, wrist control and endurance, jump and reactive measures, shoulder stability, serve speed, and movement efficiency during tennis-specific drills.

These practical indicators would help determine whether a variation-based tennis conditioning model such as the present one produces measurable improvements in both general athletic and sport-specific performance.

In practical terms, the analyzed program provides a valuable model for tennis-specific conditioning by integrating explosive power, reactive movement, grip development, and wrist–forearm specialization within a coherent weekly training structure.

4. Conclusions

The aim of this study is to analyze, from a scientific and applied sport-performance perspective, a multi-component tennis-specific fitness program based on structured exercise variations designed to improve explosive lower-limb power, upper-limb stability, wrist–forearm strength, grip function, coordination, and reactive neuromuscular performance. The program includes a combination of explosive drills, bodyweight and ring-based strength tasks, elastic-resistance exercises, unstable-surface movements, grip-intensive pulling exercises, rope climbing, and a specialized wrist–forearm circuit, indicating an integrated conditioning model oriented toward the specific biomechanical and functional demands of tennis.

More specifically, the study aims to: characterize the internal structure of the fitness program according to its dominant functional components; examine how exercise variation is used to target complementary performance qualities relevant to tennis; evaluate the expected contribution of the program to the development of explosive power, wrist–forearm conditioning, neuromuscular coordination, and upper-limb control; and provide a scientific framework for interpreting such a training model in the context of competitive tennis preparation.

The present article analyzed a variation-based tennis fitness program and showed that its internal structure reflects a coherent, multi-component conditioning model rather than a conventional general-preparation routine. The program integrates explosive lower-limb work, reactive movement tasks, grip-intensive upper-body exercises, shoulder-support elements, and a specialized wrist–forearm circuit, indicating a training philosophy centered on the functional demands of tennis.

A major conclusion of the study is that the program is strongly organized around the logic of the kinetic chain. Lower-limb force production, lateral movement control, upper-limb stabilization, grip function, and distal wrist–forearm execution are trained as interconnected components of performance. This is especially relevant in tennis, where efficient stroke production depends not only on local muscular strength, but on coordinated force transfer from the legs and trunk toward the racket through the shoulder, forearm, and wrist.

Another important conclusion is that the most distinctive feature of the analyzed training model is the systematic specialization of the wrist–forearm segment. The repeated inclusion of wrist push-ups, wrist curl variations, pronation work, internal-external rotational drills, explosive supination, and weighted internal-rotation actions suggests that the program was deliberately designed to strengthen distal upper-limb function. In practical terms, this may contribute to improved racket control, better force transmission, greater rotational stability, and potentially enhanced resistance to repetitive mechanical stress.

The study also supports the conclusion that exercise variation is used here as a structured methodological principle rather than as simple diversification. The alternation of explosive, reactive, unstable-surface, grip-based, ring-based, and wrist-specific exercises appears to create a broad but functionally coherent stimulus profile. Such an approach may be particularly valuable in tennis, where performance depends on the simultaneous interaction of power, reactivity, coordination, balance, and distal control.

Several limitations are also acknowledged. First, the present article is based primarily on the scientific interpretation of a training program, not on a completed intervention with reported pre-post measurements. As a result, the discussion can identify the logic and potential value of the program, but it cannot yet claim demonstrated causal effects on performance variables. Second, the article focuses on one athlete-specific plan, which limits generalizability. Third, the training program does not include contextual variables such as age, competitive schedule, injury background, or concurrent tennis load, all of which would influence adaptation. For these reasons, the current analysis should be interpreted as a strong applied framework rather than as definitive outcome evidence.

Future research should extend this framework by collecting objective performance and health-related data before and after implementation. Particularly relevant measures would include handgrip strength, wrist flexion-extension strength, pronation-supination strength, countermovement jump, unilateral jump ability, reactive strength index, short-distance acceleration, serve speed, and stroke quality indicators. It would also be valuable to examine whether a program with pronounced wrist–forearm specialization can reduce symptoms associated with overuse in the distal upper limb while maintaining or enhancing stroke performance. Comparative studies could further test whether such an integrated variation-based model produces greater sport transfer than more traditional resistance-based tennis conditioning.

Overall, the analyzed program may be regarded as a relevant applied model for tennis-specific physical preparation. Although the present paper is based mainly on the scientific interpretation of the training plan and not yet on a full intervention with reported pre-post testing, the structure of the program suggests strong practical and theoretical value. Future studies should verify its effects using objective performance indicators, but the current analysis already indicates that this type of integrated conditioning design is well aligned with the physiological and biomechanical requirements of competitive tennis.

Credit Authorship Contribution Statement:

Popirlan Liviu: Conceptualization, Investigation, Methodology, Formal analysis, Writing – original draft, Data curation, Validation, Writing – review and editing.

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