

DID THE CHANGES MADE TO THE 2022-2024 CODE OF POINTS IN TRAMPOLINE GYMNASTICS CHANGE THE SCORE OF THE GYMNASTS?

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Original article

DOI: 10.52165/sgj.16.2.333-342

Abstract

The evaluation rules for trampoline gymnastics were revised by the technical committee post-Tokyo 2020 Olympics, notably affecting the qualifying round. Previously, only four elements were considered for difficulty points in the first routine, but now all elements count in both routines. To assess the impact, data from the 28th/29th FIG Trampoline Gymnastics World Age Group Competitions and 35th/36th FIG Trampoline Gymnastics World Championships in 2021/2022 were analyzed. A t-test compared scores in Execution (E), Difficulty (D), Time Of Flight (TOF), and Horizontal Displacement (HD) between 2021 and 2022. In the senior men's category, average values increased in D, HD, and total scores in 2022, with significant differences in Execution and near-significant in TOF scores. Across all other categories, mean values of D, E, TOF, HD, and total scores rose in 2022, though without statistical significance. The trend towards higher scores under the new rules suggests their influence, yet unexplored factors may also play a role. Further research is needed for a comprehensive understanding.

Keywords: trampoline; gymnastics; routine; evaluation rules.

INTRODUCTION

All sports disciplines have undergone significant changes since their inception, evolving into their modern forms today. It is well-established that the rules governing these sports continue to be updated over the years for various reasons, including addressing issues, advancements in athletes' technical abilities, the incorporation of new technologies, and enhancing spectator enjoyment. It remains a subject of inquiry for sports scientists to assess the extent to which these objectives have been achieved following these updates, and whether any unforeseen effects have emerged.

For instance, a study in the literature examines the impact of the Spanish Basketball Federation's rule changes in mini basketball (Arias, Argudo & Alonso, 2009). The rules governing various disciplines within the Fédération Internationale de Gymnastique (FIG) are regularly revised by the technical committees of each discipline after every Olympic cycle. Consequently, the frequency of workshops provided to coaches increases after each edition of the Olympic Games, and international judges must update their knowledge, retake exams, and demonstrate continued proficiency.

Despite the implementation of rigorous evaluation criteria, a significant portion of the scoring system in all gymnastics disciplines still necessitates a degree of subjectivity. Therefore, researching and interpreting the effects of these rules in gymnastics requires a multidimensional approach and substantial expertise. Kerr and Obell undertook such investigations in a study published years after the introduction of new rules, which laid the groundwork for radical changes during a period when the maximum score in artistic gymnastics was 10 (Kerr & Obel, 2015).

Trampoline gymnastics, in particular, has undergone significant changes in the last decade with the integration of technological measuring devices and the introduction of new scoring criteria (FIG, 2021). These changes represent important factors that can influence a gymnast's ranking. For instance, the total score distribution differs when scoring does not include assessments of all element heights or the landing point on the trampoline bed. Consequently, following each Olympic Games, coaches and athletes must thoroughly acquaint themselves with the updated rules, review gymnastic routines in light of these changes, and devise strategic plans accordingly.

Despite trampoline gymnastics' increasing popularity as an Olympic discipline and the notable revisions to evaluation rules in recent years, scientific research in this field remains relatively limited. This scarcity of research may stem from the intricate nature of the evaluation rules, which may not be easily comprehensible to non-gymnasts, despite the branch's high entertainment value.

When reviewing current studies on trampoline gymnastics in the literature, it is evident that processes related to injuries are addressed (Kirişçi & Alpaya, 2019). For

instance, Patel, McGregor, Williams, Cumming, and Williams (2021) discovered that trampoline gymnasts face a higher risk of injury under certain circumstances, such as growth spurts or increased workloads. An intriguing study conducted in the United Kingdom aimed to explore the experiences of trampoline and artistic gymnasts as they returned to training after a hiatus due to the pandemic (Patel, McGregor, Cumming, Williams, & Williams, 2022).

There are studies investigating the physical characteristics of both artistic gymnasts and trampoline gymnasts (Siahkoushian, Aalizadeh, & Esmaeilzade, 2013), as well as research examining muscle activity during trampoline movements (Matsushima, 2023). Aydin, Gündoğan, and Demirkan (2023) delved into the effects of trampoline and artistic gymnastics training on various biomotor abilities. Additionally, a groundbreaking study investigated whether movements could be detected using machine learning, potentially altering the landscape of trampoline gymnastics judging in the future, with largely successful results (Woltmann, Hartmann, Lehner, Rausch, & Ferger, 2023).

While all these studies are significant in terms of advancing the discipline, it is equally crucial to research and interpret the potential outcomes of rule changes to provide guidance for coaches and athletes.

When examining the latest Code of Points in Trampoline Gymnastics published by the FIG (FIG, 2021), the most significant change is observed in the routines during the qualifying round. According to this alteration, the difficulty value of four elements in the first routine of the qualifying round has been removed, and now two voluntary routines are performed in qualification one. Under the new rules, the routine with the best result is considered

valid, meaning that the difficulty value of all movements is evaluated in both routines. Additionally, while previously the combined score of the 1st and 2nd routines determined whether gymnasts progressed to the next round, now only the routine yielding the highest score among the two is valid under the new rules. This new practice applies to both gymnasts competing in the senior category and young gymnasts competing in the 17-21 years old age group category. Of course, during competition implementation, other changes have been made, such as determining the total number of competitors to determine the number of gymnasts qualifying for the second round or updating warm-up times (FIG, 2021).

However, it is believed that none of these changes will impact the training and competition strategies of gymnasts as significantly as the alteration in qualification one. Therefore, this study was designed with the observation and consideration that the aforementioned rule change may reveal different parameters compared to the past in the general competition performance of gymnasts and in determining the winning gymnasts. The study aims to compare the results of the Trampoline Gymnastics World Championship and the World Age Groups Competitions, which were conducted according to the 2017-2020 Code of Points (FIG, 2016) and the 2022-2024 Code of Points (FIG, 2021), and to contribute to the studies of coaches, athletes, and technical committees by interpreting the potential differences.

METHODS

The data for this study comprises the competition results of athletes who participated in four competitions: the 28th FIG Trampoline Gymnastics World Age

Group Competitions (17-21 age group) and the 35th FIG Trampoline Gymnastics World Championships tournament held in Baku in 2021, as well as the 29th FIG Trampoline Gymnastics World Age Group Competitions and the 36th FIG Trampoline Gymnastics World Championships tournaments held in Sofia in 2022. These results are publicly available on the official website of the FIG under the results tab (<https://www.gymnastics.sport/site/events/searchresults.php>) [Accessed on 20.07.2023]. The tournament results, including difficulty score (D), execution score (E), time of flight (TOF), horizontal displacement score (HD), and total scores, were utilized as data.

At the 28th FIG Trampoline Gymnastics World Age Group Competitions held in 2021, data from 49 men and 47 women in the 17-21 age group were analyzed, along with data from 78 men and 54 women at the 35th FIG Trampoline Gymnastics World Championships. Similarly, at the 29th FIG Trampoline Gymnastics World Age Group Competitions held in 2022, data from 65 men and 49 women in the 17-21 age group were evaluated, alongside data from 99 men and 73 women at the 36th FIG Trampoline Gymnastics World Championships.

In 2021, the second routine in the qualifying round was taken into consideration, whereas in 2022, the highest score was evaluated, consistent with the official results. Due to the rule change, the difficulty score (D), execution score (E), time of flight (TOF), horizontal displacement score (HD), and total scores, which constitute the results of two different tournaments (2021-2022), were statistically compared.

Descriptive statistics of the data are presented as mean \pm standard deviation, and statistical significance was determined as p

< 0.05 . To assess whether the data followed a normal distribution, skewness and kurtosis values were calculated, and Shapiro-Wilk normality tests were performed. Normal distribution was confirmed when $p > 0.05$.

The independent samples t-test was employed to compare the result scores between women's and men's world championships in age groups, as well as between women's and men's world championships in the senior category for the years 2021 and 2022. Effect sizes were assessed using Glass's delta (δ). For data analysis, the SPSS Statistics Ver. 29 software package (IBM Corp. Release 2022. IBM SPSS Statistics for Windows, Version 29.0. Armonk, NY) was used.

RESULTS

Women's D (9.19 ± 3.15), E (12.23 ± 4.34), TOF (12.29 ± 4.16), HD (7.90 ± 2.76), and total scores (41.61 ± 14.23) of the age groups of the World Age Group Competitions held in 2021 did not have a statistically significant difference D (9.66 ± 2.98), E (13.26 ± 3.68), TOF (13.23 ± 3.48), HD (8.40 ± 2.14), and total scores (44.55 ± 11.90) compared with the competition held in 2022 ($p > .05$). Comparisons of average D, E, TOF, HD, and total scores from the Championships held in 2021 and 2022 are presented in Figure 1.

The men's D (11.17 ± 4.44), E (11.72 ± 4.61), TOF (12.68 ± 4.83), HD (7.29 ± 2.89), and total scores (42.86 ± 16.61) of the age groups of the World Age Group Competitions held in 2021 did not have a statistically significant difference D (11.98 ± 3.85), E (12.70 ± 4.12), TOF (13.59 ± 4.27), HD (7.86 ± 2.56), and total

scores (45.49 ± 15.29) compared with the competition held in 2022 ($p > .05$). Comparisons of average D, E, TOF, HD, and total scores from the Championships held in 2021 and 2022 are presented in Figure 2.

The women's D (11.22 ± 3.66), E (13.09 ± 4.28), TOF (12.89 ± 4.07), HD (7.98 ± 2.62), and total scores (45.12 ± 14.38) of the senior category of the World Championship held in 2021 did not have a statistically significant difference D (11.84 ± 3.08), E (14.30 ± 2.79), TOF (13.94 ± 2.53), HD (8.76 ± 1.50), and total scores (48.83 ± 9.33) compared with the competition held in 2022 ($p > .05$). Comparisons of average from the championships held in 2021 and 2022 are presented in Figure 3.

The men's E score of the championship held in 2021 was lower (12.037 ± 4.50) compared with 2022 (13.290 ± 3.24), with a statistically significant increase of 1.253 (95% CI: [-2.45 / -.056] $t(135.09) = -2.070$, $p = .040$, $\delta = 0.386$). The TOF score of the championship held in 2021 was lower (13.517 ± 4.85) compared with 2022 (14.809 ± 3.49), with a near statistically significant increase of 1.291 (95% CI: [-2.580 / -.003] $t(134.89) = -1.982$, $p = .050$, $\delta = 0.370$).

The men's D (13.25 ± 4.72), HD (7.65 ± 2.85), and total scores (46.44 ± 16.81) of the senior category of the World Championship held in 2021 did not have a statistically significant difference D (13.93 ± 3.76), HD (8.34 ± 2.01), and total scores (50.36 ± 12.16) compared with the competition held in 2022 ($p > .05$). Comparisons of average D, E, TOF, HD, and total scores from the Championships held in 2021 and 2022 are presented in Figure 4.

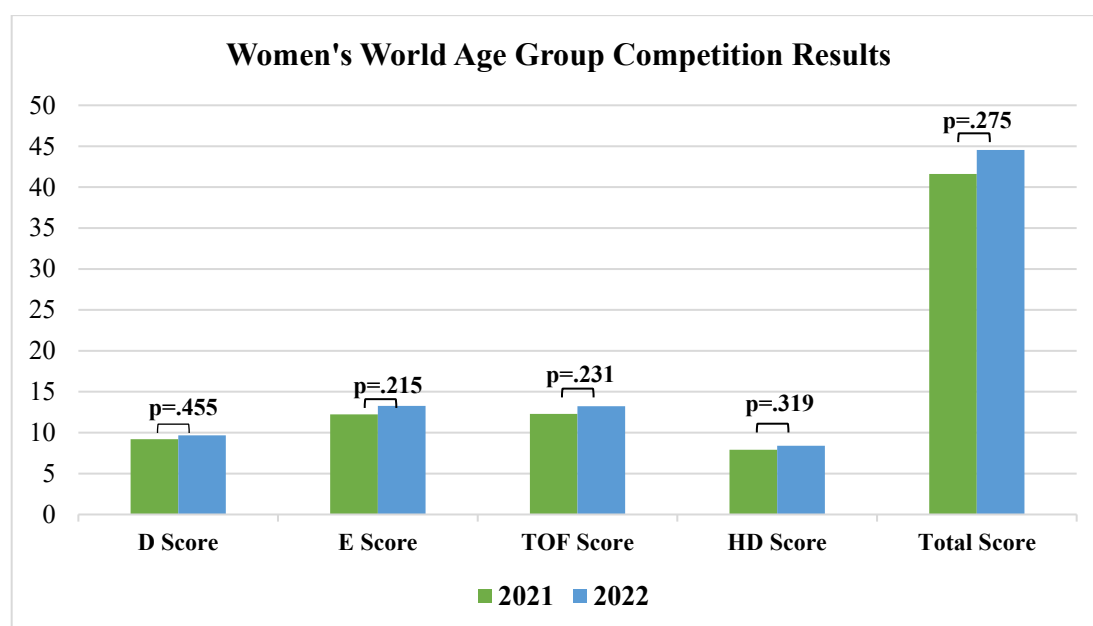


Figure 1: Women's World Age Group Competition Results

D: Difficulty, E: Execution, TOF: Time of Flight, HD: Horizontal Displacement

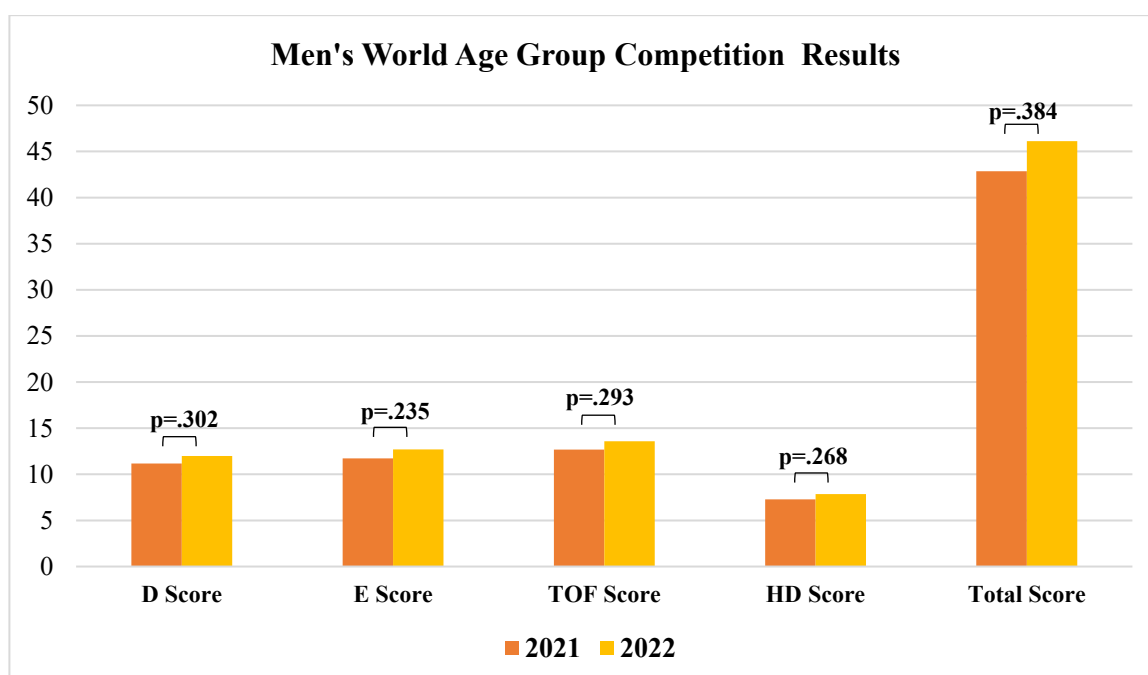


Figure 2: Men's World Age Group Competition Results

D: Difficulty, E: Execution, TOF: Time of Flight, HD: Horizontal Displacement

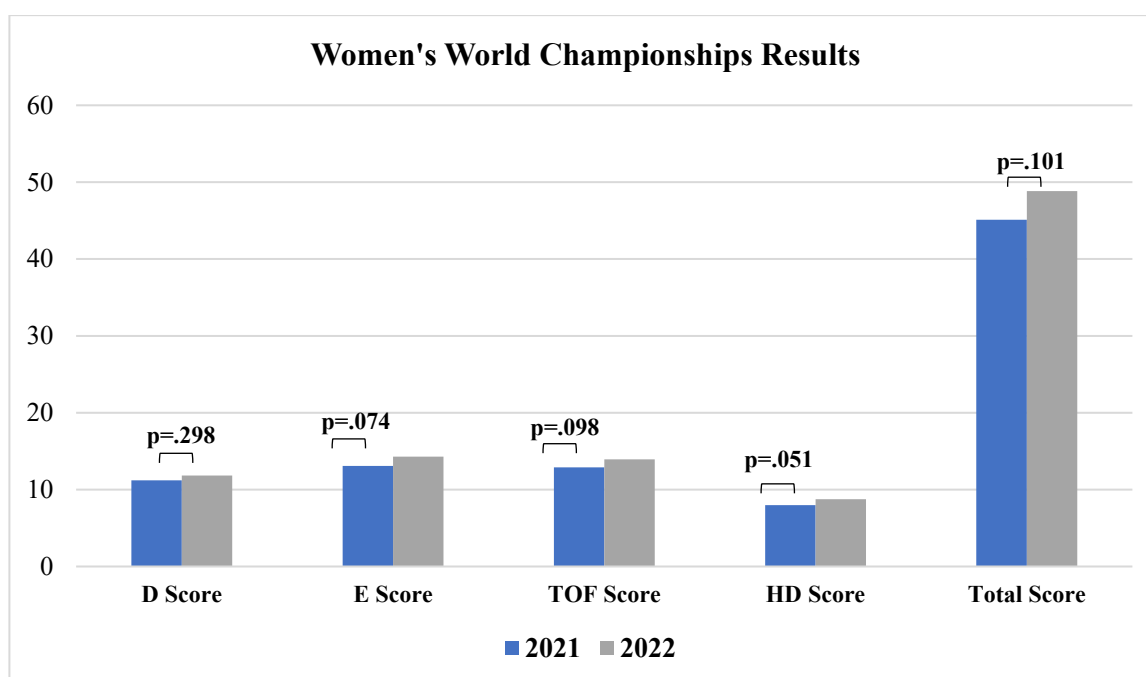


Figure 3: Women's World Championships Results

D: Difficulty, E: Execution, TOF: Time of Flight, HD: Horizontal Displacement

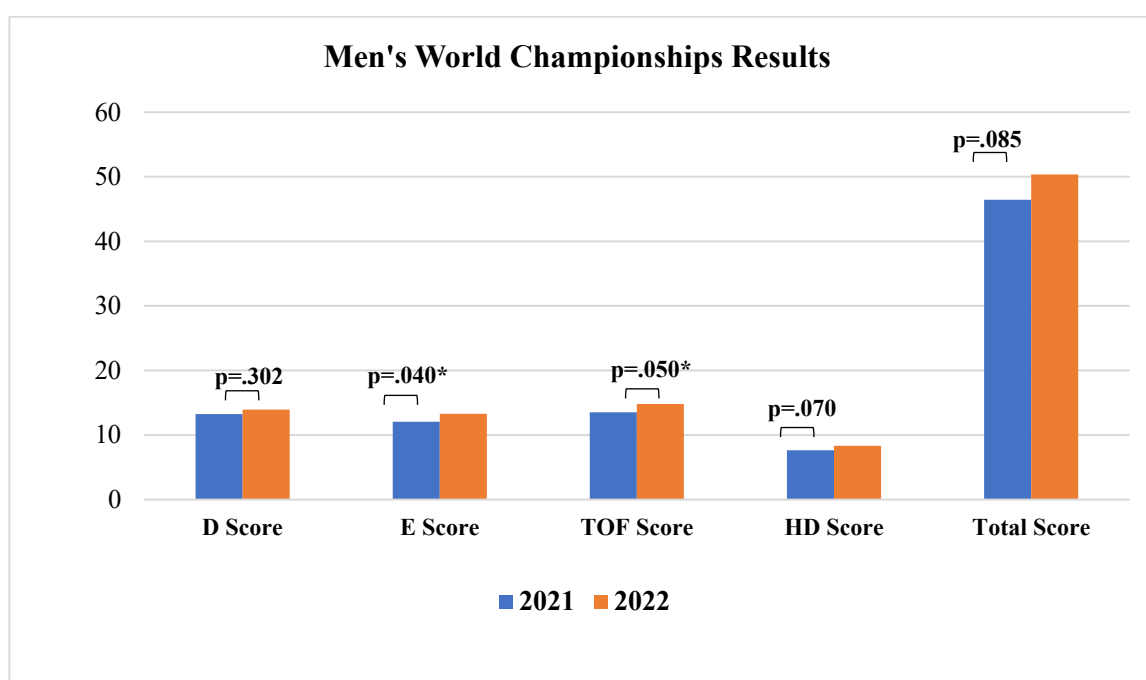


Figure 4: Men's World Championships Results

D: Difficulty E: Execution, TOF: Time of Flight, HD: Horizontal Displacement

DISCUSSION

In the present study, the results of trampoline gymnastics World Age Group competitions and World Championships were compared before and after the update

of evaluation rules. The study was designed in this manner due to the curiosity surrounding whether the change in evaluation rules would impact the athletes' scores. According to the statistical analyses, the only category with significant results

was identified as the E score of senior men, which was found to be higher in the evaluation conducted according to the new rules. Additionally, the TOF scores of the same group yielded a p-value of exactly 0.05, and it was observed that the TOF averages of the 36th FIG Trampoline Gymnastics World Championships were higher.

While interpreting the results, it would not be adequate to rely solely on statistically significant findings because scores in trampoline gymnastics can be highly correlated. Furthermore, it should be noted that competitors adopt different strategies based on different rules. The score of the second routines in the 2021 qualifiers and the best score in the 2022 qualifiers carry different implications due to the rule change. Therefore, it would be prudent not to consider these scores as exact equivalents.

Upon examining all score types of the World Championships held in 2021 and 2022 for senior men, it is evident that there is a higher average in each score type in the 2022 competition. Moreover, the higher average score observed in the 2022 World Championship is consistent across both genders and extends to the results of older female athletes and the World Age Groups Championship (17-21 years age category). Additionally, when comparing the results of senior female athletes in the 2022 World Championship with those of female and male athletes in the World Age Group Competitions (17-21 years age category) in 2022, it is observed that all score types tend to increase compared to the previous year.

In this regard, it can be inferred that routines developed in accordance with the current rules outlined in the 2022-2024 Code of Points for Trampoline Gymnastics contribute to the presentation of higher-quality routines. Although most of these

results lack statistical significance, they hold significant importance in a sport like gymnastics, where even a 0.1-point difference can impact podium finishes. Another critical issue to consider is that the increase in scores in 2022 occurred despite the absence of two top-level countries, namely Russia and Belarus, which typically secure podium positions.

It has been noted in the literature that increasing the difficulty score will positively contribute to the total score; however, it is crucial to ensure that points are not lost from other score types in the process (Koca Kosova & Kosova, 2021). According to the current rules, the requirement for athletes to perform two voluntary routines in the qualifying round to advance to the next round further emphasizes this necessity. Upon examining the results of the current study, it is evident that competitors in all categories are able to meet this demanding requirement.

Under the 2017-2020 Code of Points, athletes often refrained from incorporating very risky and difficult moves into their routines during the qualifying round. Despite this, athletes still had the opportunity to progress to the next round, with the execution score holding significant importance in the first routines of the qualifying round. However, as indicated by the results, it will be challenging to advance through the qualifying round with a low difficulty score under the current rules.

Although world age group competitions facilitate the participation of more countries in trampoline gymnastics competitions (Vicente-Mariño, 2021), the 17-21 years age category can be viewed as a preparatory stage for the senior category. Consequently, the evaluation rules for this age group were slightly different from each other in the previous cycle but have become aligned in

the current cycle. The absence of a second qualification phase in age group competitions, and the variation in qualification 2 rules based on the number of registered athletes in senior competitions, may lead to the adoption of different strategies in these groups. For instance, since there is only one opportunity to qualify for the finals in age groups, athletes may opt for higher-risk routines in the qualifying round. Conversely, for seniors, different routines may be employed to qualify for the second round and finals. The results of the current study did not reveal any conflicting outcomes in this regard, and the increasing trend in score types appears to be similar for both the 17-21 years age group and seniors.

One possible reason for the increase in average difficulty scores across all categories in 2022 is that athletes have two opportunities to perform relatively challenging routines, with no penalties if they fall during one of these attempts. This new rule may have provided coaches and athletes with greater flexibility. Consequently, athletes may have incorporated movements that they have not yet mastered perfectly into their routines, as they now have the opportunity to present both secure and riskier routines in their performances. Additionally, the increase in both other score types and difficulty scores may be attributed to the shift from focusing on at least two different routine types under the previous rules to concentrating on a single routine under the current rules. The inability to repeat movements with a difficulty score counted in the first routine of the previous cycle may have also contributed to lower average difficulty scores in the routines evaluated under the new cycle. However, from another perspective, this newfound freedom and risk-taking may also lead to an increase in incomplete routines.

Although the number of completed moves is not explicitly stated in the result lists, a high number of athletes falling without completing 10 moves was apparent in the qualifying rounds of competitions in 2022, evident from the scores to anyone familiar with trampoline gymnastics. Hence, it becomes crucial for coaches and athletes to decide on the level of risk they are willing to take. While making this decision, prioritizing safety should be the first consideration, followed by assessing the likelihood of qualifying for the next round if the risk is undertaken. Observing the performance of potential competitors can be instrumental in this decision-making process.

The issue of optimal risk-taking when designing routines is critical, both under the rules of the current cycle and previous cycles, despite the different characteristics of various routine types (Kosova & Koca Kosova, 2021).

The scarcity of studies conducted in the literature on trampoline gymnastics, and even those that have been conducted being interpreted based on previous evaluation rules, presents challenges in leveraging their findings, particularly in the discussion section of the current study. This circumstance can be identified as a significant limitation of the study.

CONCLUSIONS

In conclusion, the current study revealed that the significant rule changes implemented in the last cycle have the potential to induce notable alterations in both training content and competition scores. The trend toward increasing scores in each score type within athletes' routines represents a significant development for a discipline that encompasses numerous score

types. However, as discussed in the preceding section, while the rule update may enhance the quality of routines, it may also lead to an increased incidence of incomplete routines and subsequently, a higher risk of injury among gymnasts.

Future studies could explore the extent to which current rules influence both the practice of trampoline gymnastics and the risk of injury.

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Article received: 4.9.2023

Article accepted: 2.4.2024

