

Improving Training Technologies for Beginner Athletes In Kurash During the Initial Preparation Stage

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Abstract: This study investigates the modernization of training technologies for beginner athletes in kurash, focusing on the initial preparation stage where fundamental technical, physical, tactical, and psychological foundations are established. As a national style of upright wrestling originating from Central Asia, kurash requires rapid balance adjustment, precise gripping actions, explosive force generation, and refined biomechanical control. Traditional kurash training methods heavily emphasize repeated throwing drills and general strength work, often overlooking motor learning principles and individualized adaptation for beginners. Using a theoretical–analytical research design, this study synthesizes findings from kurash pedagogy, biomechanics, motor control, and contemporary training technologies to identify effective developmental strategies. The results show that progressive training technologies—such as visual feedback systems, movement analysis tools, dynamic balance training, modified kurash tasks, reaction and anticipation drills, and coordination-based conditioning—significantly enhance beginners’ technical acquisition, movement stability, and tactical understanding. The study concludes that integrating modern technologies with traditional kurash methodology offers a more efficient, safer, and scientifically grounded pathway for developing novice kurash athletes, forming a strong foundation for future competitive performance.

Keywords: Kurash Training, Initial Preparation Stage, Grip Mechanics, Coordination Development, Training Technologies.

Introduction

Kurash, as one of the most ancient and culturally significant forms of wrestling in Central Asia, has developed into a modern competitive sport requiring exceptional balance, coordination, grip strength, tactical awareness, and psychological resilience (Kazakbaev & Shamuratova, 2024) (Alkhamov & Kaniyazov, 2023). The initial preparation stage in kurash is a decisive period during which young or novice athletes acquire the fundamental motor skills, biomechanical understanding, physical conditioning, and cognitive readiness necessary for successful long-term development (Matveev, 2013) (Platonov, 2013). Unlike many other combat sports, kurash emphasizes upright posture, dynamic gripping, rapid directional changes, and throwing techniques that rely heavily on leverage, balance displacement, and coordinated lower–upper body interaction (Kadirov & Mardonov, 2022) (Kazakbaev et al, 2022). Because of this unique structure, training technologies during the beginner stage must be carefully designed to cultivate proper movement patterns, prevent

technical errors, and ensure safe and progressive adaptation to sport-specific loads (Platonov, 2013) (Sloan & Richards, 2019).

Traditional kurash instruction has historically been based on repeated execution of throws, resistance-based conditioning, and coach-centered verbal explanation (Kazakbaev et al, 2022) (Alkhamov & Kaniyazov, 2023). While these methods have produced many successful athletes, modern sport science reveals that beginners require a more structured, individualized, and biomechanically informed approach to avoid consolidating inefficient patterns and to reduce early injury risk (Schmidt & Lee, 2019) (Sloan & Richards, 2019). Novice kurash athletes typically experience difficulties in maintaining stable posture during grip exchange, timing their movements in harmony with the opponent's weight shifts, and generating throwing momentum through coordinated leg-hip-torso rotation (Kadirov & Mardonov, 2022) (Kazakbaev & Allayarov, 2022). Without early attention to these fundamentals, athletes risk developing compensatory movement errors that later limit performance efficiency or increase injury risk (Platonov, 2013) (Sloan & Richards, 2019). Contemporary research therefore highlights the significance of incorporating motor learning theories, perceptual training, and biomechanical modeling into kurash instruction at the earliest stages (Fitts & Posner, 1967) (Schmidt & Lee, 2019) (Newell, 2019).

One of the defining features of kurash is the central role of balance control and center-of-gravity manipulation (Kadirov & Mardonov, 2022). Throws such as "yonbosh", "chalqancha uloqtirish", "tepma", and "siltab tashlash" depend on precise destabilization of the opponent while maintaining one's own structural alignment (Kadirov & Mardonov, 2022) (Kazakbaev & Allayarov, 2022). Beginners often struggle to coordinate foot positioning, hip rotation, and gripping pressure simultaneously, especially when coping with opponent resistance and time pressure (Kadirov & Mardonov, 2022) (Newell, 2019). Training technologies that simplify these tasks—such as dynamic balance platforms, stability cues, step-pattern systems, and video analysis—allow novice athletes to visualize correct angles, force directions, and body alignment, thereby supporting faster error correction and more stable technique formation (Smith & Dalton, 2021) (Schmidt & Lee, 2019). This insight accelerates the learning process and prevents incorrect technical habits by strengthening the athlete's internal representation of movement structure (Fitts & Posner, 1967) (Schmidt & Lee, 2019).

Similarly, grip mechanics represent a crucial component of kurash performance because kurash rules prohibit ground fighting and emphasize speed and fluidity of upright exchanges (Kazakbaev et al, 2022) (Alkhamov & Kaniyazov, 2023). Athletes must learn to develop strong, controlled, and strategically timed grips that coordinate directly with lower-body drive and trunk rotation (Kadirov & Mardonov, 2022) (Kazakbaev & Allayarov, 2022). Beginners often exert excessive force or fail to synchronize grip initiation with lower-body motion, which may reduce throwing efficiency and increase fatigue (Kazakbaev & Allayarov, 2022) (Platonov, 2013). Training technologies that strengthen hand-forearm function, provide tactile feedback, or simulate grip exchanges in controlled environments enable athletes to understand the biomechanical role of gripping in generating throws and stabilizing the kinetic chain (Kazakbaev et al, 2022) (Smith & Dalton, 2021).

Another major aspect of beginner development is movement anticipation and tactical decision-making. Kurash is not merely a physical contest (it is a dynamic interaction in

which athletes must read the opponent's posture, interpret weight shifts, predict attack sequences, and react with biomechanically efficient counteractions (Kadirov & Mardonov, 2022). Beginners frequently lack perceptual-cognitive readiness and may attempt throws without recognizing situational advantage, which can reduce effectiveness and increase exposure to counterthrows (Newell, 2019) (Schmidt & Lee, 2019). Modern training approaches—such as anticipation drills, visual-cue recognition tasks, reaction systems, and opponent-movement simulations—are described as supporting gradual development of tactical perception and faster perception–action coupling (Newell, 2019) (Park, 2020).

Physical preparation also plays a fundamental role in the initial stage of kurash training. Unlike advanced athletes who require maximal strength cycles, beginners benefit more from coordination-based conditioning, core stability, joint mobility, and controlled power development that supports technique learning (Matveev, 2013) (Magill & Anderson, 2020). Kurash techniques require synchronized whole-body engagement, meaning that foundational physical qualities should be developed in harmony rather than in isolated muscle-focused routines (Platonov, 2013) (Kazakbaev et al, 2022). Progressive training technologies such as elastic-resistance drills, proprioceptive tools, plyometric progressions, and functional movement screens are widely used in modern sport preparation to enhance stability, agility, and safe force production for complex movements (Sloan & Richards, 2019) (WHO, 2021). These approaches help beginners build the movement capacity required for safe and effective technique execution under partner resistance (Platonov, 2013) (Sloan & Richards, 2019).

Finally, psychological readiness—including confidence, emotional control, competitive mindset, and discipline—is shaped significantly during the initial kurash preparation stage (Semenova, 2017) (Cantwell & Ingleton, 2019). Training formats that integrate gamification, visual progress tracking, interactive learning, and feedback-driven motivation contribute to a supportive environment for beginners, increasing engagement and perceived competence (UNESCO, 2015) (WHO, 2021). When athletes understand progress visually, experience early success through progressive tasks, and feel supported through constructive feedback, their long-term commitment to training and competitive resilience tends to increase (Semenova, 2017) (Cantwell & Ingleton, 2019).

As kurash continues to expand globally, many national federations and training centers emphasize scientifically grounded methodologies and technological innovation as essential for sustainable performance development (Kazakbaev & Shamuratova, 2024) (Platonov, 2013). Uzbekistan, as the birthplace of kurash, has increased integration of modern sport science with traditional coaching, yet many regional programs still rely on outdated methods and limited feedback technology (Tursunov, 2018) (Kazakbaev et al, 2022). Therefore, improving training technologies for beginner kurash athletes is not only a pedagogical necessity but also a strategic priority for developing competitive depth and sustaining the cultural heritage of the sport (Kazakbaev & Shamuratova, 2024) (UNESCO, 2015).

Methodology

The methodological foundation of this study is based on a theoretical–analytical framework designed to evaluate and synthesize training technologies relevant to the initial preparation of beginner athletes in kurash (Newell, 2019) (Schmidt & Lee, 2019). Because kurash is a highly specific national upright wrestling discipline that integrates biomechanical precision, explosive strength, balance control, and tactical responsiveness, the research methodology was constructed to capture the interdisciplinary nature of the sport (Kadirov & Mardonov, 2022) (Platonov, 2013). The methods combine elements of sport pedagogy, biomechanics, motor learning theory, psychological preparation, and kurash-specific training practices to assess the mechanisms shaping training effectiveness in beginners (Matveev, 2013) (Schmidt & Lee, 2019) (Semenova, 2017). This integrative approach makes it possible to evaluate both technical demands and the underlying physiological, cognitive, and pedagogical factors that determine skill acquisition and safe adaptation (Platonov, 2013) (Sloan & Richards, 2019).

The first methodological component involved a comprehensive review of scientific literature on kurash, wrestling pedagogy, combat-sport biomechanics, motor learning, reaction training, and coordination development (Newell, 2019) (Schmidt & Lee, 2019). Academic databases such as Scopus, Web of Science, PubMed, Google Scholar, CyberLeninka, and regional Central Asian sport-science publications were examined to cover both international and regional perspectives (WHO, 2021) (UNESCO, 2015). The literature review focused on studies addressing upright wrestling mechanics, grip forces, balance displacement, throwing efficiency, and neuromuscular characteristics during combat, all of which are central to kurash performance (Kadirov & Mardonov, 2022) (Kazakbaev et al, 2022). Particular emphasis was placed on research conducted in Uzbekistan and neighboring regions where kurash and related upright traditions are methodologically developed, enabling the study to reflect culturally grounded training practices alongside broader sport-science frameworks (Kazakbaev & Shamuratova, 2024) (Tursunov, 2018).

The second methodological component consisted of comparative analysis of training models used in kurash, judo, belt-wrestling, and sambo. These sports share biomechanical principles such as center-of-gravity manipulation, grip-based control, and rotational throwing mechanics, making them valuable sources of comparative pedagogical insights (Platonov, 2013) (Laputin, 2019). Kurash, however, differs in its prohibition of ground grappling, emphasis on upright posture, and rapid throwing sequences, requiring careful adaptation of training tools and progressions (Alkhamov & Kaniyazov, 2023) (Kazakbaev et al, 2022). Therefore, the comparative analysis explored how technologies and progression systems from related combat sports could be adjusted to kurash rules and technical structure, including modified drills, cognitive load strategies, and biomechanical teaching tools supporting beginner learning (Newell, 2019) (Wojcik & Nowak, 2020).

A third methodological component involved interpretation of motor learning principles as applied to kurash technique acquisition. Theories such as Fitts and Posner's three-stage model, Schmidt's schema theory, ecological dynamics, and variability-of-practice frameworks were analyzed to explain how novice athletes internalize throwing mechanics, balance adjustments, and gripping actions (Fitts & Posner, 1967) (Schmidt & Lee, 2019) (Newell, 2019). These theories provide a scientific basis for designing progressive

training aligned with stages of motor skill acquisition—cognitive, associative, and autonomous—each requiring different instructional strategies and feedback structures (Fitts & Posner, 1967) (Schmidt & Lee, 2019). By mapping these theories onto kurash-specific learning demands, the study identifies strategies supporting efficient and error-resistant development in complex throw-based skills (Wojcik & Nowak, 2020) (Schmidt & Lee, 2019).

The fourth methodological element involved biomechanical analysis of kurash throwing techniques and physical preparation associated with upright combat. Scientific sources describing force vectors, ground reaction forces, hip rotation mechanics, leverage application, and balance-displacement principles were reviewed to interpret which body segments contribute most to power generation and stability during throws (Laputin, 2019) (Kadirov & Mardonov, 2022). These analyses inform how beginners commonly misalign movement and which corrective strategies are most effective for early-stage training (Platonov, 2013) (Sloan & Richards, 2019). The biomechanical interpretation also considered tools such as motion-capture concepts, slow-motion video analysis, force platforms, and angle-measurement applications described in training technology research as supporting technical precision and feedback quality (Smith & Dalton, 2021).

The fifth methodological foundation evaluated training technologies increasingly used in modern kurash preparation, including visual feedback systems, dynamic balance platforms, reaction light boards, plyometric tools, resistance equipment, and coordination ladders. Each technology was assessed for its capacity to improve technique learning, posture stability, neuromuscular coordination, and psychological readiness among beginners based on sport pedagogy and motor-learning principles (Schmidt & Lee, 2019) (Newell, 2019). The methodology also reviewed modified kurash tasks—such as grip-only drills, controlled entry techniques, balance games, and partial-throw simulations—designed to reduce cognitive load and decrease injury risk, which aligns with part-to-whole learning and progressive complexity approaches (Fitts & Posner, 1967) (Wojcik & Nowak, 2020).

A sixth methodological element involved pedagogical interpretation, focusing on athlete-centered coaching, differentiated instruction, and progressive load management. Literature in coaching science emphasizes individualized adaptation, optimized feedback timing, cue selection, and psychological scaffolding as essential for beginners who differ in coordination capacity, fear response, strength, and learning tempo (Schmidt & Lee, 2019) (Cantwell & Ingleton, 2019). Therefore, the methodology emphasized frameworks such as scaffolding, motivational reinforcement, guided discovery, and error-reduced learning environments to support stable skill acquisition and retention (Newell, 2019) (Schmidt & Lee, 2019).

The seventh methodological component explored psychological and motivational aspects of early kurash training. Research on confidence development, competitive stress, risk perception, and emotional regulation was reviewed to determine which training technologies support psychological readiness and long-term retention (Semenova, 2017) (Cantwell & Ingleton, 2019). Visual progress tracking tools, gamified drills, and scenario-based tasks are frequently described as enhancing engagement and motivation, factors strongly associated with beginner persistence and success in sport (UNESCO, 2015) (WHO,

2021). Psychological methodologies were incorporated to understand how training environments shape identity, discipline, and resilience in novice athletes (Semenova, 2017).

Finally, the methodological system was synthesized into a conceptual model connecting biomechanics, motor learning, psychological development, and technological innovation into a unified kurash training framework. This model supports understanding how elements such as grip mechanics, anticipation drills, balance technology, and feedback systems interact to influence overall beginner skill development (Kadirov & Mardonov, 2022) (Schmidt & Lee, 2019). The synthesis stage ensures that conclusions drawn from literature review, comparative analysis, and theoretical interpretation remain coherent and practically applicable to kurash programs focused on safe, progressive, and scientifically supported early training (Platonov, 2013) (Sloan & Richards, 2019).

Result and Discussion

The analysis of modern training technologies applied to beginner kurash athletes during the initial preparation stage reveals several interconnected developmental outcomes that significantly enhance technique acquisition, movement efficiency, physical readiness, and psychological resilience when compared with traditional repetition-based training approaches (Matveev, 2013) (Platonov, 2013). Contemporary sport science literature consistently emphasizes that early-stage training grounded in biomechanical principles, motor learning theory, and progressive pedagogical design produces more stable and transferable skill development in combat sports (Schmidt & Lee, 2019) (Newell, 2019).

One of the most prominent results identified across the reviewed literature and coaching methodologies is the accelerated improvement in balance control, which constitutes the biomechanical foundation of kurash throwing techniques (Laputin, 2019) (Kadirov & Mardonov, 2022). Beginner athletes frequently demonstrate instability during grip engagement, lateral displacement, and resistance against opponent force, particularly when attempting to initiate throws (Kazakbaev & Allayarov, 2022). However, research indicates that when dynamic stability training tools—such as balance platforms, unstable surfaces, proprioceptive mats, and controlled leaning drills—are systematically incorporated into early-stage kurash preparation, athletes develop enhanced postural responsiveness and center-of-gravity regulation (Harsányi, 2022) (Park, 2020). This improved balance directly supports the execution of kurash techniques such as *yonbosh*, *tepma*, and *siltab tashlash*, all of which require precise equilibrium maintenance while destabilizing an opponent (Kadirov & Mardonov, 2022). Studies show that athletes exposed to structured balance-oriented training demonstrate smoother weight transfer, reduced hesitation, and greater control during the entry phase of throws (Laputin, 2019) (Schmidt & Lee, 2019).

Another key result concerns grip mechanics and upper-limb coordination, which play a central role in kurash due to its upright jacket-gripping structure and prohibition of ground grappling (Kazakbaev et al, 2022). Traditional instructional approaches often rely on repetitive gripping exercises without sufficient biomechanical explanation, which can lead to inefficient force application and premature fatigue (Allayarov et al, 2023). In contrast, contemporary training technologies—including grip-strength sensors, tactile feedback

straps, resistance simulators, and slow-motion video analysis—enable beginners to understand the timing, direction, and functional purpose of grip engagement within throwing mechanics (Smith & Dalton, 2021). Research demonstrates that athletes trained with progressive grip-focused technologies develop improved hand placement, wrist alignment, and arm–torso synchronization, resulting in more efficient throw initiation and reduced excessive muscular tension (Laputin, 2019) (Kazakbaev & Allayarov, 2022). These adaptations contribute to more consistent execution of kurash throws that depend on coordinated gripping and hip rotation (Kadirov & Mardonov, 2022).

The findings further highlight substantial improvements in lower-limb coordination and footwork, which form the kinetic base of kurash movement patterns (Matveev, 2013) (Schmidt & Lee, 2019). Beginner athletes often struggle to align foot placement relative to opponent posture, leading to inefficient leverage and poor force direction during throw attempts (Laputin, 2019). Studies indicate that when footwork progression drills are supported by visual markers, agility ladders, spatial-tracking lines, and digital pressure-distribution tools, athletes acquire a more precise understanding of step rhythm, directional change, and rotational entry mechanics (Newell, 2019) (Wojcik & Nowak, 2020). These training technologies assist beginners in synchronizing foot positioning with opponent balance shifts, stabilizing throwing angles, and timing explosive leg drive more effectively (Park, 2020) (Schmidt & Lee, 2019). As a result, research reports increased fluidity of throw preparation, reduced unnecessary steps, and improved biomechanical efficiency during throwing sequences (Laputin, 2019).

A significant outcome emerging from the analysis is the enhanced efficiency of motor learning associated with visual and augmented feedback systems. Kurash techniques involve rapid multi-segment coordination, making real-time error detection difficult for novices (Schmidt & Lee, 2019). However, slow-motion video playback, biomechanical angle analysis, and comparison with model demonstrations allow beginners to visualize body alignment, hip rotation, foot placement, and grip mechanics more clearly (Smith & Dalton, 2021). Motor learning research suggests that such visual feedback accelerates the transition from the cognitive to the associative stage of skill acquisition by strengthening internal motor representations (Fitts & Posner, 1967) (Schmidt & Lee, 2019). Empirical observations indicate that athletes exposed to systematic video analysis correct technical errors more rapidly, retain proper movement patterns for longer periods, and exhibit greater confidence during partner drills and controlled sparring situations (Smith & Dalton, 2021).

In addition to technical refinement, the results demonstrate notable improvements in reaction speed and anticipatory abilities when perceptual–cognitive training tools are employed (Newell, 2019). Kurash performance requires athletes to detect subtle changes in opponent posture, grip pressure, and weight distribution, and to respond with minimal delay (Kadirov & Mardonov, 2022). Research shows that reaction-light systems, anticipatory cue drills, and opponent-movement simulations condition beginners to process visual information more efficiently and respond with biomechanically appropriate actions (Harsányi, 2022) (Park, 2020). As a consequence, athletes demonstrate shorter reaction

times, smoother counteractions, and improved defensive positioning, which collectively enhance tactical awareness and long-term performance development (Schmidt & Lee, 2019).

The study also identifies meaningful advancements in core stability and coordinated strength development. Contrary to the assumption that beginners require maximal strength training, sport-science literature emphasizes that early-stage combat athletes benefit more from controlled power generation, trunk stability, and synchronized limb engagement (Platonov, 2013) (Magill & Anderson, 2020). When training technologies such as elastic-resistance systems, plyometric progressions, core-stability platforms, and movement-quality monitoring tools are utilized, athletes exhibit improved hip rotation, enhanced pelvic stability, and more efficient energy transfer from the lower to the upper body during throws (Laputin, 2019) (Sloan & Richards, 2019). These adaptations reduce compensatory movement patterns and lower injury risk while improving throwing effectiveness (Kazakbaev et al, 2022).

Another important result relates to improvements in movement economy, particularly during transitional phases such as entry positioning, stance adjustment, and follow-through mechanics. Beginners commonly waste energy through excessive steps, overly forceful gripping, and inefficient rotational actions (Matveev, 2013). Research indicates that when movement visualization diagrams, biomechanical cueing, and angle-demonstration models are integrated into training, athletes learn to minimize unnecessary motion and execute techniques with greater efficiency (Laputin, 2019) (Smith & Dalton, 2021). Enhanced movement economy not only improves technical accuracy but also contributes to greater endurance and sustained performance during prolonged training sessions and competitive exchanges (Platonov, 2013).

Psychological outcomes also emerge as a critical dimension of the results. Studies in sport psychology indicate that beginner athletes trained with technology-supported and progressively structured environments demonstrate higher confidence levels, reduced fear of failure, and stronger intrinsic motivation (Cantwell & Ingleton, 2019) (Semenova, 2017). Gamified drills, visual progress tracking, and incremental challenge systems create a supportive psychological climate that fosters engagement, perseverance, and enjoyment (UNESCO, 2015) (WHO, 2021). Coaches consistently report that athletes who experience early success through scientifically designed progressions show greater long-term commitment and a more resilient competitive mindset (Semenova, 2017).

The integration of modified kurash drills and partial-throw tasks further contributes to effective beginner development. Motor learning theory supports part-to-whole learning for complex skills, allowing novices to focus on individual biomechanical components—such as hip entry, leg sweeping direction, or grip stabilization—before integrating full techniques (Fitts & Posner, 1967) (Schmidt & Lee, 2019). Research demonstrates that athletes trained using such progressive breakdowns develop clearer understanding of movement purpose and show improved whole-technique execution when components are combined (Wojcik & Nowak, 2020).

Furthermore, the findings indicate a reduction in injury risk when beginners are trained using scientifically grounded technologies and progressive load management

strategies. Movement screening tools help identify mobility limitations, strength asymmetries, and coordination deficits prior to the execution of complex throws (Sloan & Richards, 2019). Safe learning environments—such as cushioned mats, controlled partner drills, and simulated resistance tools—allow athletes to practice correct mechanics with reduced exposure to excessive force, thereby decreasing early-stage injury incidence (WHO, 2021) (Platonov, 2013).

Collectively, the results indicate that modern training technologies substantially enhance the early development of kurash athletes across technical, physical, cognitive, and psychological domains. Beginner athletes exposed to technology-assisted and scientifically informed training demonstrate more stable throwing mechanics, improved balance control, refined gripping skills, enhanced reaction speed, greater confidence, and smoother coordination compared with those trained exclusively through traditional methods (Schmidt & Lee, 2019) (Laputin, 2019) (Kazakbaev et al, 2022). These findings support the growing consensus that kurash training systems must integrate contemporary sport-science principles to ensure effective long-term athlete development and sustainable competitive success (Matveev, 2013) (Platonov, 2013).

Discussion

The findings of this study highlight that the modernization of training technologies for beginner kurash athletes produces significant improvements in balance control, grip efficiency, technical coordination, perceptual readiness, and psychological engagement (Kadirov & Mardonov, 2022) (Kazakbaev et al, 2022) (Schmidt & Lee, 2019). The discussion of these results provides a deeper understanding of why these changes occur, how they align with contemporary sport-science theories, and what implications they hold for the future of kurash training (Newell, 2019) (Platonov, 2013). As kurash is an upright, fast-paced throwing discipline that relies heavily on biomechanical precision and coordinated whole-body movement, improvements in early-stage training technologies have a disproportionate impact on long-term athlete development (Matveev, 2013) (Platonov, 2013) (Laputin, 2019).

One of the primary themes emerging from the results is that enhanced balance training significantly accelerates technical acquisition among beginners (Kadirov & Mardonov, 2022) (Park, 2020). Balance is central to kurash because every throw begins with controlling one's own center of gravity while manipulating the opponent's (Kadirov & Mardonov, 2022). The earlier an athlete learns to stabilize their stance, react to force, and maintain equilibrium under dynamic pressure, the more effectively they can execute throwing mechanics (Laputin, 2019) (Platonov, 2013). This supports the ecological dynamics perspective, which posits that athletes learn best when exposed to controlled variability and sensory-rich environments that strengthen perception–action coupling (Newell, 2019). Technologies such as dynamic balance platforms, destabilization mats, and reactive leaning drills create precisely such environments by providing varied constraints and feedback conditions (Newell, 2019) (Park, 2020). They allow beginners to experience micro-adjustments in

posture that mimic real competition scenarios without the full risk of uncontrolled contact (Park, 2020) (Sloan & Richards, 2019).

A second major theme is the improvement in grip mechanics and kinetic chain synchronization, both crucial to kurash's upright throwing system (Kazakbaev et al, 2022) (Kadirov & Mardonov, 2022). Traditional training often overemphasizes strength at the expense of technical fluidity, leading beginners to rely excessively on arm force and to disrupt whole-body sequencing (Platonov, 2013) (Kazakbaev & Allayarov, 2022). However, technological tools that track grip force, demonstrate optimal hand positions, or slow down the visual execution of grip-to-throw transitions reveal to athletes how gripping interacts with hip rotation, leg drive, and torso alignment (Smith & Dalton, 2021) (Laputin, 2019). These findings align with motor learning research, especially Schmidt's schema theory, which emphasizes that learners must internalize relationships between force, timing, and movement parameters to stabilize motor programs across variable contexts (Schmidt & Lee, 2019). Beginners trained with augmented visual or tactile feedback develop a more economical and biomechanically efficient gripping style—one that supports rather than restricts the execution of throws (Smith & Dalton, 2021) (Schmidt & Lee, 2019) (Laputin, 2019).

Additionally, the results highlight the substantial impact of footwork technologies on throw preparation and execution (Kadirov & Mardonov, 2022) (Wojcik & Nowak, 2020). Because kurash throws depend on stepping angles, hip entry, body alignment, and rotational momentum, beginners must master lower-limb coordination early to create effective leverage and destabilization opportunities (Laputin, 2019) (Platonov, 2013). Yet this skill is often overlooked in traditional methods that prioritize upper-body dominance and repeated throw attempts without systematic entry mechanics (Platonov, 2013) (Kazakbaev et al, 2022). Modern footwork drills using visual markers, agility maps, and sensor-based movement tracking help athletes understand where and how to place their feet relative to the opponent and how to sequence steps with hip rotation and grip control (Newell, 2019) (Park, 2020). This supports findings from related upright throwing sports where correct foot positioning and entry timing are discussed as major predictors of throwing success through improved force direction and balance displacement (Platonov, 2013) (Laputin, 2019). By training beginners to conceptualize footwork as the foundation of throwing mechanics, modern technologies reshape the learning hierarchy: athletes learn to move first, then throw, in a progression aligned with motor-learning principles of task simplification and staged complexity (Fitts & Posner, 1967) (Schmidt & Lee, 2019) (Wojcik & Nowak, 2020).

Another important finding concerns the role of visual feedback tools, such as slow-motion video analysis, biomechanical overlays, motion capture, and position-angle diagrams (Smith & Dalton, 2021). These tools transform abstract technical instructions into concrete visual information, enabling clearer error detection and more objective coaching feedback (Smith & Dalton, 2021) (Schmidt & Lee, 2019). Beginners who watch their throw attempts or grip sequences in slow motion gain immediate clarity about movement errors, including timing deviations, joint alignment issues, and sequencing faults that are difficult

to detect in real time (Smith & Dalton, 2021). This process of externalizing internal perception accelerates error correction and supports early-stage learning frameworks, including Fitts and Posner's model, which emphasizes the importance of clear cues and augmented feedback during the cognitive stage of motor learning (Fitts & Posner, 1967) (Schmidt & Lee, 2019). Coaches also benefit from these tools because they provide observable movement evidence, reducing exclusive reliance on intuition and improving the precision of instructional feedback (Smith & Dalton, 2021) (Schmidt & Lee, 2019).

The integration of perceptual-cognitive training further enhances kurash development (Newell, 2019) (Park, 2020). Kurash exchanges require rapid decision-making, anticipation, and reading of opponent movement under time pressure (Kadirov & Mardonov, 2022). When beginners are exposed to technologies such as reaction lights, cue-based entry drills, interactive partner movement simulations, or cognitive-load scenarios, they begin to develop what is often described in coaching contexts as tactical perception or "tactical vision," meaning improved detection of cues and faster selection of appropriate responses (Newell, 2019) (Schmidt & Lee, 2019). This reflects the athlete's ability to predict an opponent's shift in balance, identify throwing opportunities, and respond decisively with efficient counteractions (Kadirov & Mardonov, 2022) (Newell, 2019). The development of tactical perception is especially important because throwing success depends not only on strength or technique but on timing actions to coincide with the opponent's instability and force direction (Laputin, 2019) (Kadirov & Mardonov, 2022). Therefore, perceptual training functions as a bridge between physical capacity and tactical intelligence by strengthening perception-action coupling in varied and representative contexts (Newell, 2019) (Park, 2020).

The results also emphasize improvements in core stability and coordinated strength, which form the structural base for safe throwing mechanics (Platonov, 2013) (Sloan & Richards, 2019). Kurash throws require energy transfer from the ground through the legs, hips, torso, and arms—an interconnected kinetic chain in which weak trunk control may disrupt sequencing and increase injury load on joints (Laputin, 2019) (Sloan & Richards, 2019). When beginners train with technologies such as elastic resistance tools, core-activation devices, and movement-quality monitors, they develop stable and efficient movement pathways, improving hip rotation control and trunk stiffness regulation during force application (Magill & Anderson, 2020) (Sloan & Richards, 2019). These findings correspond with biomechanical perspectives indicating that improper sequencing and insufficient core stability can increase stress on the spine and shoulders during throwing-type actions (Sloan & Richards, 2019) (Laputin, 2019). Therefore, improved neuromuscular coordination not only enhances performance but also supports injury prevention and long-term durability (Sloan & Richards, 2019) (Platonov, 2013).

Furthermore, a notable outcome of modern training technologies is enhanced movement economy (Laputin, 2019) (Schmidt & Lee, 2019). Efficient execution is characterized by fewer unnecessary steps, reduced muscular tension, smoother rotations, and more accurate timing, which is especially valuable in fast-paced throwing exchanges (Platonov, 2013) (Laputin, 2019). Beginners trained with visualization aids or biomechanical

cues learn to refine movement patterns and minimize energy waste, consistent with motor-learning perspectives emphasizing optimized coordination as skills stabilize (Schmidt & Lee, 2019). This is particularly beneficial in kurash, where repeated bursts of explosive action demand efficient mechanics to sustain performance throughout training and competition (Platonov, 2013).

Psychological development also plays a significant role in the discussion of results. Technologies that gamify kurash drills—such as point systems, time challenges, and visual progress charts—can cultivate motivation, resilience, and enjoyment by increasing perceived competence and engagement (UNESCO, 2015) (WHO, 2021). Kurash beginners often struggle with fear of falling, performance anxiety, or frustration when attempting complex throws, which can inhibit learning and reduce persistence (Cantwell & Ingleton, 2019) (Semenova, 2017). When training becomes interactive, measurable, and visually rewarding, athletes frequently show higher confidence and stronger willingness to attempt new techniques, consistent with motivation research emphasizing competence support and positive learning climates (Cantwell & Ingleton, 2019) (Semenova, 2017). This psychophysiological effect aligns with self-determination theory, which highlights autonomy, competence, and relatedness as key motivational drivers in sport participation and learning contexts (Cantwell & Ingleton, 2019) (UNESCO, 2015).

Another important implication revealed by the findings is the reduction of injury risk when modern training technologies are used (Sloan & Richards, 2019) (WHO, 2021). Beginners commonly sustain injuries due to incorrect falling technique, poor posture, excessive force application, or lack of physical preparedness, particularly under partner resistance (Sloan & Richards, 2019) (Platonov, 2013). With controlled learning environments, progressive resistance tasks, and biomechanically guided drills, athletes can practice correct mechanics safely and reduce exposure to uncontrolled loading during early learning (Sloan & Richards, 2019) (WHO, 2021). Movement screening tools can also assist early identification of mobility deficits and asymmetries, enabling individualized correction before more demanding actions are performed (Sloan & Richards, 2019). This prevention-oriented approach aligns with international best practices emphasizing safe progression, load management, and developmentally appropriate training in youth and novice sport settings (WHO, 2021) (UNESCO, 2015).

Moreover, the combination of traditional kurash values with modern training technologies produces cultural and pedagogical synergy. Kurash is a heritage sport that emphasizes respect, discipline, and moral strength, which are often highlighted in national and educational sport frameworks (Kazakbaev & Shamuratova, 2024) (UNESCO, 2015). When these cultural elements are supported by scientifically informed instruction, athletes may develop both technically and ethically, strengthening not only sport performance but also cultural continuity (Kazakbaev & Shamuratova, 2024) (Matveev, 2013). The fusion of tradition and innovation therefore supports athletic development and cultural preservation simultaneously (UNESCO, 2015) (Kazakbaev & Shamuratova, 2024).

Finally, the discussion highlights the critical role of the coach. Technologies alone cannot improve athletes if coaches lack pedagogical and biomechanical literacy and cannot

integrate tools strategically into progressive learning designs (Schmidt & Lee, 2019) (Platonov, 2013). Effective kurash coaching requires understanding how to introduce complexity, individualize feedback, and align practice tasks with learning stages and athlete readiness (Fitts & Posner, 1967) (Schmidt & Lee, 2019). Coaches must balance traditional kurash wisdom with scientific methodology, ensuring that the spirit of the sport is preserved while optimizing development pathways (Kazakbaev & Shamuratova, 2024) (Platonov, 2013). The results indicate that athletes achieve the greatest developmental gains when coaches use technologies not as replacements but as extensions of expertise that strengthen feedback quality, safety, and learning efficiency (Smith & Dalton, 2021) (Schmidt & Lee, 2019).

Conclusion

The findings of this study demonstrate that modern training technologies significantly enhance the development of beginner kurash athletes during the initial preparation stage. Improvements in balance control, grip efficiency, footwork coordination, and core stability show that biomechanically informed methods provide a more stable foundation for executing traditional kurash throws. Visual feedback tools accelerate motor learning by helping athletes internalize correct posture, hip rotation, and throwing mechanics, while perceptual-cognitive training strengthens anticipation, reaction speed, and tactical awareness—skills essential for competitive kurash.

The results also indicate that progressive load management, modified task structures, and gamified drills reduce psychological barriers, increase motivation, and create safer learning environments. These technologies not only improve technique acquisition but also reduce injury risk and support long-term athletic retention. Ultimately, integrating contemporary sport-science methods with the cultural and technical traditions of kurash offers the most effective pathway for preparing novice athletes for future competitive performance. Coaches who apply these technologies strategically will contribute to the sustainable growth and modernization of kurash training systems.

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