



Handball for Girls Aged 12–16: A Personalized, Game-Based and Safe Training System with the GATE-HB Coach Module

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Abstract

The present methodology constitutes a comprehensive, evidence-based system for preparing female handball players aged 12–16, devised to address the principal challenges inherent to this developmental window: an elevated injury risk, psycho-emotional vulnerability, and a high attrition rate from sport. The GATE-HB coach module, offered by the author, sits at the heart and reason for being of this methodology, placing the four pillars in sequential order within a hybrid training environment. The methodology works off of a game-based learning process (Game-Based Learning), include proactive safety through neuromuscular integrated training, load progression systematically applied, and addressing an environment that should ideally be positive psychosocial). The purpose is to provide an easy and flexible tool for weekly and monthly cycle planning maximizing technical/tactical skill development while maximizing intrinsic motivation and minimizing injury—the anterior cruciate ligament (ACL) involves most injuries—through the gatekeeping system requiring minimum documentation geared toward long-term commitment to healthy lifestyles by athletes.

INTRODUCTION

The age span from 12 to 16 years for girls engaged in sport represents a unique and critically important period, aptly characterized as an “ideal storm” of physiological, biomechanical, and psychological transformations. This stage is one of intense, yet frequently asynchronous development, generating both considerable opportunities for athletic advancement and substantial risks to health and long-term sporting careers. Central among the challenges of this period is the pubertal growth spurt, which in girls begins and completes earlier than in boys (Tingelstad et al., 2023). Rapid longitudinal growth of the limb bones outpaces the adaptation of the neuromuscular system, resulting in a transient disturbance of coordination and proprioceptive control—commonly referred to as “adolescent awkwardness” (Eisenmann et al., 2020).

This neuromuscular deficit has immediate and dangerous effects. Empirical studies clearly show that female athletes after the onset of sexual maturation are at 4–6 times greater risk for non-contact anterior cruciate ligament (ACL) injuries than their male counterparts performing similar sports activities (Myer et al., 2004). Handball includes high-intensity jumping as well as abrupt decelerations and changes of direction, which perfectly set the stage for this risk to reveal itself. The dynamic knee valgus (medial collapse of the knee) during landing or direction change is directly related to inadequate neuromuscular control of the hip and pelvic musculature.

This age group, therefore, has high psychological vulnerability notwithstanding physiological hazards. Motivational drivers change the emphasis on play (on “fun”), shift to an outcome-oriented approach, and add competitive pressure. This, in the absence of constructive coaching behaviors or under conditions of parental pressure, results in a drop in self-esteem, a loss of intrinsic motivation, and sports dropout. The coach is faced with two parallel mandates: the acquisition of athletic skill and the preservation of the health and psychological well-being of athletes at their most vulnerable developmental stage. Conventional parallels to adult athlete training models are inappropriate as well as ineffective in this context.

The primary objective of this approach is to develop a practical, scientific, and systematic methodology for handball coaches to plan and implement training programs for girls aged 12 to 16 years, which will develop athletes in a holistic manner, mitigating associated risks.

The objectives of the methodology are to:

Propose a structured weekly and monthly planning framework that ensures balanced development of technical, tactical, physical, and psychological attributes.

Integrate contemporary pedagogical approaches (game-based methods, constraints-led approach) to enhance learning efficacy and intrinsic motivation.

Implement mandatory neuromuscular training (NMT) protocols within the structure of each session for targeted injury prevention.

Provide simple and accessible tools for monitoring athlete status and managing training load that do not require specialized or costly equipment.

Formulate principles for creating a positive and supportive psychosocial environment that facilitates long-term athlete retention in sport.

The GATE-HB approach provides a practical, evidence-based system for coaches of girls aged 12–16 to plan and run holistic, safe development programmes. Its aims are to balance technical, tactical, physical and psychological development; use modern pedagogies to boost learning and motivation; embed mandatory neuromuscular training (NMT) for injury prevention; offer low-cost monitoring/load tools; and shape a positive psychosocial climate that supports long-term retention.

The methodology rests on four integrated principles: 1) game-based learning (small-sided/modified games) to develop skills, decision-making and fitness in realistic contexts; 2) systematic progression via a constraints-led approach so players discover adaptable motor solutions; 3) proactive safety by making standardized NMT part of every session; and 4) a task-involving motivational climate with positive discipline and constructive feedback. Its innovation lies in combining these elements into a single developmental ecosystem that redefines the coach as an environment architect.

The guide is hands-on and structured into four sections: (1) age-group theory, (2) training architecture (weekly/monthly and session design), (3) simple monitoring, prevention and communication tools, and (4) the GATE-HB coach module (plan → implement → analyse cycle). Read sequentially and use the provided templates and examples, adapting them to your team's context.

SECTION 1. AGE-RELATED FOUNDATIONS AND TARGET OBJECTIVES

Physiological-Biomechanical Profile: Coordination, Reaction Speed, Muscular Endurance, Landing Control

An understanding of the distinctive physiological and biomechanical processes unfolding in the bodies of girls aged 12–16 constitutes a cornerstone for the construction of a safe and efficacious training regimen. This period is characterized by nonlinear growth, in which rapid skeletal development does not necessarily coincide with the development of systems for controlling movements. Females demonstrate an earlier initiation of puberty and peak height velocity that generally takes place around the ages of 11 to 12 years old. There is a slowdown in growth thereafter, such that by the age range between 15 and 16 years old, most

females have achieved their final adult stature (Tingelstad et al., 2023). The scenario results in changes in body composition, with an increase in fat deposition. At the same time, muscle accumulation is less significant due to no great increase in circulating testosterone, like that found in males. Incremental gains from year to year on physical capability attributes such as lower and upper limb strength are apparent but not as conspicuous as those realized amongst their male counterparts. They may plateau by the ages of fifteen to sixteen years.

A key problem is the aforementioned discrepancy between skeletal growth and the development of neuromuscular control. Rapid elongation of lever arms (limbs) alters the centre of mass and moments of inertia, demanding continual recalibration of motor programs by the central nervous system. During this interval, athletes commonly experience a transient deterioration in coordination, balance, and proprioception. This neuromuscular deficit is directly associated with an elevated injury risk, particularly for the anterior cruciate ligament (ACL). Inadequate control of the muscles that stabilise the hip and knee joints gives rise to hazardous movement patterns, such as knee valgus on landing from a jump or during abrupt changes of direction.

Based on this profile, the training process should not prioritize forced development of maximal strength, but rather the establishment of a robust and intelligent body capable of managing its own mass dynamically, safely, and efficiently. In rehabilitation and preparatory phases, exercises involving heavy axial loading that impose substantial compression on the spine and joints—such as high-load back squats—are excluded. Instead, emphasis shifts toward enhancement of neuromuscular control and improvement of overall movement quality.

Particular emphasis is placed on correct landing technique. Athletes are instructed to land softly and with control on both two-leg and single-leg contacts, with strict attention to joint alignment along the “foot-knee-hip” line. This decreases the forces of impact and thus reduces the risk of injury. It also includes exercises in balance and proprioception. Static and dynamic balance include single-leg stances on the floor as well as on an unstable surface, which enhances coordination and awareness of the body's position in space.

And by the way, beefing up those core and hip stabilizers is key too. Keeping at it with moves that target your abs, back extensors, and glutes goes a long way in locking down solid pelvic support. A strong core and active gluteal musculature effectively prevent knee valgus collapse — the inward knee movement that represents a frequent antecedent of injury. A summary of the physical and psychomotor development of girls is illustrated in Table 1.

Table 1. Summary table of physical and psychomotor development of girls aged 12–16 and key coaching tasks

Characteristic	Early adolescence (12–14 years)	Middle adolescence (15–16 years)
Growth and maturation	Period at or immediately following the peak height velocity. Rapid anthropometric change. Onset of hormonal alterations.	Deceleration and cessation of linear growth. Stabilisation of hormonal milieu and body composition.
Strength qualities	Moderate strength gains, primarily attributable to improved intramuscular coordination.	Greater potential for muscular hypertrophy and strength endurance development on a stabilised foundation.
Coordination	Period of “adolescent awkwardness.” Risk of transient deterioration in bodily control.	Improvement and stabilisation of motor control. Opportunity to acquire more complex technical elements.
Injury risk profile	Maximal risk of non-contact injuries (particularly ACL) due to neuromuscular deficits. Risk of apophysitis (Osgood–Schlatter disease).	Risk persists but diminishes as growth stabilises. Increased risk of overload injuries if training volume is inadequate or poorly managed.
Key coaching tasks	Priority №1: neuromuscular control. Instruction in landing, jumping, and change-of-direction technique. Development of balance and core strength. Prohibition against forced overloads.	Development of basic strength endurance. Gradual introduction of resistance exercises (bodyweight, elastic bands). Integration of physical qualities into game-based tasks.

Psychological Characteristics: Motivation and Discipline

The psychological state of athletes at this age is at least as consequential as their physical preparedness. A coach who fails to apprehend the peculiarities of adolescent motivation and needs risks losing even the most talented players.

The theoretical underpinning of the approach is the Achievement Goal Theory (AGT), a powerful instrument for understanding and shaping motivation in sport (Fabra et al., 2021). AGT posits that the coach (as well as parents and teammates) creates a motivational climate within the team that frames for athletes how to interpret what constitutes success or failure. There are two primary types of coach-created motivational climates in sports psychology, which have distinct effects on athlete development and well-being. The first is a task-involving climate. In such an environment, attaining success means not competing with others but improving oneself, making an effort, and mastering new skills. Errors are construed not as failures but as an integral and valuable part of the learning process. A coach who cultivates this climate encourages cooperation among team members and values each player’s contribution regardless of current performance level.

In contrast, an ego-involving climate places emphasis on demonstration of superiority and victory at all costs. Success is measured exclusively relative to others. In such an atmosphere, errors are frequently punished, and coaching attention and rewards are directed predominantly to the most talented and accomplished athletes. It results in a constant fear of failure and heightened anxiety among athletes, generates inter-team strife, and typically leads to emotional burnout and premature withdrawal from the

sport. To make a task-involving climate real, coaches can use several strategies that are considered best practices. One such strategy is to organize practice into short blocks of time, 10–12 minutes long. This will sustain the type of attention span that is normally not very stable among adolescents. Within these blocks, any drill can be redefined not as competition against a teammate but as microcompetition against oneself. For example, a challenge can be posed in this manner: “How many accurate passes out of 10 can you complete?” This shifts the emphasis away from being better than others and focuses on individual skill and improvement.

Allowing every athlete the chance to take on leadership helps build autonomy as well as a sense of belonging to the team. This can be done by letting them lead a part of the warm-up, or be the captain for a series, etc. Creating an environment where personal responsibility and belonging are also very crucial in this process. Positive specific feedback is another major element. Not general praise - “good job,” not sudden criticism - “what are you doing?!” Comments should be effort-based and action-specific. For instance: “excellent footwork on defence; you prevented the opponent from getting past you,” or “I can see you are striving to execute the correct movement during the throw; let us refine the elbow position.” Such an approach enables athletes to understand precisely what they are performing well and what requires improvement, thereby reinforcing their effort and endeavour.

The Foundation of Safety: Standardized Protocols and Preventive Measures

In this methodology, safety is conceived not as a catalogue of prohibitions but as a proactive system of measures integrated into each training session. The central element

of this system is the so-called “neuromuscular vaccine.” By this term is meant a standardized warm-up that functions not merely as preparation for the principal work but as a mandatory, evidence-based intervention aimed at correcting the neuromuscular deficit. The protocol of such a warm-up is constructed from components of the most effective injury-prevention programmes.

This standardized warm-up typically occupies 15–20 minutes and comprises several key blocks. It commences with a five-minute dynamic mobilization segment, including joint gymnastics and dynamic stretching exercises such as swings, lunges, and rotations, to prepare the joints and musculature. The subsequent five minutes are devoted to balance and proprioception, during which single-leg stances with eyes open and closed, ball-passing in unstable postures, and, where feasible, exercises on unstable surfaces are performed. Thereafter follows a five-minute block of plyometrics and landing-technique rehearsal. Emphasis here is placed on two- and one-legged jumps with the explicit task of landing softly, silently, and under control, attenuating impact via flexion at the hip, knee, and ankle joints and avoiding hazardous knee valgus. The warm-up concludes with a five-minute activation and agility block consisting of running drills with changes of direction, sidesteps, and accelerations, with particular attention paid to correct braking technique.

Beyond the warm-up, a foundational principle is the recognition that correct technique in itself constitutes a primary safeguard. Proper biomechanics of the throw and of physical contact are not only the basis of effectiveness but also a principal element of injury prevention. Instruction in the correct sequencing of kinetic-chain segments (feet–pelvis–trunk–shoulder–arm) during the execution of the throw substantially reduces loading on the shoulder and elbow joints. Similarly, mastery of safe techniques for absorbing and transmitting contact forces during interaction with an opponent minimises the risk of contusions and dislocations.

The coach must possess the ability to recognise early signs of overfatigue; for this purpose a simple checklist of observable symptoms is proposed, to be used in conjunction with the monitoring instruments described in Section 3: decreased quality in execution of habitual exercises, increased irritability or apathy, complaints of persistent muscle soreness that does not resolve within 24–48 hours, decreased motivation to train and sleep disturbances as indicated by surveys. Upon the manifestation of two or more of the specified signs in an athlete, her training load must be adjusted immediately.

Goal-setting for the Mesocycle (4 Weeks): Technique, Tactics, Physical Attributes, Values

Effective planning necessitates the formulation of clear and multifaceted objectives. For a four-week mesocycle it is recommended to set goals in four principal domains to ensure balanced development; as an exemplar template, mesocycle objectives may be articulated as follows: technical

objective — to master the technique of the support-leg throw following a three-step approach with stable execution achieved by 80% of the squad; tactical objective — to improve decision-making quality in 2×2 game situations (choices: pass or beat the defender) and to increase the proportion of successful attacks in those situations by 15% relative to baseline; physical objective — to enhance single-leg landing control, with the target criterion defined as absence of knee valgus collapse in 90% of players during a control exercise; value-based objective — to establish a persistent habit of offering support to a teammate after an error, recording at least five acts of support (verbal or gestural) during each training session.

Optimization of Equipment and Space

The methodology does not need costly equipment. What is required is a standard handball court, enough balls, cones (markers), and, where possible, several elastic bands. The principle lies in the organization of space. The use of court markings to denote several work zones (“mini-stations”) permits small-group organisation, increasing time on task for each athlete. At least two different training objectives can be carried out simultaneously -for example at one station shots at goal another feints practiced in paired 1×1 situations a third balance exercises- thus offering more efficient use of training time by increasing session density as well as making load individualisation easier. This maximises training density and sustains a high level of engagement.

SECTION 2. ARCHITECTURE OF THE TRAINING PROCESS: FROM MICROCYCLE TO SESSION

The architecture of the training process within the GATE-HB system is predicated on the principles of variability, integration and pedagogical purposiveness. It shifts emphasis from mechanical repetition of drills toward the resolution of game-relevant tasks, thereby promoting the development not only of technical skills but also of tactical intelligence.

Structure of the Weekly Microcycle (Example of Three Sessions): Rotation of Emphases

To prevent monotony and ensure well-rounded development, a weekly microcycle with rotation of emphases is proposed. This approach constitutes a simplified variant of undulating periodisation that has proven effective in youth sport. Physical components such as the neuromuscular warm-up and core strength work are constant and present at every session.

The exemplar weekly microcycle envisages three training sessions (Monday, Wednesday, Friday) and is constructed with a clear allocation of tasks: the first session (Monday) is oriented toward individual technique and 1×1 tactics; the central part implements exercises aimed at refining ball handling, feints and various throwing techniques, and simulates 1×1 offensive and defensive game situations to practice individual decision-making and motor-technical

stability; the second session (Wednesday) accentuates small-group interactions (2×2, 3×3); the principal component comprises exercises and game variants 2×1, 2×2, 3×2 and 3×3 with targeted work on interactions (walls, crossings) and decision making under numerical advantage or equality, which fosters communicative and tactical skills; the third session (Friday) focuses on team tactics and integration of skills, wherein the main part employs 4×4 and 5×5 games,

exercises transitions from defence to attack (fast breaks), positional attack and fundamental elements of team defence, and consolidates the week's skills in complex game conditions to assess transferability of technical and tactical competencies to match-like scenarios.

Such a structure permits a progressive move from individual actions to group and team behaviours, ensuring logical continuity and sequencing in instruction.

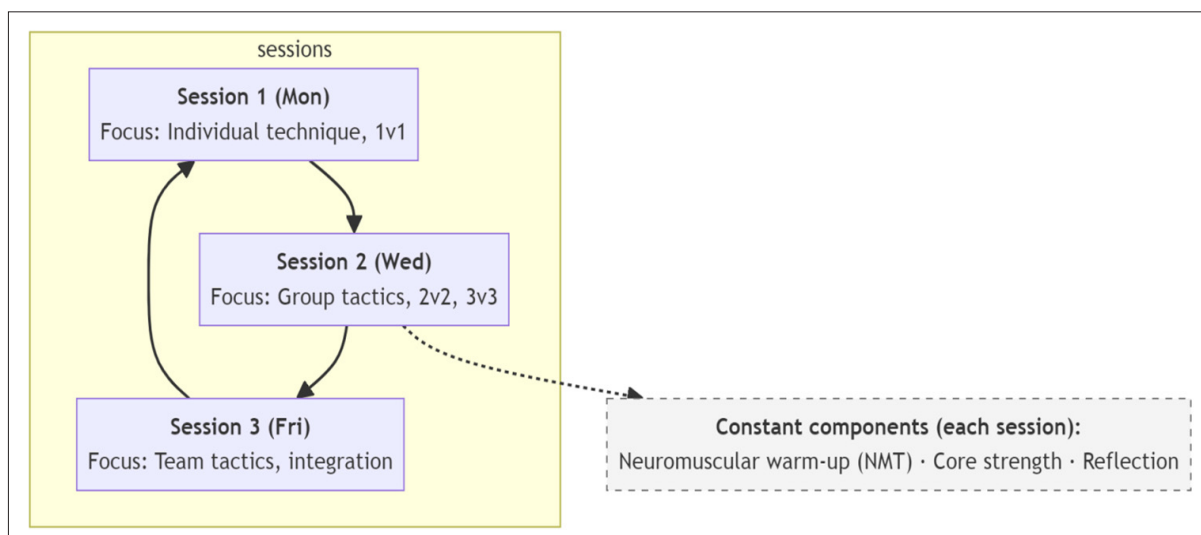


Fig. 1. Weekly microcycle diagram with rotation of accents

This model illustrates the principle of undulating periodisation, whereby each session retains a distinct principal orientation while mandatory components for safety and development remain invariant.

Template of a Training Session (60–90 Minutes)

Every training session, irrespective of its primary focus, is constructed according to a unified four-part structure. This ensures consistency in approaches to safety and development and establishes a predictable and comprehensible work rhythm for the athletes.

A warm-up lasting 15–20 minutes includes the mandatory standardized neuromuscular training (NMT) protocol described in Section 1.3, which is not subject to abbreviation or modification and serves as the foundation of injury prevention; the technical-tactical core, allotted 25–35 minutes, constitutes the principal portion of the session in which the declared mesocycle theme is addressed using exercises and game tasks designed in accordance with the constraints-led approach; small-sided games (SSGs) of 15–25 minutes are intended for application and consolidation of acquired skills in 3×3 and 4×4 formats, are characterised by heightened competitive intensity with minimal coach interference and simultaneously fulfil the functions of tactical instruction and development of game-specific endurance under conditions more effective and motivationally advantageous than isolated running drills; the concluding segment — cool-down and team reflection (5–10 minutes) — includes static stretching for recovery

and a brief structured discussion in which reflection is treated as a key element of learning, and the coach employs directed questions (“What did we do best today?”, “What was the principal difficulty we encountered?”, “What new thing did we learn?”) to consolidate the instructional material, strengthen team cohesion and obtain immediate feedback.

Principles of Progression Construction: From Simple to Complex

Rather than adhering to a traditional pedagogy predicated on the rehearsal of technique in isolated, “sterile” conditions, the GATE-HB methodology rests upon the Constraints-Led Approach (CLA), the essence of which lies in the deliberate manipulation by the coach of assorted variables — constraints — to provoke the athlete’s autonomous search for effective motor solutions and of cultivating adaptive, cognitively engaged game skills rather than mechanically repetitive, “robotic” behaviours.

Task constraints may encompass rule modifications — for example, “no more than three steps with the ball” to stimulate rapid passing, or “a goal counts only if preceded by a pass from outside the 9-metre line” to encourage perimeter play; equipment constraints include measures such as employing more petite balls to refine handling or using two balls simultaneously to develop peripheral vision and attentional capacity; manipulation of player numbers (e.g., 2×1 to teach attacking with numerical superiority or 3×4 to practise defensive actions when outnumbered) likewise functions as an instructional lever.

Environmental constraints cover parameters of playing space and goal placement — for instance, narrowing a corridor facilitates 1×1 dribbling solutions, widening the playing area trains rapid ball transfers, and additional small side-goals incentivise utilization of the full width of the court. Individual constraints are the athlete-specific, coach-immutable characteristics — such as stature, fatigue level, and degree of biological maturation — that must be accounted for when selecting and dosing tasks.

The pragmatic implementation of CLA principles prescribes progressions according to increasing pressure levels: Stage 1 (low pressure) employs pair passing through a passive defender (a cone); Stage 2 (moderate pressure) introduces a 2×1 game in confined space under active defence; Stage 3 (high pressure) implements 3×2 scenarios in which attackers are required to complete three precise passes before goal attempt. Such a sequenced escalation ensures the systemic development of game competences under conditions approximating competition and enhances the transfer of training gains to match real-life situations.

Methods of Group Individualisation

Within girls' teams aged 12–16, it is essential to accommodate heterogeneity in biological maturation, preparedness, and current well-being to avert injury and preserve motivation; simple instruments of individualisation within the group are therefore employed. Practical bio-banding pairs players with similar anthropometric or physical development profiles for small-sided games. More mature athletes get opportunities to develop tactical sophistication, while less mature athletes have greater game exposure.

The “Traffic-Light” system is a self-regulation method for load management: “green” — standard work; “yellow” — regressions (fewer repetitions, more extended rest, reduced

intensity) applied in cases of mild fatigue; “red” — substantial modification or substitution of the exercise in the presence of pronounced fatigue or pain. Paired work of the “experienced + novice” type accelerates learning through mentorship and cultivates leadership in the more experienced athlete.

Tactical education in adolescence should be grounded in comprehension of game principles via modified tasks (TGfU), rather than rote memorisation of combinations: working on creation and exploitation of space can be conducted in a 4×4 format on a wide court with bonuses for transfers across the flank; fast-break transitions are rehearsed through the “Three Quick Steps” drill; communicative skills are trained via the “Quiet Game,” during which verbal communication is temporarily prohibited and subsequent debriefing addresses difficulties and reinstates simple essential verbal cues (“Me!”, “Help!”, “Switch!”).

SECTION 3. MONITORING, COMMUNICATION, AND MINIMAL RECORD-KEEPING

Effective management of the training process requires a simple, accessible feedback system; in GATE-HB, this system is founded on principles of simplicity, accessibility, and athlete engagement, whereby the primary “sensor” is the athlete herself and the coach instructs athletes to attend to bodily signals and to respond accordingly. The central instrument is the weekly GATE board (manual or virtual), which renders the process transparent: a column with 2–3 weekly goals (technical, tactical, physical), a plan/actual column indicating focus and planned/actual duration for each training day, and a notes/reflection column where brief post-session marks (“+”, “-”, “!”) are recorded. The board functions not as bureaucratic reporting but as a means to form a collective picture of the week, enhancing athlete awareness and engagement. Table 2 provides an exemplar of such a board completed.

Table 2. Example of a completed weekly GATE board

Weekly goals	Session 1 (Mon)	Session 2 (Wed)	Session 3 (Fri)
Technique: Improve shooting accuracy from the wing. Tactics: Quick transition to offense. Physical: Knee control on landing.	Focus: Individual shooting technique, 1v1. Time: 75 min. Reflection: + Good concentration on technique. - Need to work more on approach/run-up speed.	Focus: 2v2 and 3v2 interactions. Time: 80 min. Reflection: + Better at seeing teammates. ! Passing is more important than dribbling.	Focus: Team play; fast break. Time: 90 min. Reflection: + Managed several good fast breaks. - We lose the ball on the first pass.

To track individual progress in GATE-HB, simple mini-metrics are employed every 4–6 weeks, not to compare athletes with one another but to assess each athlete's personal trajectory: a five-point throwing-technique checklist (foot placement, trunk rotation, elbow position, wrist action, follow-through) with coach visual rating; timed ball-control dribble through a “snake” course of 5–6 cones; 10-m sprint with a stopwatch; standing long jump measured by tape; and visual assessment

of single-leg squat on a three-point scale of knee valgus (0–2).

Injury prevention relies on subjective monitoring: before training athletes complete a wellbeing diary using a 5-point scale for fatigue and muscle soreness (1 — excellent, 5 — very poor); the “Stop at 4” rule prescribes automatic load reduction when scores are ≥4 for two consecutive days; the

“+10%” rule limits weekly volume increase to no more than 10% relative to the mean of the preceding 3–4 weeks.

To nurture a healthy sporting ecosystem, a communication package is engaged: a parent information sheet (team philosophy, schedule, recommendations for nutrition/sleep/recovery, behavioural rules), a team agreement composed with the players, and a single official communication channel to avoid rumours and misunderstandings. Competition preparation includes a weekly taper plan: Monday — moderate volume, moderate intensity training; Wednesday — short session of 45–60 minutes with reduced volume but maintenance of high intensity in game episodes; Friday (pre-match) — very short session of 30–40 minutes for activation (light warm-up, rehearsal of set plays and tactics

without opposition); the principal tapering philosophy is a substantial reduction in volume while preserving or slightly increasing intensity in key exercises to recover without loss of game readiness.

SECTION 4. THE AUTHOR’S COACH MODULE GATE-HB

The GATE-HB module (Goals, Activities, Timing, Evaluation) is not merely an acronym but an operational system for the coach. It is a cyclical algorithm that structures weekly planning, implementation and analysis. GATE-HB functions as a forcing function that compels the coach to systematically traverse all essential stages of effective pedagogical practice, shifting from intuitive planning to evidence-based methodology.

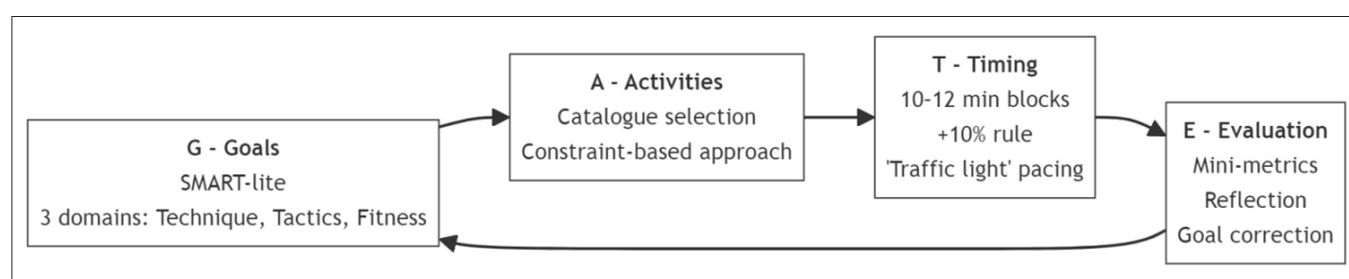


Fig. 2. GATE-HB Module Cycle

The diagram illustrates the continuous and interlinked process of weekly planning: goal-setting (G) determines the selection of activities (A), which are executed with load management in mind (T), and whose outcomes are evaluated (E), thereby forming the basis for goal-setting in the subsequent cycle.

G — Goals: Weekly Objective Setting Using SMART-lite

The first step of each weekly cycle is the explicit articulation of goals. A simplified version of SMART criteria, adapted for weekly planning, is utilised. Goals must be specific, measurable, and relevant to the current phase of preparation.

At the start of the week the coach formulates one–two key objectives in each of three domains: in the technical-motor domain — for example, an increase in the percentage of accurate passes to the non-dominant hand while on the move; in the game-understanding (tactical) domain — for example, accelerated decision-making during fast-break entry (pass or drive); in the physical and safety domain — for example, achieving that 90% of players perform jumps with controlled landings absent of knee valgus collapse. The stated goals are recorded on a simple card template (or on the GATE board) and remain visually accessible to the team throughout the week to sustain instructional focus and to permit prompt adjustment of tasks and loads.

A — Activities: Selection from a Catalogue of Progressions

On the basis of the delineated goals the coach selects 6–8 key

exercises and games for the week. This selection must not be arbitrary; it should follow directly from and conduce to the attainment of the weekly objectives.

Coaches are advised to create and systematise a personal “bank” of exercises. Every exercise should be documented with a description indicating which skill it targets and which constraints (according to CLA) are employed. Such documentation enables rapid and purposeful construction of training sessions.

T — Timing: Management of Intensity and Volume

This component synthesises the load-management principles set forth above. When planning activities the coach must continually reflect upon the temporal and intensity parameters of the training process: one must assess whether exercises are partitioned into blocks of 10–12 minutes to sustain concentration and optimise execution quality; whether adequate individualisation is afforded through application of the “Traffic-Light” system, informed by wellbeing-diary data and permitting prompt load adjustment in accordance with the athlete’s state; and whether the principle of safe progression in volume is preserved — that is, whether the planned weekly volume does not exceed the approximate ~10% increment rule, which is critical to minimising the risk of overreaching and injury and to ensuring a sustainable adaptive response.

E — Evaluation: the Feedback and Reflection System

The final stage of the cycle closes the feedback loop and

constitutes the point of departure for the subsequent week. Evaluation is conceived as a combination of testing and qualitative analysis; at week's end the evaluative process comprises review of metrics — analysis of trends in administered simple tests and their juxtaposition with wellbeing-diary entries — together with a team reflection at the GATE board aimed at answering key questions concerning attainment of weekly goals, identification of principal difficulties and determination of elements to be carried forward to the next week, whereby reflection functions as a tool for collective learning and for obtaining rapid feedback. Concurrently, the coach conducts analytic work, integrating

objective data, athletes' subjective appraisals, and personal observations to formulate evidence-informed goals (Goals) for the next GATE-HB cycle and to adjust training plans in light of observed tendencies and risks.

Example of Two Week Planning Using the GATE-HB System

Below is a table demonstrating the application of the GATE-HB system to planning five training sessions over two weeks. The plan is differentiated for two subgroups: younger (12–14 years) and older (15–16 years), illustrating the system's flexibility.

Table 3. Two-week plan-grid for the GATE-HB system

Week / Day	Component (GATE)	Group 12–14 years (Focus on fundamentals & control)	Group 15–16 years (Focus on speed & tactics)
Week 1	G	Technique: Basics of the 3-step approach. Tactics: Ball retention in 3x3. Physical: Stable landing on two feet.	Technique: Jump shot after a fake. Tactics: Decision-making in 2x1. Physical: Powerful single-leg push-off.
Day 1	A	Dribbling games. Exercises for step rhythm without shooting. "Square" game 3x3.	Feint/dribble-fake exercises. 2x1 games with various constraints. Single-leg plyometrics.
Day 2	A	Approach + pass. 3x2 games with emphasis on passing. Landing drills from a low platform.	Jump shot with resistance (band). 3x2 games with quick role switches.
Day 3	A	Integration: approach + shot on goal. 4x4 game with a "5 passes before attack" rule.	4x4 game focusing on fast break. Competitive shooting series.
Week 2	E1	Visual assessment of landings. Reflection: "What is the hardest part of the approach?"	Analysis of % successful 2x1 attacks. Reflection: "When is it better to pass and when to shoot?"
	G	Technique: Connecting the approach and the shot. Tactics: Getting open to the ball. Physical: Landing on one leg.	Technique: Shot stability under fatigue. Tactics: Wing-to-baseline / wing-line interactions. Physical: Strength endurance.
Day 4	A	2x2 games with emphasis on getting open. Repetition of shooting technique. Controlled single-leg jumps.	3x3 game series under controlled fatigue. Practice of tactical combinations.
Day 5	A	Final 5x5 game focusing on the week's goals. Technique control exercise.	Final 5x5 game with tactical tasks. Circuit training (general physical preparation).
	E2	Video analysis of shots. Final reflection on the 2-week block.	sRPE intensity analysis. Setting goals for the next cycle.

Scaling and Continuity of the Methodology

To secure long-term success of the system within a club or sport school three interrelated elements are critical: the creation of an exercise bank as a unified database (for example in Google Docs or a specialised application) with video material and detailed descriptions of effective exercises and game tasks, classified by objectives and applied constraints, which enables systematisation and exchange of practical resources among coaches; preservation of validated weekly GATE-HB plans as templates, saving planning time and disseminating best practices; and the development of a team-handover procedure, whereby an archive of GATE-HB plans, monitoring data and a clearly articulated methodological

philosophy guarantee a smooth and seamless transition of coaching personnel and maintain continuity in athlete development.

CONCLUSION

The presented GATE-HB methodology is not merely a compendium of exercises but a comprehensive system aimed at addressing fundamental problems of female adolescent handball. It reconceptualises the role of the coach, furnishing instruments for creating a safe, motivating, and intellectually rich developmental environment. The integration of game-based learning principles, proactive safety, systematic progression, and positive psychology into a unified cyclical planning process (GATE-HB) enables harmonious athlete

development, reduces injury and dropout risks, and lays a durable foundation for long-term sporting careers and healthy lifestyles.

A coach who has mastered this methodology may implement three simple yet highly effective changes as soon as the next training session: firstly, replace the standard warm-up with the 15-minute neuromuscular training (NMT) protocol described in Section 1.3, since this provides immediate enhancement of safety and reduction of injury risk through standardisation of preparation and activation of key movement patterns; secondly, introduce an sRPE scale for subjective internal-load assessment — at session end each athlete rates intensity on a 10-point scale and the resulting number is multiplied by session duration in minutes, yielding a valid but straightforward quantitative indicator for monitoring and load adjustment; thirdly, convert one traditional technical drill into a game task by adding a single simple constraint (for example, a competitive element “who first completes 20 accurate passes” or transforming the drill into a 2×1 square format), which promptly increases engagement, competitive density and proximity of the training task to game conditions, facilitating assessment of changes in motivation and execution intensity.

The efficacy of the GATE-HB methodology depends upon several conditions. The principal limitation is the requirement for coach qualification and readiness to transition from a directive style to that of a facilitator and “architect of the environment.” This transition necessitates education and modification of habitual practices.

When adapting the methodology to diverse contexts coaches should foresee practical measures: when working with large groups (more than 20 persons) it is advisable to involve an assistant or to divide the squad into subgroups organised as “mini-stations” led by appointed captains, thereby ensuring manageability and maintenance of execution quality; in contexts of restricted space or limited equipment most game exercises are adaptable by moving to small formats (2×2, 3×3), which require less area while preserving training density and motivation; during the competitive calendar the training plan and load volume are adjusted toward maintenance of form and rehearsal of tactical schemes with

reduced overall volume, to optimise match readiness and minimise overtraining risk.

Successful implementation of the GATE-HB system is not an instantaneous act but a process requiring from the coach persistence, reflection, and genuine commitment to the comprehensive development of her or his athletes.

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