

# Global trends in throwing techniques and performance in women's shot put

 **Satoshi Hatase.** *Nihon University College of Art. Tokyo, Japan.*

**Taiki Okada.** *Graduate School of Health and Sports Science. Juntendo University. Japan.*

 **Yuta Takanashi** . *Department of Athletics Field Laboratory. School of Health and Sports Science. Juntendo University. Japan.*

## ABSTRACT

The aim of this study was to investigate global trends in throwing techniques and performance in women's shot put to provide useful data for future advancements. The study focused on the period from 2008 to 2024, analyzing records and trends of athletes placing in the top-eight at the World Championships and the Olympics. Additionally, the study examined characteristics of the top-eight finishers who adopted the rotational technique after its introduction to the sport in 2015. The primary source of data used for this analysis was World Athletics (<https://worldathletics.org/>). The results showed that there was no statistically significant change in the performance level for top-eight finishers in the World Championships and Olympics since 2008. Significant ( $p = .002$ ) differences were observed between Group G (33.00 [28.50–34.50]) and Group R (27.00 [24.75–29.00]) in terms of their age. These findings suggest that the rotational throw technique has not yet contributed to improving performance at the competition level in women's shot put. However, given the younger age of rotational throwers, further improvements in performance are expected in the future.

**Keywords:** Sport history, Throwing techniques, Shot put, Athletics throwers, Rotational throw.

### Cite this article as:

Hatase, S., Okada, T., & Takanashi, Y. (2025). Global trends in throwing techniques and performance in women's shot put. *Scientific Journal of Sport and Performance*, 4(2), 229-235. <https://doi.org/10.55860/LOBB9573>

 **Corresponding author.** *Department of Athletics Field Laboratory. School of Health and Sports Science, Juntendo University 〒270—1695 Hiragagakuendai1-1 Inzai City Chiba, Japan.*

E-mail: [ytakana@juntendo.ac.jp](mailto:ytakana@juntendo.ac.jp)

Submitted for publication December 31, 2024.

Accepted for publication February 19, 2025.

Published March 25, 2025.

[Scientific Journal of Sport and Performance](#). ISSN 2794-0586.

©Asociación Española de Análisis del Rendimiento Deportivo. Alicante. Spain.

doi: <https://doi.org/10.55860/LOBB9573>

## INTRODUCTION

Technological advancements in sports techniques can drive revolutionary developments within their respective disciplines. The backflip technique in high jump, introduced by Richard Douglas Fosbury in 1968, and the glide technique in shot put, introduced by William Patrick O'Brien in 1952, are notable examples of such transformative innovations. However, the rotational throw technique, which emerged in the 1970s, has been a rare case where it coexisted with the glide technique for decades without initiating revolutionary changes in shot put. This suggests that the glide technique offers numerous advantages. In fact, there is no clear evidence supporting the complete adoption of the rotational technique over the glide technique (Dinsdale et al., 2017, Salinero and Del Coso, 2022). One historical reason for the lack of widespread adoption of the rotational technique may be that the glide technique requires less training time (Stepanek, 1986).

In 2022, Hatase and Takanashi reported that the technique in men's shot put had been shifting from the glide to the rotational throw (Hatase and Takanashi, 2022). Currently, all top-eight finishers in men's shot put at the Olympics and World Championships use the rotational throw technique. This shift has enabled athletes from more countries to succeed at the global level (Hatase and Takanashi, 2022). As a result, the global standard in men's shot put has improved. Notably, five of the top ten records in men's shot put were set in the 2000s, with four of these achieved after 2019 using the rotational technique. In Japan, although the rotational technique has been adopted less frequently compared to global trends, the first 19-meter mark in men's shot put was achieved by a rotational thrower in 2024.

In contrast, women's shot put has largely remained dominated by glide technique users globally, and the records have stagnated, with all of the top 10 world records set in the 1990s using the glide technique. For the global development of women's shot put, the introduction and adoption of the rotational technique, similar to men's shot put, may prove beneficial. It is essential to assess the effectiveness of the rotational technique for female athletes, while also understanding the current global trends. Therefore, this study aims to examine global trends in competitive performance and throwing techniques in women's shot put, providing valuable insights for future advancements.

## MATERIALS AND METHODS

To investigate global trends in competitive performance, this study analysed data from major international competitions, specifically the Olympic Games (2008–2024) and the World Championships (2005–2023). The analysis included records and throwing styles of athletes who placed in the top-eight. Furthermore, to examine trends in the age of top women's shot putters, the study focused on athletes who placed in the top-eight from 2015 to 2024, after the introduction of the rotational technique. These athletes were divided into two groups: Group R (rotational throwers) and Group G (glide throwers). For athletes who participated in multiple competitions, only their most recent performance was included. As a result, 13 athletes from Group G and 14 from Group R were selected for the age-related analysis. Among these, seven athletes from Group G and 11 from Group R had experience in both shot put and discus. The study also analysed the personal best records in discus throw of these athletes during the years in which they placed in the World Championships or Olympics.

To explore the global spread of the rotational technique, athletes were categorized by region: North and Central America, South America, Europe, Africa, Oceania, and Asia. The top-eight scores and throwing

techniques were compiled for each region. Data were collected primarily from World Athletics (<https://worldathletics.org/>).

Mann-Whitney Rank Sum Tests were used for group comparisons and Kruskal-Wallis One-Way Analysis of Variance on Ranks was employed to examine the performance trends over time. A significance level of 5% was used, with a 10% level considered as a "trend." Results are presented as median values with the 25th and 75th percentiles (median [25%–75%]). SigmaPlot 14 (GraphPad LLC) was used for statistical analysis.

## RESULTS

The trends in records and throwing styles of women's shot put in the World Championships and Olympics from 2005 to 2024 are shown in Figure 1. No significant changes in performance levels were observed during this period. However, the introduction of the rotational technique began yielding results starting in the 2015 World Championships, with a fifth place finish by a rotational thrower, followed by a bronze medallist at the 2016 Olympics. By 2024, six of the top-eight finishers were rotational throwers. In 2022, a gold medallist using the rotational technique emerged, and in 2023 and 2024, rotational throwers claimed the top-four positions in the Olympics.

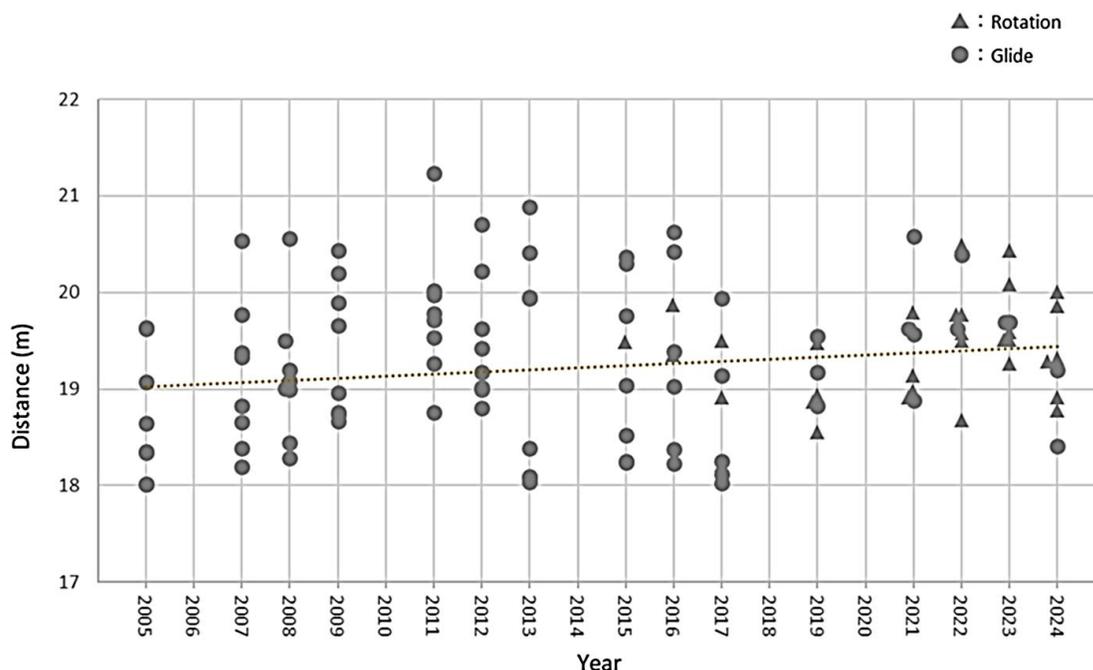


Figure 1. Trends in competitive performance and shot style in women's shot put.

The ages of Group G (33.00 [28.50–34.50]) and Group R (27.00 [24.75–29.00]) showed a significant difference ( $p = .002$ ). When analysing discus performance, Group R athletes ( $981.27 \pm 109.84$ ) had higher scores than Group G athletes ( $817.29 \pm 202.15$ ), although this difference was marginal ( $p = .07$ ). No significant difference in shot put records was found between the two groups (Group G: 19.42 [18.84–19.90] vs. Group R: 18.86 [18.25–19.22],  $p = .80$ ).

The analysis of regional rankings (Table 1) revealed that in North and Central America and Oceania, all top-eight athletes used the rotational technique. In Europe, seven of the top-eight athletes used the rotational

throw, and in Africa, six of the top-eight athletes did so. In South Africa and Asia, only two of the top-eight athletes used the rotational technique. When examining the world's top-ten, nine of them were rotational throwers. The data for Africa's 4th place and Asia's 6th, 7th, and 8th place athletes were unreliable.

Table 1. Top 8 performances and throwing style by region worldwide.

Ranking	North and Central America			South America			Europe		
1	1416	R	USA	1156	R	CHI	1407	R	GER
2	1403	R	CAN	1100	G	BRA	1327	R	NED
3	1278	R	USA	1091	G	CHI	1245	R	SWE
4	1274	R	JAM	1081	G	VEN	1219	R	POR
5	1248	R	USA	1077	G	BRA	1206	R	SWE
6	1246	R	USA	1013	G	BRA	1205	G	GER
7	1228	R	USA	965	G	BRA	1197	R	ESP
8	1222	R	USA	923	R	ARG	1172	R	NED
Ranking	Africa			Oceania			Asia		
1	1115	R	RSA	1368	R	NZL	1337	R	CHN
2	1026	R	RSA	1055	R	AUS	1334	G	CHN
3	997	R	NAM	1039	R	NZL	1137	G	CHN
4	981	NA	GAB	998	R	NZL	1136	G	CHN
5	947	R	CMR	988	R	NZL	1135	R	IND
6	911	R	RSA	984	R	AUS	1118	NA	CHN
7	883	R	RSA	943	R	AUS	1074	NA	UZB
8	866	G	BEN	867	R	AUS	1071	NA	CHN

Note. R: Rotational, G: Glide, NA: Not Applicable. The country names follow the ISO (International Organization for Standardization) standards. The competition performance follows the event ranking criteria established by World Athletics.

Table 2. The comparison between glide group and rotational group.

	G-Group	R-Group	Significant difference
Age (year)	33.00 [28.50-34.50]	27.00 [24.75-29.00]	$p < .01$
SP (m)	18.86 [18.37-19.59]	19.28 [18.78-19.59]	n.s.
DT (m)	47.00 [46.15-51.98]	57.17 [50.05-59.74]	$p < .10$

Note. SP: Shot put performance, DT: Discus throw performance, G-Group: Glide group, R-Group: Rotational group, n.s.: no significant.

## DISCUSSION

### Trends in style and performance in women's shot put

In women's shot put, the technique has shifted towards the rotational technique, similar to the men's event. This transition can be traced back to 2016, when the first medallist using the rotational technique in women's shot put emerged. Since then, the number of athletes employing the rotational technique in international competitions has increased. In the 2024 Olympic Games, 6 out of the 8 medallists used the rotational technique, and as of November 2024, 9 out of the top 10 athletes in the world, based on their performance scores, also employed the rotational technique (Table 1). This trend is also evident in different regions (Table 1), where North Central America, Oceania, and Europe show widespread use of the rotational technique. However, in other regions, the glide technique remains a dominant method. Interestingly, the top athletes in each region tend to use the rotational technique. This suggests that, in the world's top-level athletes, the rotational technique is now widely adopted. For men, the increased adoption of the rotational technique has

likely contributed to the global expansion of shot put athletes (Hatase and Takanashi 2020). Similarly, women may also see more athletes from various regions advancing to the international stage due to the rotational technique.

However, an important question arises: While the increased use of the rotational technique has led to performance improvements in men, the same has not been observed in women so far. As shown in Figure 1, the performance records in women's shot put have remained unchanged from 2005 to 2024. In contrast, men's shot put records have been updated in line with the increased use of the rotational technique, but the top women's shot put records have not been updated since the 1990s. Does this mean that the rotational technique does not apply to female athletes? To explore this further, we looked at the ages of the top female shot put athletes.

### **Age trends**

It is expected that mastering the rotational technique takes time (Stepanek 1986), and it is necessary to engage in performance improvement over a long period (Babbitt and Hoffa 2016). While it is true that mastering the rotational technique requires time, it seems that some younger athletes are already capable of competing at the highest levels before reaching full maturity. This is because, in women's shot put, younger athletes using the rotational technique are already dominating at the world level. The athletes using the rotational technique are significantly younger ( $p = .002$ ). In this study, when comparing the ages of top female shot putters, the rotational group (R group) had a significantly higher age (27.00 [24.75–29.00]) than the glide group (G group, 33.00 [28.50–34.50]). This suggests that many of the veteran athletes in the glide group have been using the glide technique for a longer period. On the other hand, more young athletes are adopting the rotational technique. Although the younger athletes in the rotational group have less experience than the veteran glide athletes, they are already becoming key competitors in international events. In the future, as these athletes mature, there may be a surge in performance that exceeds the current world records. Thus, it is premature to conclude that there is no clear advantage for female athletes in transitioning to the rotational technique. The answer may become clearer in the coming years as current young athletes mature. Additionally, the increasing availability of coaching and media content on the rotational technique may lead to an increase in athletes who start training in this technique at an early age. However, it is difficult to draw a definitive conclusion based solely on the current data, and further research is needed.

### **Relationship with discus throw performance**

An important perspective is the potential relationship between shot put and discus throw performance. Since both events share a similar turning motion, the records in both events might be correlated. Among the 27 females shot put athletes in this study, 18 had experience in discus throwing. There was no significant difference in shot put performance between the two groups ( $p = .30$ ), but when focusing on discus throw performance, the rotational group (R group) showed a tendency for significantly higher records than the glide group (G group,  $p = .07$ ). Of course, it is also possible that training with the rotational technique in shot put contributed to the discus performance, so further investigation may be needed. By clarifying the similarities in the turning movements between shot put and discus throwing, coaching strategies that utilize the synergistic effect of both events could be developed. Moreover, early engagement with the rotational technique may allow athletes to excel in both events and transfer skills between the two.

### **Implications for practical coaching**

The recent spread of the rotational technique indicates a lack of experienced coaches for this method. Since the rotational technique requires more complex movements than the glide technique, it is essential to develop a coaching system that provides specialized instruction at an early stage. Moreover, there is a scarcity of

coaching manuals and research on the technique, which highlights the need for more resources and information in this area.

If it takes a long time for the rotational technique to fully mature, it will be necessary to consider an integrated development system from an early age. For example, in Japan, athletes traditionally compete in school clubs during middle school (3 years), high school (3 years), and university (4 years). Although the number of athletes in regional club teams has increased in recent years, school clubs remain the most common setting. However, some countries with strong performances in international competitions provide a consistent training environment from the junior to senior levels. In countries like Japan, where training is often segmented into 3- or 4-year stages at each school level, there may be a tendency for coaches to focus on achieving results within a short time frame. This lack of consistency in the training environment might become a barrier to improving performance in events like shot put, which require long-term development. However, these views are largely speculative, and further investigation is needed to draw definitive conclusions.

## CONCLUSIONS

In summary, this study highlights the steady increase in the use of the rotational technique in women's shot put and its potential for improving performance. Although current records are not yet significantly higher than those achieved by glide throwers, the adoption of the rotational technique has led to the emergence of more competitive and diverse athletes. Further performance improvements are expected, particularly as younger rotational throwers continue to make their mark on the global stage.

## AUTHOR CONTRIBUTIONS

The concept for this study was proposed by Mr Hatase and Mr Takanashi. Mr Okada and Mr Takanashi collected and analysed the data and prepared the first draft. Mr Hatase contributed to the interpretation of the results and the process of producing the final draft.

## SUPPORTING AGENCIES

No funding agencies were reported by the authors.

## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

## REFERENCES

- Babbitt D, Hoffa R (2016) A Longitudinal Examination of the Throwing Career of Reese Hoffa. *New Studies in Athletics*, 31:3/4, 29-37.
- Dinsdale, A., Thomas, A., & Bissas, A. (2017). Biomechanical Report for the IAAF World Championships London 2017. Shot put men's. Retrieved from [Accessed 2025, March 11]: <https://www.iaaf.org/about-iaaf/documents/research>
- Hatase S, Takanashi Y (2022). Evolution of throwing techniques in men's shot put: A study. *Scientific Journal of Sport and Performance*, 1(2), 103-111. <https://doi.org/10.55860/OZZY9305>
- Stepanek, J (1986). Comparison of the Glide and the Rotation Technique in the Shot Put. 5 International Symposium on Biomechanics in Sports.

Salinero, J.J., & Del Coso, J. (2022). Rotational versus glide technique in elite shot put: Trend analysis in the 21st century. *Journal of Human Sport and Exercise*, 17(4), 732-739.  
<https://doi.org/10.14198/jhse.2022.174.02>



This work is licensed under a [Attribution-NonCommercial-ShareAlike 4.0 International](https://creativecommons.org/licenses/by-nc-sa/4.0/) (CC BY-NC-SA 4.0).

---