

Competitive Efficiency Across Age Categories (SENIOR; U23; U20; U17) in GR: Analysis of performance indicators at the World Championship – 2025.

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ABSTRACT

This report presents a comprehensive analysis of competitive performance across all age categories (U17, U20, U23, Seniors) in Greco-Roman wrestling, based on data collected from the 2025 World Championship competitions. The aim was to identify age-related patterns in technical–tactical efficiency, scoring structure, positional contribution, and match intensity, in order to support evidence-based long-term athlete development and coaching strategies.

The analysis reveals a clear developmental progression from high-intensity, open wrestling at the U17 level toward more controlled and efficiency-oriented performance in older age categories. Match intensity, expressed as points per minute (WQ), was significantly higher in U17 compared to all other age groups, with a pronounced decrease observed during the transition to U20. From U20 to Senior level, WQ values stabilized, indicating that further performance development is driven primarily by tactical control and execution efficiency rather than by increased technical output or diversity.

The first scoring action was strongly associated with match outcome across all age categories, confirming the importance of early initiative and positional control at the elite level. The findings identify the U20 age group as a critical transitional phase in athlete development and emphasize the need for age-specific performance benchmarks and training priorities.

This report provides practical insights for United World Wrestling (UWW), national federations, and coaches, supporting the alignment of competitive demands with long-term development models and the optimization of training focus across all age categories.

INTRODUCTION

Modern elite wrestling is characterized by continuous changes in competition rules, tactical trends, and performance demands across all age categories. As a result, understanding how technical–tactical efficiency and match dynamics evolve throughout the athlete development pathway has become a key priority for international federations, national teams, and coaches.

While previous research has predominantly focused on senior-level wrestling, considerably less attention has been paid to the developmental progression from cadet to senior categories, particularly through the use of objective, competition-based performance indicators. This lack of longitudinal, competition-driven evidence limits the ability of coaches and federations to design age-appropriate training models and performance benchmarks. World Championships provide a unique and standardized context for such analyses, as they represent the highest competitive level within each age category (U17, U20, U23, Seniors) and reflect current global trends in wrestling performance.

A systematic analysis of technical–tactical actions, scoring structure, positional dominance (standing versus parterre), and match intensity allows for a comprehensive understanding of how wrestling performance evolves with age and competitive maturity.

Greco-Roman wrestling (GR) has distinct characteristics compared to the other two Olympic styles, and previous analyses have identified a decline in both efficiency and attractiveness of GR wrestling relative to Freestyle (FS) and Women’s Wrestling (WW). Therefore, the primary aim of this report is to analyze and compare competitive performance in Greco-Roman wrestling across all age categories using detailed technical–tactical indicators and match intensity metrics derived from World Championship competition data. Particular emphasis is placed on:

- differences in scoring structure,
- the contribution of wrestling positions to total points scored,

- the distribution of technical and non-technical points,
- wrestler efficiency expressed as points per minute (WQ/min),
- key performance actions and techniques that differentiate age categories.

By identifying stable patterns and critical transition points within the athlete development pathway, this report seeks to provide practical, evidence-based insights for coaches, performance analysts, and decision-makers within United World Wrestling (UWW). The findings aim to support long-term athlete development strategies, optimize age-specific training priorities, and contribute to the continuous improvement of elite wrestling performance.

METHODS

Data Source

The analysis was based on official match data from United World Wrestling (UWW) World Championships across four age categories: U17, U20, U23, and Seniors. All data were obtained from the official UWW Public Data Access (PDA) platform (<http://uww.io/wpar>). Only Greco-Roman wrestling matches were included in this report. All performance data were derived from official match results and competition records.

NUMBER WRESTLERS (WCH 2025. –SEN; U23; U20; U17) / Table “A”

| Sn | CHAMPIONSHIP | GR | FS | WW | TOTAL |
|----|---------------------------|-------------|------------|------------|--------------|
| 1. | U17 WORLD CHAMPIONSHIP | 246 | 233 | 183 | 662 |
| 2. | U 20 WORLD CHAMPIONSHIP | 231 | 231 | 186 | 648 |
| 3. | U23 WORLD CHAMPIONSHIP | 255 | 241 | 189 | 685 |
| 4. | SENIOR WORLD CHAMPIONSHIP | 278 | 293 | 205 | 776 |
| | TOTAL = | 1010 | 998 | 763 | 2.771 |

NUMBER MATCHES (WCH 2025. –SEN; U23; U20; U17) / Table “B”

| Sn | CHAMPIONSHIP | GR | FS | WW | TOTAL |
|----|---------------------------|------------|------------|------------|--------------|
| 1. | U17 WORLD CHAMPIONSHIP | 288 | 275 | 218 | 781 |
| 2. | U 20 WORLD CHAMPIONSHIP | 272 | 272 | 220 | 764 |
| 3. | U23 WORLD CHAMPIONSHIP | 299 | 282 | 224 | 805 |
| 4. | SENIOR WORLD CHAMPIONSHIP | 320 | 339 | 241 | 900 |
| | TOTAL = | 859 | 829 | 662 | 2.350 |

NUMBER TAG/ACTIONS (WCH 2025. –SEN; U23; U20; U17) / Table “C”

| Sn | CHAMPIONSHIP | GR | FS | WW | TOTAL |
|----|---------------------------|-------------|-------------|-------------|---------------|
| 1. | U17 WORLD CHAMPIONSHIP | 1287 | 1451 | 991 | 3729 |
| 2. | U 20 WORLD CHAMPIONSHIP | 1345 | 1644 | 1113 | 4102 |
| 3. | U23 WORLD CHAMPIONSHIP | 1373 | 1699 | 1127 | 4199 |
| 4. | SENIOR WORLD CHAMPIONSHIP | 1444 | 1876 | 1149 | 4469 |
| | TOTAL = | 5449 | 6670 | 4380 | 16.499 |

The previous three tables present the basic information on four World Championships held in 2025: Seniors, U23, U20, and U17. In order to collect all the data required for this analysis, a video review of 2,350 matches was conducted (Table “B”) across all four age categories. All matches were analyzed, involving a total of 2,771 wrestlers (Table “A”). Overall, 16,499 technical actions were recorded across all matches at these four World Championships (Table “C”).

Based on this extensive database, a large number of meaningful insights into the characteristics of wrestling matches at the World Championships were obtained. Numerous high-quality comparative and expert analyses were conducted according to various parameters across all four age categories.

On the basis of the obtained results, specific conclusions were drawn and practical recommendations were formulated. These are presented at the end of this analysis and are of significant importance for each of the four age categories.

Performance Indicators

Each bout was analyzed using a standardized set of performance indicators, including:

- technical–tactical variables (techniques executed in standing and parterre positions),
- scoring actions classified as technical and non-technical points,
- positional contribution to total points scored (standing position versus parterre),
- match duration and total number of points scored per minute of match time,
- match intensity and wrestler efficiency expressed as points per minute (WQ/min).

In addition, specific scoring situations (e.g., first scoring action) and their relationship with the match result

Data Processing

Performance indicators were calculated at both the wrestler and match levels and subsequently grouped by age category. To ensure comparability across age groups, selected indicators were expressed in relative or standardized forms (e.g., points per match, points per minute). Non-parametric statistical procedures (Kruskal–Wallis test) were applied to assess differences between age categories where appropriate. Data processing and analysis were conducted using the Python programming language with standard analytical libraries (Pandas, NumPy, Matplotlib).

Analytical Approach

Comparisons between age categories were performed to identify patterns and developmental changes in competitive performance. Non-parametric statistical methods were applied where data distributions deviated from normality. Results are presented through a combination of descriptive statistics, graphical visualizations, and selected inferential analyses to support interpretation.

The focus of the analysis was not on individual athletes or teams, but on identifying global developmental trends characterizing each age category at the World Championship level.

RESULTS AND DISCUSSION

Development pathway of Greco-Roman wrestling performance (U17–Seniors)

The developmental transition from the U17 level to Senior competition is characterized by a gradual decrease in match intensity, expressed as points per minute (WQ/min), accompanied by a shift from parterre-oriented scoring toward standing wrestling and tactically induced points (Chart 1). This trend reflects increasing match control, efficiency, and strategic maturity at the elite Senior level.

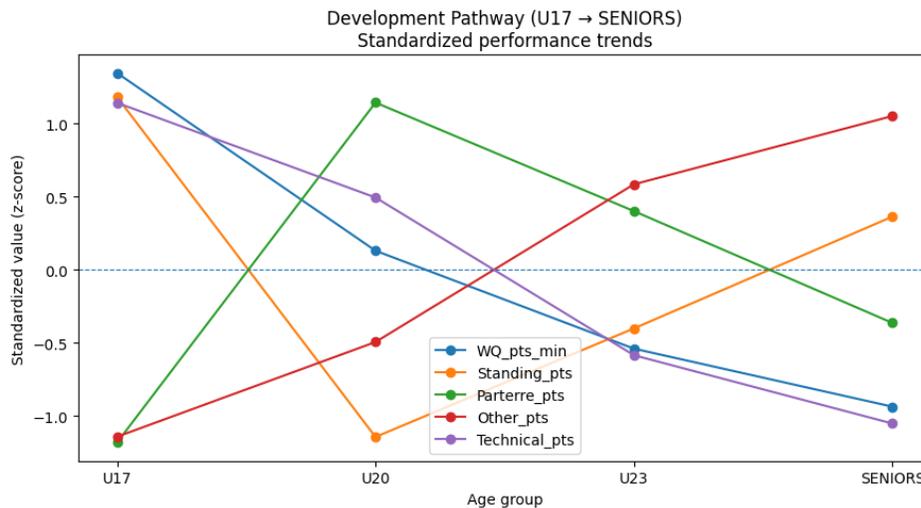


Chart 1. Development pathway by each age group (senior, U23, U20, and U17)

Match Intensity (WQ – Points per Minute)

A continuous decline in match intensity (WQ) was observed with increasing age category. Younger wrestlers tend to adopt a higher-risk approach, characterized by increased activity, a greater number of technical errors, and lower levels of tactical control. In contrast, Senior wrestlers demonstrate a slower competitive tempo, greater selectivity in attacking actions, and superior overall match control. This shift indicates a transition from activity-volume-based scoring toward performance models focused on efficiency and an optimal risk-reward balance in point scoring.

Standing vs. Parterre Scoring Contribution

A clear positional shift in scoring contribution was identified across age categories. Parterre scoring reaches its peak at the U20 level and gradually decreases toward the Senior category. Conversely, the contribution of standing wrestling increases progressively with age, becoming dominant at the Senior level. While U20 wrestlers score the highest number of points from parterre situations, Senior wrestlers rely increasingly on standing exchanges, reflecting enhanced positional control and tactical maturity.

Technical vs. Non-Technical Points

A pattern similar to the standing-parterre relationship was observed in the distribution of technical versus non-technical points. As age category increases from U17 to Seniors, the relative share of technical points decreases, while the proportion of non-technical points increases. This trend is largely attributable to the ability of Senior wrestlers to generate scoring opportunities through passivity calls, step-out situations, and sustained tactical pressure, effectively forcing opponents into errors rather than relying solely on direct technical execution wrestling techniques.

Key Developmental Transitions

- U17 → U20 (Technical base and volume)** - This stage is characterized by the development of technical foundations and automatized actions, particularly in parterre situations. High match intensity (WQ) and a greater volume of scoring actions reflect an emphasis on technical execution wrestling techniques and constant activity.

- **U20 → U23 (Match control and reduced aggressiveness)** - This represents a critical transitional phase, marked by a reduction in aggressive volume-based wrestling and a growing emphasis on match control. Performance development at this stage is driven by improved attack selection and the effective transfer of parterre dominance into standing situations.
- **U23 → Seniors (Winning with control and reduced risk)** - At the Senior level, performance is defined by high standing efficiency, the ability to force passivity and step-out situations, and advanced management of match rhythm. Tactical leadership, score protection, and risk minimization become central elements of competitive success.

1. TOTAL POINTS PER TECHNICAL IN % (PERCENTAGE)

Out of 20 scoring segments identified in match analysis (), five segments accounted for more than 5% of total points scored across all matches (Chart 2). Of particular concern is the fact that only three of these segments represent wrestling techniques, while the remaining two are non-technical scoring actions resulting from penalties, namely **passivity** and **step-out** situations.

When examining the contribution of these five segments across the full sample, their combined share of total scoring ranges from **61.46% in the U17 category to 68.43% at the Senior level**. This indicates an increasing concentration of scoring within a limited number of actions as age and competitive maturity increase.

Table 1 presents an overview of all technical–tactical variables (a total of 20 segments) across the age categories, expressed as percentages (%). Based on the data in this table, a detailed comparison of the scoring structure across different age categories can be performed. The table highlights the percentage distribution of points scored through dominant wrestling techniques as well as other scoring actions that are not classified as wrestling techniques (top five), across all segments and all matches in Greco-Roman wrestling for the four age categories.

Table 1. Overview of all technical-tactical variables by age category in percentage (%)

| Sn | AGE CATEGORY | SEN | U23 | U20 | U17 | AVERAGE |
|-----|--------------------------|-------|-------|-------|-------|---------|
| | WRESTLING TECHNIQUE - GR | | | | | |
| 1. | GUT WRENCH | 22.17 | 21.95 | 25.30 | 24.19 | 23.40 |
| 2. | PASSIVITY | 18.51 | 16.18 | 14.51 | 14.30 | 15.88 |
| 3. | TAKE DOWN | 9.49 | 10.41 | 8.23 | 10.49 | 9.66 |
| 4. | LIFTS – SUPLEX | 9.99 | 9.14 | 10.27 | 6.63 | 9.01 |
| 5. | STEP OUT | 8.27 | 8.66 | 7.89 | 5.85 | 7.67 |
| 6. | SUPLEX THROW | 3.27 | 4.59 | 3.42 | 7.54 | 4.71 |
| 7. | HIP TURNING THROV | 4.11 | 3.76 | 3.55 | 6.68 | 4.53 |
| 8. | STANDING COUNTER | 3.02 | 3.94 | 4.42 | 4.33 | 3.93 |
| 9. | FORWARD BEDING THROV | 3.11 | 2.45 | 5.03 | 4.72 | 3.83 |
| 10. | SHOULDER TURNING THROW | 3.95 | 3.15 | 2.95 | 2.60 | 3.16 |
| 11. | PARTERRE COUNTER | 2.35 | 3.15 | 3.29 | 2.21 | 2.75 |
| 12. | TURN OVER | 1.85 | 2.10 | 2.69 | 2.08 | 2.18 |
| 13. | STANDING CHALLENGE | 2.69 | 1.40 | 1.82 | 2.12 | 2.01 |
| 14. | LIFTS – REVERSE GRIP | 2.56 | 1.62 | 0.87 | 1.30 | 1.59 |
| 15. | PARTERRE CAUTION | 1.09 | 2.36 | 0.95 | 1.56 | 1.49 |
| 16. | STANDING CAUTION | 1.64 | 1.27 | 1.60 | 1.43 | 1.49 |
| 17. | PARTERRE CHALLENGE | 1.09 | 1.88 | 1.30 | 0.74 | 1.25 |
| 18. | FRONT HEAD LOOCK | 0.59 | 1.22 | 0.43 | 1.13 | 0.84 |
| 19. | TAKE DOWN HEAD TO HEAD | 0.25 | 0.79 | 1.39 | 0.09 | 0.63 |
| 20. | NEGATIVE WRESTLING | 0.00 | 0.00 | 0.09 | 0.00 | 0.02 |

Legend: red color – best result; green color – worst result;

Comparison of the Top Five Scoring Actions (Technical and Non-Technical Points)

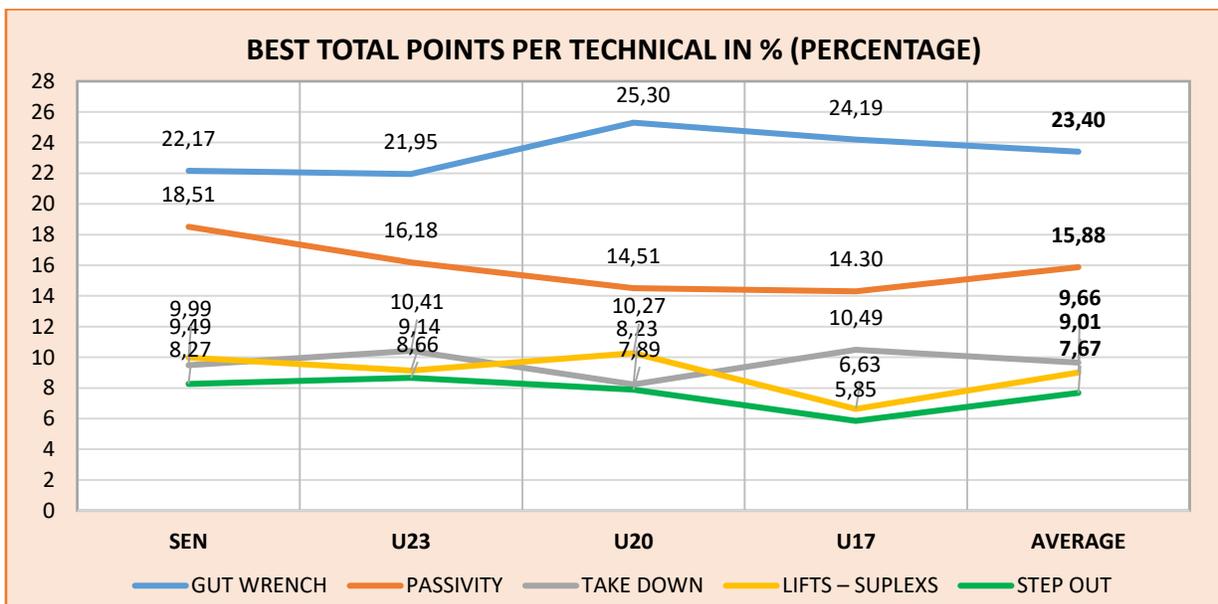
Across all age categories, **GUT WRENCH** is the most frequently applied scoring technique. On average, nearly **one in every five points (23.40%)** is scored using the gut wrench. This technique is more prevalent in the U17 and U20 categories compared to U23 and Seniors. One of the main reasons for this trend lies in the high static and dynamic strength requirements needed for effective gut wrench defense, which are significantly more developed in older wrestlers.

With regard to **PASSIVITY**, its contribution to total points scored ranges from **14.30% to 18.51%** in all age categories. The lower proportion observed in **U17 (14.30%)** compared to **Seniors (18.51%)** can be explained by greater tactical maturity at the Senior level. Senior wrestlers tend to manage risk more conservatively, while **U17** wrestlers rely more heavily on standing techniques—such as **suplex throw, hip turning throw, and standing counters**—to generate scoring opportunities before passivity situations arise.

The **TAKE DOWN** technique is most prevalent in the U17 category (**10.49%**), while the lowest percentage of points scored via this action is observed in U20 (**8.23%**). This pattern reflects the greater emphasis on open standing exchanges and direct technical execution in younger age groups.

The **LIFT-SUPLEX** technique shows the highest prevalence in the **U20 category (10.27%)**, with only slightly lower values observed in U23 and Senior wrestlers. The lowest frequency of this technique is found in **U17 (6.63%)**. Successful execution of lift-suplex actions requires substantial strength to elevate the opponent from the parterre position, a physical capacity that is still underdeveloped in the youngest age group.

For **STEP OUT** situations, a higher proportion of points is observed in older age categories (**U23 and Seniors**). While younger wrestlers place greater emphasis on executing wrestling techniques, older wrestlers increasingly apply tactical strategies aimed at scoring points with minimal risk, using mat control and positional pressure to force step-out situations.



Graph 2. The five most represented points for wrestling techniques and points for non-technical points by age categories (in %)

2. SCORING PATTERNS BY WEIGHT CATEGORIES

When examining points scored across weight categories, it can be concluded that wrestlers competing in the **67 kg** weight category demonstrate the broadest technical repertoire and achieve the highest number of points through a diverse range of wrestling techniques in three age categories (**Seniors, U23, and U20**). In the **U17** category, wrestlers in the **48 kg** weight category show the highest performance in as many as four different wrestling techniques compared to other weight categories (Table 2).

Table 2. Highest number of won point by technics, weight category and age group

| No | AGE CATEGORY WRESTLING TECHNIQUE - GR | SEN | | U23 | | U20 | | U17 | | TOTAL POINTS | AVERAGE POINTS |
|----|------------------------------------------|--------|-----|--------|-----|--------|-----|--------|-----|-----------------|-------------------|
| | | Cat/kg | pts | Cat/kg | pts | Cat/kg | pts | Cat/kg | pts | | |
| 1 | GUT WRENCH | 130 | 64 | 87 | 76 | 97 | 66 | 92 | 88 | 294 | 73.50 |
| 2 | PASSIVITY | 87 | 63 | 67 | 52 | 72 | 44 | 60 | 49 | 208 | 52.00 |
| 3 | LIFTS – SUPLEX | 67 | 45 | 77 | 37 | 60 | 46 | 60 | 45 | 173 | 43.25 |
| 4 | TAKE DOWN | 72 | 36 | 82 | 32 | 55 | 28 | 55 | 34 | 130 | 32.50 |
| 5 | STEP OUT | 77 | 35 | 55 | 31 | 67 | 38 | 92 | 19 | 123 | 30.75 |
| 6 | SUPLEX THROW | 72 | 22 | 67 | 24 | 67 | 12 | 80 | 32 | 90 | 22.50 |
| 7 | HIP TURNING THROV | 60 | 20 | 97 | 18 | 82 | 22 | 48 | 20 | 80 | 20.00 |
| 8 | FORWARD BEDING THROV | 60 | 20 | 130 | 12 | 72 | 24 | 71 | 20 | 76 | 19.00 |
| 9 | LIFTS – REVERSE GRIP | 67 | 34 | 63 | 10 | 67 | 12 | 48 | 10 | 66 | 16.50 |
| 10 | SHOULDER TURNING THROW | 67 | 20 | 97 | 14 | 60 | 12 | 110 | 14 | 60 | 15.00 |
| 11 | TAKE DOWN HEAD TO HEAD | 55 | 2 | 67 | 6 | 130 | 10 | 48 | 34 | 52 | 13.00 |
| 12 | TURN OVER | 55 | 16 | 60 | 8 | 55 | 14 | 60 | 10 | 48 | 12.00 |
| 13 | FRONT HEAD LOOCK | 0 | 0 | 67 | 14 | 130 | 4 | 48 | 12 | 30 | 7.50 |

When points are analyzed according to the highest number of points scored by technique and weight category, the following patterns emerge:

- For the **GUT WRENCH** technique, which accounts for the highest number of points overall, dominance is observed primarily in **heavyweight** categories (**130 kg, 97 kg, and 87 kg**), as well as in the **U17** category at **92 kg**.
- **PASSIVITY** points are most prevalent in middleweight categories (**67 kg, 72 kg, and 87 kg**), while in the **U17** category they are most pronounced in the **60 kg** weight class.
- The **LIFT–SUPLEX** technique is most frequently applied in **middle category senior and U23 (67 kg and 77 kg)**. The highest number of points scored with this technique was recorded in **lihter category the 60 kg** weight category in the **U20-U17** age category.
- The **TAKE DOWN** technique is most prevalent in **middleweight** categories among **Seniors and U23** wrestlers (**72 kg and 82 kg**), while in the **U20-U17** category the highest number of points from this technique were recorded in the **55 kg** weight class.
- For **Seniors and U20**, the highest total number of points was recorded in **middleweight** categories (**77 kg and 67 kg**). In contrast, **U23** wrestlers achieved the highest total points in the **55 kg** weight class, while in **U17** the highest number of points was observed in the **92 kg** category.

3. WQ/min - TOTAL PER AGE CATEGORY

The **WQ/min index** represents one of the most important indicators in the analysis of wrestling match quality, as it reflects the number of points scored per minute (pts/min). Higher values of this index indicate more dynamic, attractive, and spectator-friendly wrestling. The WQ/min values obtained in this analysis (Chart 3) are in line with expectations.

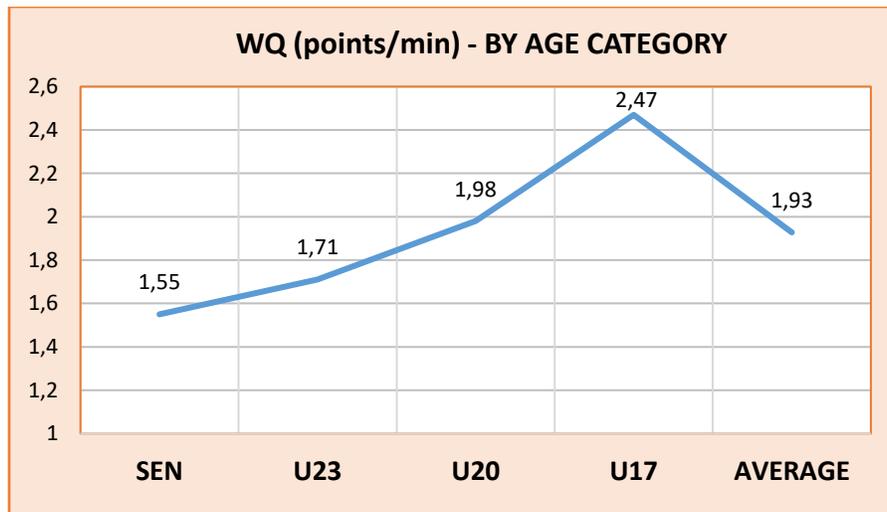


Chart 3. WQ – points / minutes by age category - GR

The lowest number of points per minute was recorded in the **Senior** category (**1.55 pts/min**). Each successive younger age category demonstrated a higher WQ index, with the highest value observed in the **U17** category, where an exceptionally high index of **2.47 points per minute** was recorded.

As age increases, the level of tactical preparation for matches also increases, leading wrestlers to engage less frequently in high-risk situations and to attempt fewer high-amplitude techniques. In contrast, **younger wrestlers are more prone to risk-taking and more frequently attempt throwing techniques**. An additional factor contributing to the lower number of points per minute in older age categories is the substantial difference in strength compared to U17 wrestlers. With increasing strength, wrestlers are better able to neutralize opponents and more effectively prevent scoring actions against them.

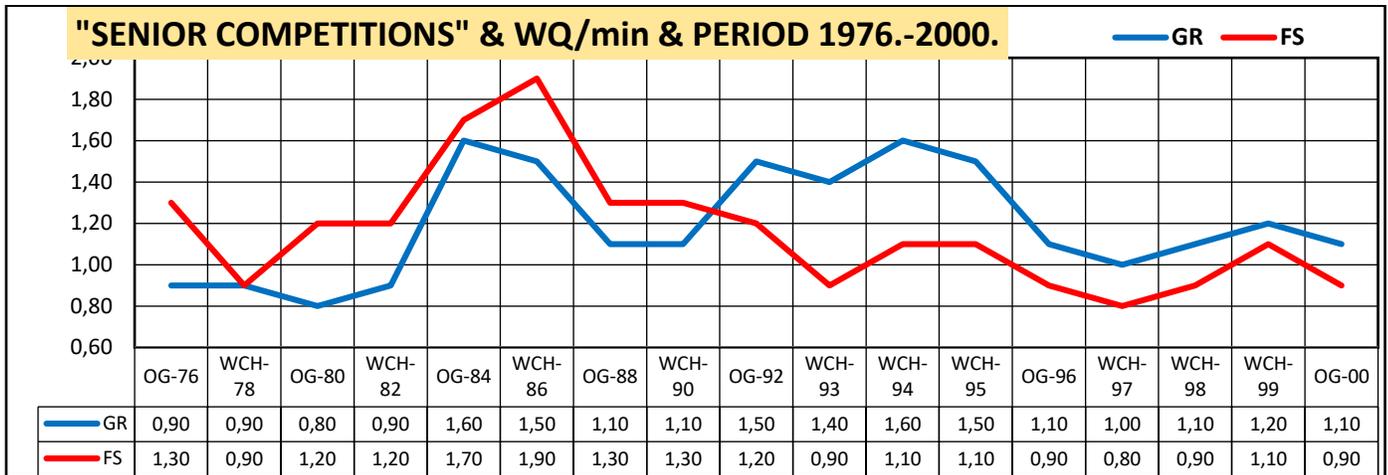
Compared to the other two Olympic wrestling styles (Freestyle and Women’s Wrestling), Greco-Roman wrestling demonstrates a **significantly lower WQ/min** index across all four age categories.

Graphs “A” and “B” present, for the first time since 2015 (when Dr. Tunnemann concluded his analyses of major world competitions), **complete data from major international tournaments (World Championships and Olympics) for the WQ/min index**. These graphs are highly significant for tracking trends in elite-level wrestling.

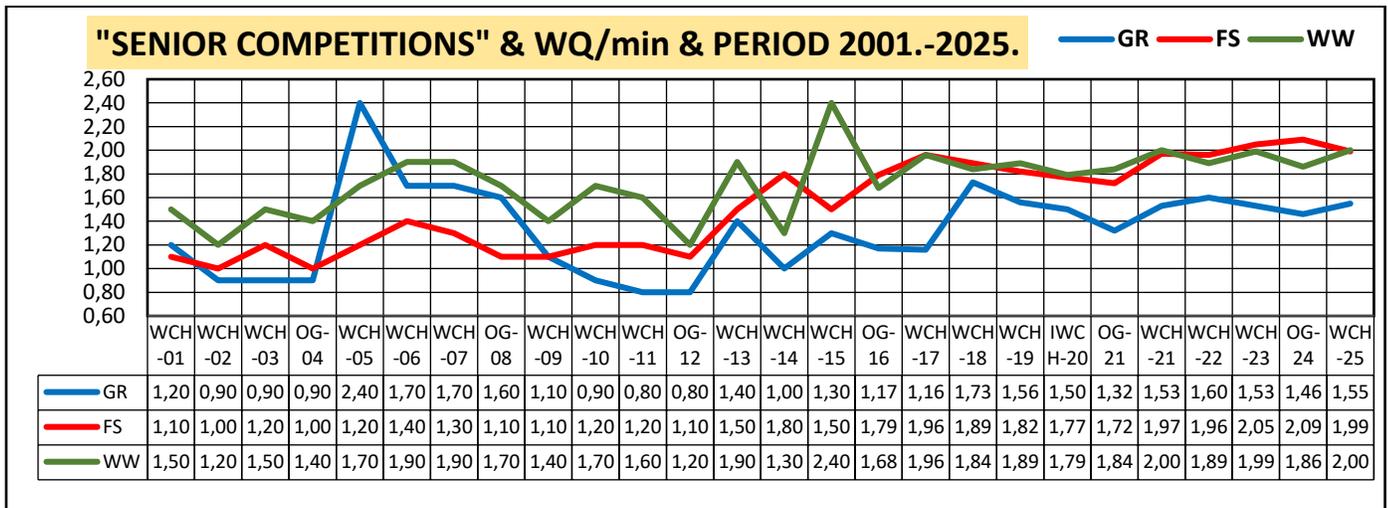
Since 2025, analyses have included **all age categories (Senior, U23, U20, and U17)**. For the **U23 category**, WQ/min has been continuously monitored since 2021. From 2025 onward, analyses will be conducted in all four age categories, allowing **longitudinal tracking of performance trends in younger age groups**.

WQ/min & PERIOD 1976–2025 (SENIORS ONLY)

Graph "A". WQ – points per minute by age categories, 1976–2000 – GR/FS



Graph "B". WQ – points per minute by age categories, 2001–2005 – GR/FS/WW



4. POINTS IN PERCENTAGE (%): STANDING POSITION / PARTERRE POSITION

The results indicate that, on average, **57.49%** of points are scored from the **standing position**, with the largest contribution coming from points scored through **PASSIVITY** (15.88% of points, Chart 2). Analysis of the first point scored from passivity (all age groups combined) shows that the win rate after scoring the first point is 69.9%. Logistic regression analysis revealed that scoring the first point is a strong predictor of match outcome. Wrestlers who scored the first point had significantly higher odds of winning the match (**OR = 7.63, 95% CI: 5.67–10.25, p < 0.001**), increasing their chances of victory by approximately 7.6 times.

The observed differences in points scored from standing and parterre positions fall within the expected range, except in the U20 age category, where a significantly higher proportion of points was scored from the parterre position (Chart 4). This can be explained by the fact that, in the U20 category, two wrestling techniques—**GUT WRENCH** and **LIFT-SUPLEX**—are considerably more prevalent compared to the other three age groups.

The Chi-square test revealed a **statistically significant association between age category and the distribution of points between standing and parterre positions** ($\chi^2 = 14.54, df = 3, p = 0.002$). This suggests that the relative contribution of standing and parterre scoring differs depending on developmental stage, reflecting changes in

match structure and tactical emphasis associated with age. The relationship between points scored from standing and parterre positions changes with age, **indicating a gradual shift in tactical priorities as wrestlers progress toward senior-level competition.**

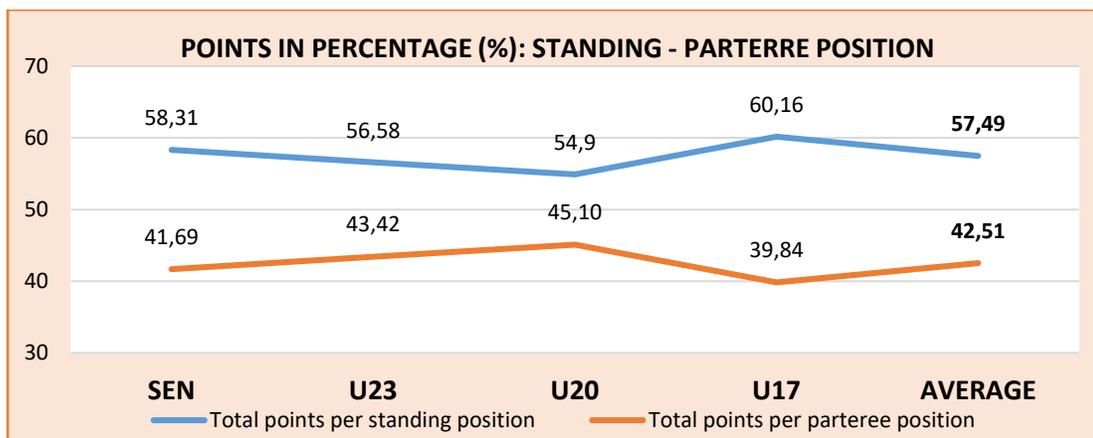


Chart 4. Standing – parterre position ratio (%) by age groups

5. POINTS IN PERCENTAGE (%): TECHNICAL POINTS / OTHER POINTS

The results fall within the expected range. In the senior category, the highest degree of tactical maneuvering is observed, resulting in a large proportion of points being scored from passivity and the opponent stepping out of the mat. Specifically, **33.29% of points in seniors do not originate from wrestling techniques but from penalty points** (passivity, stepping out, challenges, etc.). In contrast, in the youngest **U17** age group, the highest proportion of points is scored **from wrestling techniques**, reaching **74%**, which aligns with expectations (Chart 5).

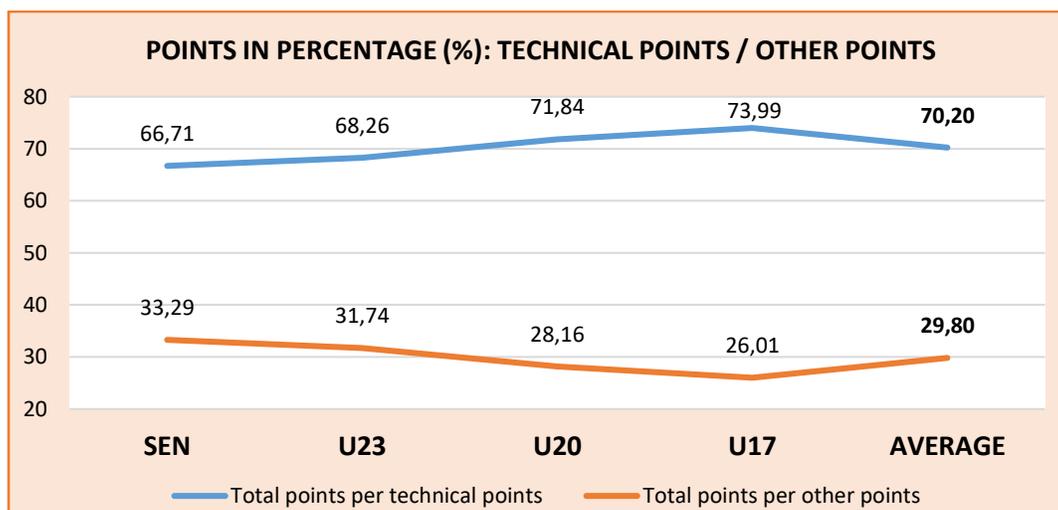


Chart 5. Technical – other points ratio (%) by age groups

Chi-square analysis revealed a statistically significant association between age category and the share of technical versus non-technical points ($\chi^2 = 36.81$, $df = 3$, $p < 0.001$). Although the effect size was small (**Cramér's V = 0.063**), the results indicate consistent changes in the scoring structure with age, showing a gradual increase in the relative contribution of non-technical points at higher competitive levels in older age categories. While technical actions remain the primary source of points across all age groups, the relative importance of non-technical points increases with age, highlighting the growing role of **tactical control and match management** in senior-level competitions.

6. PERCENTAGE OF MATCHES BY WAY OF WINNING

The obtained data (Table 3) indicate that, in the **senior category**, the **highest proportion of matches concluded after the full 6 minutes of combat** was recorded (**63.4%**), comprising **55.0%** at VPO1 and **8.4%** at VPO, which are points wins with or without a point scored by the defeated wrestler.

Table 3. Type of winning by age groups (%)

| AGE GROUPS | VPO1 | VSU | VPO | VFA | VSU1 | VIN | VFO | VCA |
|------------|------|------|-----|-----|------|-----|-----|-----|
| SENIORS | 55,0 | 22,5 | 8,4 | 6,3 | 5,9 | 1,6 | 0,3 | 0,0 |
| U23 | 49,8 | 27,1 | 5,7 | 6,0 | 8,4 | 1,0 | 1,7 | 0,0 |
| U20 | 42,6 | 30,9 | 5,1 | 8,5 | 12,1 | 0,0 | 0,4 | 0,4 |
| U17 | 53,1 | 20,5 | 9,4 | 8,0 | 7,3 | 1,0 | 0,3 | 0,3 |
| AVERAGE | 50,1 | 25,3 | 7,2 | 7,2 | 8,4 | 0,9 | 0,7 | 0,2 |

Legend: **VPO1** - VICTORY BY POINTS (With point(s) scored by the opponent); **VSU** - VICTORY BY TECHNICAL SUPERIORITY (Without any point scored by the opponent); **VPO** - VICTORY BY POINTS (Without any point scored by the opponent); **VFA** – VICTORY BY FALL (Victory by fall); **VSU1** - VICTORY BY TECHNICAL SUPERIORITY (With point(s) scored by the opponent); **VIN** - VICTORY BY INJURY (If an athlete is injured before or during a bout); **VFO** - VICTORY BY FORFEIT (If an athlete doesn't show up on the mat); **VCA** - VICTORY BY 3 CAUTIONS (3 cautions given to the opponent during a bout)

The highest proportion of **victories by fall (VFA 5-0)** was recorded in the **U20** age category (**8.5%**). This category also showed the highest proportion of victories by technical superiority without the opponent scoring points (**VSU 4-0**) (**30.9%**), as well as the highest proportion of victories by technical superiority with the opponent scoring points (**VSU1 4-1**) (**12.1%**).

In the **U17** age category, the highest proportion of victories by points without the opponent scoring technical points under penalty (**VPO, 3-0**) was observed (**9.4%**). Additionally, matches in which opponents scored technical points under penalty (**VPO1, 4-1**) accounted for **53.1%**.

It was also observed that **1.6%** of senior matches ended with a **victory due to injury (VIN 5-0)**.

7. NATIONAL TEAM PERFORMANSE – MOST WIN POINTS / FIRST 3. NATIONS

When considering the most successful teams based on the **total points scored** across the four age categories (Table 4), the national teams of **Iran** stand out, ranking among the top three teams in all four age groups. In the senior, **U20**, and **U17**, Iran achieved the highest number of points, while in the **U23** it ranked second.

The **UWW team** ranked among the top three teams in three age categories. It is important to note that the UWW team included wrestlers from two countries (**RUS** and **BLR**), which resulted in more than 10 wrestlers per age category in this selection, affecting the overall total points scored.

The most frequently used techniques in terms of points scored among all nations are: **GUT WRENCH**, **PASSIVITY**, and **TAKE DOWN**.

Table 4. The three best national selections by age category and the three most common techniques (according to points won)

| AGE GROUP | NATION | 1st best techn. | pts | 2nd best techn. | pts | 3th best techn. | pts | TOTAL pts |
|-----------|--------|-----------------|-----|-----------------|-----|-----------------------|-----|------------|
| SENIORS | IRI | take down | 54 | gut wrench | 42 | step out | 32 | 243 |
| | UWW | gut wrench | 42 | passivity | 39 | lift - suplex | 30 | 191 |
| | AZE | lift - suplex | 33 | passivity | 24 | gut wrench, take down | 22 | 150 |
| U23 | IRI | gut wrench | 68 | take down | 50 | passivity | 30 | 262 |
| | UWW | gut wrench | 42 | passivity | 40 | take down | 20 | 228 |
| | KAZ | gut wrench | 38 | lift - suplex | 21 | step out, take down | 20 | 154 |
| U20 | UWW | gut wrench | 130 | take down | 32 | passivity | 29 | 306 |
| | IRI | gut wrench | 58 | passivity | 28 | lift - suplex | 27 | 224 |
| | AZE | lift - suplex | 58 | passivity | 27 | gut wrench | 16 | 186 |
| U17 | IRI | gut wrench | 50 | take down | 34 | passivity | 30 | 203 |
| | KAZ | gut wrench | 72 | take down | 24 | passivity | 21 | 197 |
| | UZB | gut wrench | 54 | passivity | 21 | lift - suplex | 20 | 197 |

When examining the frequency of executed actions in Table 5, it can be observed that, based on frequencies (considering the three most prevalent parameters per team), the **gut wrench** was the most frequently applied technique across **all national teams**. **Passivity** ranked second, with a total frequency of 10. exceptions were the **Iranian** senior national team and the **Kazakhstan U23** team, for which passivity did not appear among the three most frequently used techniques. A substantial number of frequencies among the top three techniques was also recorded for the **take-down**, which was observed 8 times out of a possible 12.

When considering the total number of points scored, the **gut wrench** stands out markedly, accounting for a total of 602 points. A **notable negative finding** is the **very high number** of points scored through **passivity**, totaling 289 points. The **take-down** ranked third, with 256 points scored.

Table 5. Frequency and points scored as 1st, 2nd, and 3rd technique across age groups

| | Technics | 1st best techn. | | 2nd best techn. | | 3th best techn. | | TOTAL freq. | TOTAL pts |
|----|----------------------|-----------------|------|-----------------|------|-----------------|------|-------------|------------|
| | | Freq. | Pts. | Freq. | Pts. | Freq. | Pts. | | |
| 1. | TAKE DOWN | 1 | 54 | 4 | 140 | 3 | 62 | 8 | 256 |
| 2. | GUT WRENCH | 9 | 554 | 1 | 42 | 2 | 16 | 12 | 602 |
| 3. | LIFT - SUPLEX | 2 | 91 | 1 | 21 | 3 | 77 | 6 | 189 |
| 4. | PASSIVITY | 0 | 0 | 6 | 179 | 4 | 110 | 10 | 289 |
| 5. | STEP OUT | 0 | 0 | 0 | 0 | 2 | 32 | 2 | 32 |

IRI

In three age categories, **the highest number of points was scored using the GUT WRENCH** technique while in the senior category **the highest number of points was scored with the TAKE DOWN** technique. For most of the top-performing teams Iran, points scored for **PASSIVITY** rank third in the total points; in contrast, for most other nations passivity points rank second. Notably, in the **senior** category the **STEP OUT** segment ranks third in terms of total points scored. (Charts 6,7,8,9).

UWW

Data were analyzed for a total of **56 wrestlers** across the four age categories, whereas for other nations a total of 40 wrestlers were analyzed (10 per age category). UWW wrestlers scored the highest number of points with the **GUT WRENCH** technique in three age categories. Points for **PASSIVITY** rank second across all three age categories (seniors, U23, and U20). In the senior category, points scored with **LIFT-SUPLEX** from the parterre position rank third. (Charts 6,7,8).

AZE and KAZ

The AZE and KAZ national teams rank among the top three teams in two age categories. In the AZE team, the highest number of points in the senior and U20 categories was scored using **LIFT-SUPLEX** from the parterre position, with points for **PASSIVITY** ranking second. A characteristic of **KAZ wrestlers** is that their most effective technique is **GUT WRENCH** in the **U23** and **U17** categories, with a significant number of points also scored with **TAKE DOWN**. (Charts 6,7,8,9).

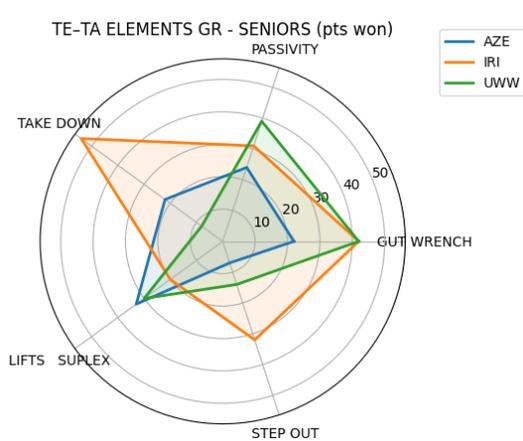


Chart 6. Visual comparison – SENIORS

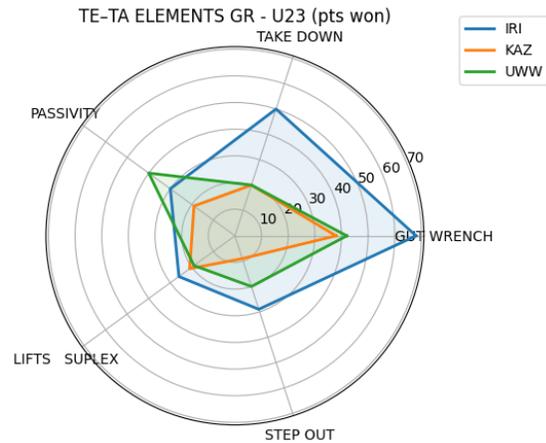


Chart 7. Visual comparison – U23

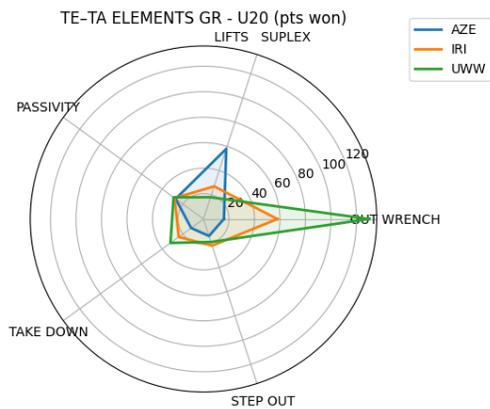


Chart 8. Visual comparison – U20

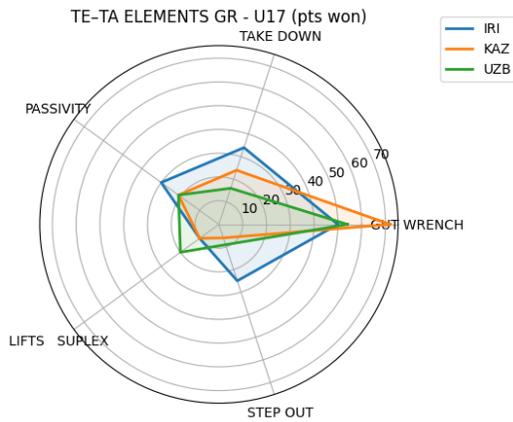


Chart 9. Visual comparison – U17

8. REVIEW OF % POINTS „ALL MATCHES“, „MEDAL MATCHES FINALS I-II, III-V“, „ ALL MATCHES OF WINNERS – GOLD MEDALIST“

The analysis of matches by competition phases (“all matches,” “medal matches I–II and III–V,” and “all matches of winners—gold medalists”) in Greco-Roman wrestling showed that the **gut wrench** was the most frequently executed technique across all phases and age categories (Table 6), accounting on average for **23.06%** of all points scored across all age categories and across the three competition phases that were analyzed separately.

Across all age categories, points awarded for **passivity** ranked second in frequency, with an average of **16.79%** of all points scored across all age categories and across the three competition phases analyzed.

Two wrestling techniques—the **take-down** (average **12.25%** of all points scored) and **parterre lifts and throws (lift–suplex)** (average **10.24%** of all points scored)—ranked third in terms of the number of points scored.

- The highest proportion of points scored with **GUT WRENCH** in **medal matches** (I–II and III–V places) was observed in the **U20** age category, accounting for **27.89%** of points.
- The highest proportion of points for **PASSIVITY** in **medal matches** was observed in the **U23** age category, amounting to **20.09%** of points.
- The highest proportion of points scored with **LIFT–SUPLEX** in **medal matches** was observed in the **U20** age category, accounting for **10.36%** of points.
- The highest proportion of points scored with **TAKE DOWN** was observed in **matches of gold medalists**, in the **U23** age category, who scored **15.87%** of their points using this technique.

Table 6. Review of % points „all matches“, „medal matches finals I-II, III-V“, „ all matches of winners – gold medalist“

| AGE GROUPS | COMPETITION PHASE | % | I - best | % | II - best | % | III - best |
|------------|------------------------|--------|------------|--------|-----------|--------|-------------|
| | | points | technique | points | technique | points | technique |
| SENIORS | ALL MATCHES | 22,17 | GUT WRENCH | 18,51 | PASIVITY | 9,99 | LIFT SUPLEX |
| | MEDAL MATCHES FINALS | 20,75 | GUT WRENCH | 18,26 | PASIVITY | 12,45 | TAKE DOWN |
| | ALL MATCHES OF WINNERS | 19,87 | GUT WRENCH | 19,87 | PASIVITY | 14,74 | TAKE DOWN |
| U23 | ALL MATCHES | 21,95 | GUT WRENCH | 16,18 | PASIVITY | 10,41 | TAKE DOWN |
| | MEDAL MATCHES FINALS | 23,36 | GUT WRENCH | 20,09 | PASIVITY | 10,28 | TAKE DOWN |
| | ALL MATCHES OF WINNERS | 20,32 | GUT WRENCH | 17,78 | PASIVITY | 15,87 | TAKE DOWN |
| U20 | ALL MATCHES | 25,30 | GUT WRENCH | 14,51 | PASIVITY | 10,27 | LIFT SUPLEX |
| | MEDAL MATCHES FINALS | 27,89 | GUT WRENCH | 13,55 | PASIVITY | 10,36 | LIFT SUPLEX |
| | ALL MATCHES OF WINNERS | 20,11 | GUT WRENCH | 17,66 | PASIVITY | 10,33 | LIFT SUPLEX |
| U17 | ALL MATCHES | 24,19 | GUT WRENCH | 14,30 | PASIVITY | 10,49 | TAKE DOWN |
| | MEDAL MATCHES FINALS | 21,80 | GUT WRENCH | 15,41 | PASIVITY | 12,03 | TAKE DOWN |
| | ALL MATCHES OF WINNERS | 24,04 | GUT WRENCH | 15,35 | PASIVITY | 11,76 | TAKE DOWN |

When examining the frequency of executed actions in **Table 7**, it can be observed that, based on frequencies (considering the three most prevalent parameters according to points scored from wrestling techniques and other scoring actions), the **GUT WRENCH** was the most frequently applied technique across all competition phases, with **12** frequencies. **PASSIVITY** ranked second, also with **12** frequencies, consistently occupying the second position across all phases.

A substantial number of frequencies among the top three techniques was also recorded for the **TAKE-DOWN**, which occurred **8 times**, as well as for the **LIFT–SUPLEX** technique, which was recorded **4 times**

Table 7. Frequency review of 1st, 2nd and 3th technique for all matches, medal matches finals and all matches of winners

| | TECHNIQUE | I best technique | II best technique | III best technique |
|---|-----------------------|------------------|-------------------|--------------------|
| 1 | GUT WRENCH | 12 | | |
| 2 | PASSIVITY | | 12 | |
| 3 | TAKE DOWN | | | 8 |
| 4 | LIFT - SUPLEKS | | | 4 |

9. TECHNICS EXECUTION BY TIMELINE (ALL MATCHES)

The analysis of technique execution over time was conducted for the three wrestling techniques that score the highest number of points across all matches (Table 9). This segment of the match should be considered separately for the senior, U23, and U20 age categories, where matches last 6 minutes (360 seconds), compared to the U17 category, where matches last 4 minutes (240 seconds).

Table 8. Timeline of technique execution by age groups (all matches)

| AGE GROUP | 0-360 SECOND | 1-Nbr. points | I best technique | 2-Nbr. points | II best technique | 3-Nbr. points | III best technique |
|-----------|----------------|---------------|-----------------------|---------------|------------------------|---------------|--------------------|
| SEN | 0-60 second | 56 | TAKE DOWN | 40 | SHOULDER TURNING THROW | 34 | GUT WRENCH |
| | 61-120 second | 272 | GUT WRENCH | 258 | PASSIVITY | 117 | LIFT - SUPLEX |
| | 121-180 second | 86 | GUT WRENCH | 46 | STEP OUT | 32 | TAKE DOWN |
| | 181-240 second | 140 | PASSIVITY | 72 | GUT WRENCH | 36 | STEP OUT |
| | 210-300 second | 50 | LIFT - SUPLEX | 48 | GUT WRENCH | 38 | TAKE DOWN |
| | 301-360 second | 29 | STEP OUT | 28 | STANDING CHALLENGE | 22 | TAKE DOWN |
| U23 | 0-60 second | 58 | GUT WRENCH | 50 | TAKE DOWN | 36 | HIP TURNING THROV |
| | 61-120 second | 266 | GUT WRENCH | 222 | PASSIVITY | 108 | LIFT - SUPLEKS |
| | 121-180 second | 62 | GUT WRENCH | 48 | STEP OUT | 36 | TAKE DOWN |
| | 181-240 second | 117 | PASSIVITY | 56 | GUT WRENCH | 42 | TAKE DOWN |
| | 210-300 second | 48 | GUT WRENCH | 34 | LIFT - SUPLEX | 32 | TAKE DOWN |
| | 301-360 second | 26 | STEP OUT | 24 | STANDING CHALLENGE | 16 | STANDING COUNTER |
| U20 | 0-60 second | 64 | GUT WRENCH | 46 | TAKE DOWN | 33 | STEP OUT |
| | 61-120 second | 336 | GUT WRENCH | 199 | PASSIVITY | 129 | LIFT - SUPLEKS |
| | 121-180 second | 48 | GUT WRENCH | 46 | LIFT - SUPLEKS | 28 | STEP OUT |
| | 181-240 second | 108 | PASSIVITY | 76 | GUT WRENCH | 31 | STEP OUT |
| | 210-300 second | 52 | GUT WRENCH | 28 | LIFT - SUPLEKS | 27 | STEP OUT |
| | 301-360 second | 32 | FORWARD BENDING THROW | 26 | STANDING COUNTER | 23 | STEP OUT |
| U17 | 0-60 second | 176 | PASSIVITY | 128 | GUT WRENCH | 64 | TAKE DOWN |
| | 61-120 second | 298 | GUT WRENCH | 72 | LIFT - SUPLEX | 70 | TAKE DOWN |
| | 121-180 second | 121 | PASSIVITY | 88 | GUT WRENCH | 52 | TAKE DOWN |
| | 181-240 second | 56 | TAKE DOWN | 44 | GUT WRENCH | 42 | SUPLEX-THROW |
| | 210-300 second | X | X | X | X | X | X |
| | 301-360 second | X | X | X | X | X | X |

| | |
|-------|-------------------------------------------|
| GREEN | Most points in that minute of the match |
| BLUE | Fewest points in that minute of the match |

General Conclusion

As shown in Table 8, the highest number of points per single wrestling technique across all age categories is scored in the **second minute of the match**, with the exception of the **U17** category, where the highest number of points is scored in the **first minute**. This difference can be explained by the fact that matches in the U17 category last a total of **four minutes**. In **U17** matches, the highest number of points is scored in the first minute because referees award a passivity point after **45 seconds**, after which wrestlers frequently score points from the parterre position.

In the **Senior, U23, and U20** age categories, the **fourth minute** of the match ranks second in terms of the number of points scored. This is an expected finding, given that passivity is awarded after **35–40 seconds** from the beginning of the second period, which corresponds to the fourth minute of the match.

First minute of the match

Out of the **12 analyzed segments**, the wrestling techniques **GUT WRENCH** and **TAKE DOWN** stand out as the most frequently executed in the first minute across all four age categories. Exceptions include **SHOULDER TURNING THROW** in **seniors**, **HIP TURNING THROW** in **U23**, and **STEP OUT** in **U20**.

Second minute of the match

Across **12 analyzed segments**, the most frequent techniques in three age categories are **GUT WRENCH**, **PASSIVITY**, and **LIFT–SUPLEX**. The only exception is the **U17** category, where a significant number of points in the second minute were scored using **TAKE DOWN**.

Third minute of the match

Across **12 segments**, **GUT WRENCH** and **TAKE DOWN** are the most prominent techniques in **all four age categories**, while the **STEP OUT** segment stands out in three age groups (**seniors, U23, U20**). In **U17**, the highest number of points in the third minute was scored for **PASSIVITY**, which is expected given that the match lasts 2 + 2 minutes.

Fourth minute of the match

Out of **12 analyzed segments**, only **GUT WRENCH** is prominent across **all age categories**. In **three age categories (seniors, U23, U20)**, **PASSIVITY** accounts for the highest number of points. In **U17**, the highest number of points in the fourth minute was scored using **TAKE DOWN, GUT WRENCH, and SUPLEX**.

Fifth minute of the match

Out of **9 analyzed segments**, two techniques stand out across three age categories (**seniors, U23, U20**): **GUT WRENCH** and **LIFT–SUPLEX**. In **seniors**, **GUT WRENCH** is the most frequently executed technique in the fifth minute. In **U20**, **STEP OUT** also stands out in terms of points scored in this minute.

Sixth minute of the match

Out of **9 analyzed segments**, only **STEP OUT** is prominent across the three age categories (**seniors, U23, U20**). Notably, in **seniors and U23**, a significant number of points were scored through **STANDING CHALLENGE** and **TAKE DOWN**. In **U20**, the highest number of points in the sixth minute was scored with **FORWARD BENDING THROW**. In both **U23 and U20**, a large number of points were scored using **STANDING COUNTER**. The reason for the high number of points for a lost challenge in the last minute of a match is because coaches very often throw a challenge for no reason out of anger that their wrestler lost the match.

10. MOST SUCCESSFUL WRESTLER (MSW)

Based on the analysis of the most successful champions by age category, data were obtained identifying which wrestlers were most successful according to six main criteria:

- **Number of points scored** relative to the total match duration
- **Number of points conceded** relative to the total match duration
- **Number of classification points won** relative to the total number of matches
- **Number of classification points conceded** relative to the total number of matches
- **Total duration** of all matches of the champion
- **Total number** of matches of the champion

Out of the four age categories, **Iranian wrestlers (IRI)** were the most successful in three categories (**seniors, U23, and U17**). Only in the U20 category was the most successful wrestler from **Uzbekistan** (Table 9).

Considering the **MSW index**, the best wrestler in Greco-Roman style was the **U23** champion, **FAROKHISENJANI JAVAD (IRI)**, with an index of **8.05**. This wrestler competed in five matches totaling **10.07 minutes**, during which he scored **44 technical points** and conceded only **1 point**. He also earned **20 classification points**, conceding only **1 classification point**, meaning that all five matches were won by **technical superiority**.

Table 9. Review of the most successful wrestler (MSW) by age groups

| AGE GROUPS | Wrestler | NAT | WEIGHT/CAT | MSW INDEX |
|------------|----------------------|-----|------------|-----------|
| SENIORS | ESMAEILI GHOLI | IRI | 67 kg | 5,67 |
| U23 | FAROKHISENJANI JAVAD | IRI | 87 kg | 8,05 |
| U20 | KHALMAKHANOV AYTJAN | UZB | 63 kg | 5,35 |
| U17 | MOHAMMADI BEHNAM | IRI | 92 kg | 5,68 |

11. WINNERS (CHAMPIONS) / WIN– LOST POINTS

Table 10 presents, by age category, the techniques used by champions to score the highest number of points in each age group, classified as the **most successful technique, second most successful technique, or third most successful technique**.

Across all four age categories, champions scored the highest proportion of points using the **gut wrench** technique, ranging from **22.00% (U17)** to **27.92% (U17)**.

Table 11 presents, by age category, the techniques through which champions conceded the highest number of points in each age group, also classified as the **most, second most, or third most significant** technique.

Across all four age categories, champions conceded the highest proportion of points due to **passivity**, ranging from **26.51% (U20)** to **49.58% (Seniors)**.

Percentage (%) of Points WIN by Champions

Table 10 also presents, by age category, the distribution of points scored by champions from wrestling techniques and other scoring actions, categorized into **three dominance levels**, expressed as percentages (%):

- **1st Dominant Technique:**
Across all four age categories, champions scored the highest proportion of points using the **GUT WRENCH** technique, ranging from **22.00% (U20)** to **27.92% (Seniors)**.
- **2nd Dominant Technique:**
Across all four age categories, champions in three age groups scored the highest proportion of points using the **TAKE-DOWN**, ranging from **12.99% (U17)** to **16.73% (Seniors)**.
- **3rd Dominant Technique:**
Across all four age categories, champions in three age groups scored the highest proportion of points from **PASSIVITY**, ranging from **12.34% (U17)** to **14.45% (Seniors)**.

Table 10. Overview of the frequency of the 1st, 2nd and 3rd technique by points won

| AGE GROUPS | WIN pts | 1.-% | 1st best technique | 2.-% | 2nd best technique | 3.-% | 3rd best technique |
|------------|------------|-------|--------------------|-------|--------------------|-------|--------------------|
| SENIORS | WIN POINTS | 23.57 | GUT WRENCH | 16.73 | TAKE DOWN | 14.45 | PASSIVITY |
| U23 | WIN POINTS | 23.31 | GUT WRENCH | 16.54 | TAKE DOWN | 13.91 | PASSIVITY |
| U20 | WIN POINTS | 22.00 | GUT WRENCH | 13.67 | PASSIVITY | 12.67 | LIFT-SUPLEX |
| U17 | WIN POINTS | 27.92 | GUT WRENCH | 12.99 | TAKE DOWN | 12.34 | PASSIVITY |

Percentage (%) of Points LOST by Champions

Table 11 presents data by age category on the points conceded by champions through wrestling techniques and other scoring actions, classified into **three dominance levels** and expressed as percentages (%).

- **1st Dominant Technique:**
Across all four age categories, champions conceded the highest proportion of points from the **GUT WRENCH** technique, ranging from **26.51% (U17)** to **48.98% (Seniors)**.
- **2nd Dominant Technique:**
Across all four age categories, champions conceded the highest proportion of points from **SUPLEX THROW** in the **U23** category (**16.33%**), while the lowest proportion within this rank was observed in the **Senior** category (**12.24%**) from the **front head lock** technique.
- **3rd Dominant Technique:**
Across all four age categories, champions conceded points in two age categories from **STEP-OUT** situations and the **GUT WRENCH** technique. The highest proportion of step-out points was recorded in the **U23** category (**12.24%**), while the lowest was observed in the **Senior** category (**8.16%**).

Table 11. Overview of the frequency of the 1st, 2nd and 3rd technique by points lost

| AGE GROUPS | LOST pts | 1.-% | 1st best technique | 2.-% | 2nd best technique | 3.-% | 3rd best technique |
|------------|-------------|-------|--------------------|-------|--------------------|-------|--------------------|
| SENIORS | LOST POINTS | 48.98 | PASSIVITY | 12.24 | FRONT HEAD LOCK | 8.16 | STEP OUT |
| U23 | LOST POINTS | 38.78 | PASSIVITY | 16.33 | SUPLEX THROW | 12.24 | STEP OUT |
| U20 | LOST POINTS | 35.29 | PASSIVITY | 13.24 | STEP OUT | 11.76 | GUT WRENCH |
| U17 | LOST POINTS | 26.51 | PASSIVITY | 14.46 | STEP OUT | 9.64 | GUT WRENCH |

Frequency of Executed Actions

Points WIN:

Based on frequency analysis (considering the three most frequent outcomes in points scored from wrestling techniques and other scoring actions), the **GUT WRENCH** is the absolutely dominant technique by which champions win points in all their **four** frequency matches. The second most effective technique in terms of points scored was the **TAKE-DOWN**, with **three** frequency. The third segment was **PASSIVITY**, also with **three** frequency (Table 12).

Points LOST:

Based on frequency analysis (considering the three most frequent outcomes in points conceded from wrestling techniques and other scoring actions), champions conceded the highest number of points across all four age categories in all their matches, with **four frequency**. This means that **PASSIVITY** accounted for the largest proportion of points conceded across all age categories. The second highest category of points conceded was **STEP-OUT**, with **two** frequency. The third segment included both the **GUT WRENCH** and **STEP-OUT**, each with **two** frequency (Table 12)

Table 12. Overview of the frequency of the 1st, 2nd and 3rd techniques (frequencies) for all matches of gold medal winners (champions)

| WIN – LOST pts | TECHNIQUE | I best technique | II best technique | III best technique |
|----------------|-----------------|---------------------|----------------------|-----------------------|
| WIN POINTS | GUT WRENCH | 4 | 0 | 0 |
| | PASSIVITY | 0 | 1 | 3 |
| | TAKE DOWN | 0 | 3 | 0 |
| | LIFT-SUPLEX | 0 | 0 | 1 |
| LOST POINTS | GUT WRENCH | 0 | 0 | 2 |
| | PASSIVITY | 4 | 0 | 0 |
| | FRONT HEAD LOCK | 0 | 1 | 0 |
| | SUPLEX THROW | 0 | 1 | 0 |
| | STEP OUT | 0 | 2 | 2 |

KEY FINDINGS

1. Wrestling efficiency (WQ) decreases with age

Wrestlers under 17 years of age demonstrated the highest wrestling efficiency (points per minute), with a statistically significant decline observed when moving to the U20 age group. From U20 onwards (U20, U23, seniors), match intensity remained relatively stable, indicating a shift from high-tempo wrestling toward controlled and strategically oriented performance.

2. Transition phase occurs around age 20

The most pronounced developmental change was observed between the U17 and U20 age groups. This transition phase is characterized by reduced scoring tempo, improved tactical control, and more selective use of offensive actions.

3. Standing wrestling remains dominant across all age categories

In all age groups, the majority of points were scored from the standing position. However, the relative contribution of parterre actions increased in the U20 and U23 categories before slightly decreasing at the senior level.

4. Technical points decrease with age

The proportion of points scored through technical actions decreases with age, while points from PASSIVITY, STEP OUT, and CAUTION show a relative increase. This reflects pronounced tactical control and match management, particularly in senior age categories.

5. Limited age-related differences in most techniques

For most individual technical-tactical actions, no significant differences were observed across age groups. This suggests that the overall technical repertoire remains relatively stable, while effectiveness and contextual application of techniques develop with age.

6. Selected techniques show clear developmental patterns

A small number of techniques (e.g., **TAKE DOWN; HEAD TO HEAD; SUPLEX**) exhibited significant age-related differences, highlighting their importance in differentiating competitive performance at higher levels.

7. Scoring the first point strongly affects match outcome

Across all age categories, wrestlers who scored the first point had a significantly higher probability of winning the match. This effect remained consistent across all age groups, emphasizing the importance of early initiative in the bout, but also the new rule that the winner is the wrestler who wins the first point if the score is 1-1.

8. Considering the temporal parameters of matches by minute.

It can be concluded that the first minute of the match is of exceptional importance. The highest number of points in the first minute is scored using the TAKE-DOWN and GUT WRENCH techniques. This implies that coaches should take these data into account when planning training sessions. In Greco-Roman wrestling, during the second minute of the match, points scored with the GUT WRENCH and points awarded for PASSIVITY prevail significantly.

9. Analyzing the main characteristics of champions' results,

A basic conclusion can be drawn: champions achieve most of their victories through the GUT WRENCH and TAKE-DOWN techniques. A substantial proportion of points is also scored due to the opponent's PASSIVITY. Champions concede most points due to PASSIVITY and STEP-OUT situations. Based on these data, it is possible to develop a technical-tactical combat model with the best wrestlers.

IMPLICATIONS FOR UWW & COACHES

Strategic implications for UWW

- Competition analysis should be integrated into coach education programs to support evidence-based decision making;
- This and similar analyses can serve as valuable tools for modifying wrestling rules, particularly to reduce the proportion of points from passivity and enhance the attractiveness and effectiveness of the Greco-Roman style;
- Data from this or similar analyses can be useful for preventing injuries and enhancing athlete safety during matches.

Long-term wrestler development

The results confirm that competitive development in Greco-Roman wrestling follows a nonlinear trajectory, with a clear transitional phase occurring around the age of 20. Therefore, training models should be adapted to reflect the specific demands of each age and weight category, rather than prematurely applying senior-level performance expectations (early specialization in U17).

Coach focus by age category

- **U17** – Encourage offensive initiative and high wrestling tempo, accept greater variability and error rates as part of development, and focus on technical diversity rather than result control;
- **U20** – Gradually reduce unnecessary “point wastage” and develop match management skills;
- **U23** – Refine efficiency of key techniques and emphasize control of rhythm and tempo;
- **Seniors** – Focus on precision, timing, and efficiency, capitalize on opportunities to score the first point, and maintain balance between standing dominance and maximizing parterre technique effectiveness. Special attention must be paid to the development of static and dynamic strength in order to better defend against gut wrenches.

Training Focus

- **Scoring the First Point in a Match** – Practice pre-planned actions from grips (e.g., attacks on one hand then the other, double-hand attacks, etc.) during the first 20–30 seconds;
- **Mat Control and Step-Out Situations** – Mark a smaller circle on the mat with tape and conduct training within this limited area to improve wrestlers’ spatial awareness and control. On the standard mat, use only the inner circle (7 m diameter), considering the wrestler out of bounds if they step into the passivity zone;
- **Perfection in Dominant Techniques** – Increase repetitions and practice special techniques individually (“specials”) in both standing and parterre positions;
- **Match Outcome and Pace Management** – Conduct training matches with pre-defined scores (e.g., 4:0 or 1:1) to simulate defending or chasing points. There is a different way of conducting the match if the score is 0-4 or if the score is 1-1 and the wrestler loses the match;
- **Minimizing Technical Errors** – Use video analysis to identify critical mistakes and focus training on correcting specific details (e.g., lowering the elbow, adjusting posture or head position).

Training Methodology

- **Highly Specific Sparring Simulations of Tournament Format** – Simulate a tournament once every two weeks during training to enhance stress adaptation. It is necessary to respect the break time between matches of 20 minutes, which can be shortened to 12-15 minutes, as an overload in training compared to real competition);
- **Targeted Tactical Micro-Analysis** – After micro-analysis, simulate attacks or defenses tailored to specific opponents;
- **Individualized Technical Program** – Adjust techniques and workload according to each wrestler’s abilities;
- **Energy Efficiency and Recovery** – Use active recovery after match simulations (light running, jump rope, treadmill, resistance band stretching, etc.).

Development of Key Technical Segments

Priority Techniques (All Age Groups) – Practice techniques identified as dominant for each age group to improve both offense and defense, enhancing overall performance and efficiency:

- **Gut Wrench**
- **Take down**
- **Lift suplex**
- **Step out Control**
- **Tactics for Forcing Opponent’s Passivity**

Training should focus on increasing execution success, multiple entries and throws of the same technique (“specials”), linking techniques in sequences, and practicing combinations (two techniques in a single action).

Training for Scoring the First Point

Since scoring the first point significantly increases the likelihood of victory, it is recommended to:

- **Planned Initial Attacks** – The highest intensity must be present at the end of the first minute of the match and this must be shown in the period from 45 seconds to 75 seconds of the first round;
- **Develop “Start Strategies”** – For different types of opponents (strategy for a taller and shorter opponent, for a faster opponent, for a stronger opponent, strategy for a wrestler who does good counter holds, etc.);
- **Initial Match Situation Drills** – Simulate the beginning of the match in the first 15 seconds, how and in what way to impose your fighting style 10-20 times in training, focusing on the work of the arms and legs in this period, as well as not giving the opponent the opportunity to score points in the first seconds of the match;
- **Aggressive Hand and Clinch Control** – Spend as much time as possible in training in offensively favorable and defensively unfavorable positions.

Development of Parterre Performance

The study confirms the high importance of ground wrestling, especially in the younger categories. Based on that, it is necessary to pay more attention to work in the parterre in the training process:

- Each wrestler must master at least two reliable parterre techniques (“specials”);
- Gut Wrench Defense – Focus on appropriate parterre movement, and develop both static and dynamic strength;
- Specific Development of Static and Isometric Strength, especially for U17 wrestlers.

Development of Standing Wrestling and Mat Control

With age, the importance of standing wrestling increases:

- **Footwork and Distance Control** special attention should be paid to the development of reaction speed in younger age categories, the development of leg coordination, the development of agility and the correct position of the legs;
- **Clinch and Opponent Hand Control** – Spend significant training time in the clinch;
- **Step-Out Tactics** – to practice circular techniques by returning to the center, and in the offensive sense to practice placing the legs in a wide stance with the lowering of the center of gravity of the body and intense and coordinated work of the arms and legs, to move forward and push the opponent out of the circle;
- **Situational Sparring in Limited Space** – Situational bobs in a small space, e.g. area with a diameter of 5 or 7 meters (not counting the passivity zone as an integral part of the arena);
- **Specialized Techniques** – It is necessary to work on practicing one type of special technique for the back (take down) and one special technique from the group of wrestling techniques - throws.

Conditioning by Age Category

- **U17** – General motor skills, speed, agility;
- **U20** – Maximum strength and explosiveness;
- **U23** – Specific endurance and strength;
- **Seniors** – Optimization of energy efficiency (work on fitness preparation) and proper regeneration of seniors between two matches, as well as regeneration between two competitions.

Tactical Education of Athletes

It is recommended to systematically implement:

- Video analysis;
- Individual tactical planning;
- Opponent analysis;
- Match strategy planning based on available data;
- Integration of artificial intelligence (AI) for strategy preparation against targeted opponents.

Organization of Long-Term Development

The training system should:

- Follow a progression from technical breadth to tactical efficiency;
- Avoid prematurely enforcing the senior model in younger categories, especially U17;
- Allow individualization according to each wrestler's characteristics and weight class;

Organization of the Training Process

The training plan should ensure:

- Gradual progression of workload from U17 to Seniors;
- Balanced technical, tactical, conditioning, and strength work;
- Individual development plans for each wrestler;
- Continuous evaluation throughout the wrestler's career.

Role of the Coach

The coach must:

- Monitor training status through various testing methods;
- Plan the athlete's long-term development;
- Individualize training as much as possible;
- Continuously analyze both their wrestler's and opponents' performance;
- Develop and monitor psychological stability before, during, and after competitions;
- Continuously update knowledge and skills in all aspects of training and competition.