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Kata selection trends in top-level para-karate competitions: a multi-championship study

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Abstract

Purpose Para-karate has been gaining popularity rapidly; however, scientific research on the subject remains limited. This study aims to examine the kata preferences at top-level para-karate events and explore the relationship between sport class (type of impairment) and kata selection.

Methods Data was collected from nine events—four World Para-Karate Championships (2016, 2018, 2021, 2023) and five European Para-Karate Championships (2018, 2019, 2021, 2022, 2023). A total of 906 katas were performed: 567 by males and 339 by females. Descriptive statistics and chi-square tests were used for analysis.

Results Top-level para-karate athletes utilized 62 katas (61%) from the official WKF list (102 katas). The most popular katas were Gojushiho Sho (19.9%), Unsu (11.5%), Kanku Sho (9.5%), Suparinpei (6.7%), and Jion (6.2%). A significant relationship was found between sport class and kata selection ($p \leq 0.05$). The most popular kata for K30 was Unsu (15%), while K10 and K21 + K22 classes predominantly chose Gojushiho Sho (16.6% and 30.3%, respectively).

Conclusions Kata selection for para-karate athletes is influenced by the type of impairment. Intellectually impaired athletes and their coaches often select a single, challenging kata with a balanced fast-to-slow movement ratio, such as Gojushiho Sho, to optimize performance.

Highlights

This work provides an insight into the preference of kata according to the sports class of competitors and their coaches in the monitored period of para-karate top-level competitions which does not differ of non-impaired competitors in recent years.

Keywords Intellectual impairment, Physical impairment, Visual impairment, Classification, Down syndrome

Para-karate was first introduced at the World Championships in Paris in 2012 and has since become an integral part of the World Karate Federation (WKF) Senior events, with competitions held every two years. In 2015, the WKF was recognized as a member organization by the International Paralympic Committee (IPC) [1]. Para-karate provides athletes with disabilities the opportunity to compete in the kata discipline, which emphasizes choreographed martial arts movements known as "forms."

Kata involves executing a predetermined series of techniques, including strikes, blocks, stepping, kicks, and turns, all aimed at achieving technical perfection. Kata

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performance must adhere to traditional values, demonstrating strength, power, speed, grace, rhythm, and balance, while also being realistic in fighting terms [2]. Unlike able-bodied karate, para-karate focuses solely on kata, as the risk of injury from kumite (free fighting) is eliminated. This adaptation ensures that para-karate athletes can benefit from the sport's physical and cognitive advantages while competing safely. Athletes in para-karate engage with the sport on various levels, from rehabilitation and health benefits to elite competition.

Karate has demonstrated significant benefits for both physical and mental health, across various demographics, including children [3] and older adults [4]. Studies have shown improvements in brain function, psychomotor skills, and overall health among adults who practice karate regularly [5–7], as well as enhanced executive function, academic achievement, and physical fitness in children aged 7 to 11 [8, 9]. For individuals with disabilities, adaptive training enhances physical capabilities and cognitive functioning [10]. Even athletes with Down syndrome have shown increased motor competence after brief exposure to karate training [11]. Similarly, studies in the related combat sport of Taekwondo have demonstrated positive effects. Kim (2021) [12] found that Taekwondo can enhance physical, social, emotional, and cognitive functioning in adolescents and young adults with intellectual and developmental disabilities, highlighting its effectiveness as a mind-body exercise program for promoting overall health and well-being. Likewise, Carter (2016) [13] reported that Taekwondo can effectively increase strength in individuals with Down syndrome.

In line with IPC classification codes, WKF para-karate allows athletes to compete in three impairment categories: visual impairment, intellectual impairment, and physical impairment (wheelchair users), divided into four sport classes (Table 1). As of 2020, the WKF has collaborated with VIRTUS, aligning its classification for intellectually impaired athletes in para-karate competitions [14].

The K30 category unites athletes with varying abilities (as per WKF classification rules, there are 7 types of impairments: hypertonia, ataxia, athetosis, limb deficiency, impaired passive range of motion, and impaired muscle power). Though these discrepancies, athletes are compensated with added extra score (factor system), which are allocated to the athlete by the classification panel. An athlete's triumphs in the sport also hinge on type of impairment or whether they utilise a wheelchair as part of their daily life or solely for competition purposes (as a limb amputee, for example). Furthermore, the presence of the aforementioned 7 impairments, as well as potential additional disabilities, can also impact Kata selection. Athletes with higher levels of impairment could not perform kicks or jumps using a wheelchair. Athletes with tetraplegia, or very severe cerebral palsy could not manoeuvre the wheelchair as good as athletes with e.g., lower limb amputation.

Table 1 Overview of WKF Para-karate categories and sport classes

Category (Type of impairment)	Sport class
Visual impairment	K10
Intellectual impairment	K21 (IQ < 75)
	K22 (IQ < 75 with additional significant impairment)
Physical impairment (Wheelchair users)	K30

The para-karate competition format follows a group system (Fig. 1), with rounds progressively narrowing the field of competitors. Judging is based on seven criteria, including stance, technique, balance, speed, strength, and overall conformance to the kihon (fundamentals). While para-karate follows many of the same rules as able-bodied kata competitions, there are exceptions to accommodate athletes' varying impairments. A compensation system provides additional scores to athletes with more severe impairments, ensuring fairness in competition. Furthermore, intellectually impaired athletes (K21, K22) are allowed to perform the same kata repeatedly throughout the competition, unlike athletes in other sport classes [15, 16]. In karate curriculum, katas are classified into beginner, intermediate, and advanced levels to match a karateka's skill progression. Beginner katas focus on basic stances and techniques, while intermediate katas introduce more complex sequences and coordination. Advanced katas, like Suparinpei and Unsu, involve intricate movements, rapid transitions, and require high levels of technical mastery and understanding of bunkai (meaning of the kata) [17–20].

A comprehensive analysis of kata selection has long been a standard practice in able-bodied karate, with trends well-documented across gender, age categories, and competition rounds [12, 13]. For instance, the kata Gojushiho sho has been the most frequently performed kata among young cadets (U14) and cadets (U16) [21]. In the past, during the era of the flag system in competition, it was also the most performed kata in the first rounds.

However, up to date, there is no literature regarding kata selection and performance in para-karate. While templates for analyzing kata performance have been developed for able-bodied athletes [22, 23], there is still limited understanding of how para-karate athletes select their katas based on impairment class and whether certain katas are better suited to specific impairments due to their technical or physiological demands. For example, Gojushiho sho consists of 136 techniques, including 44 fast and 12 slow upper-limb movements, 34 stances,

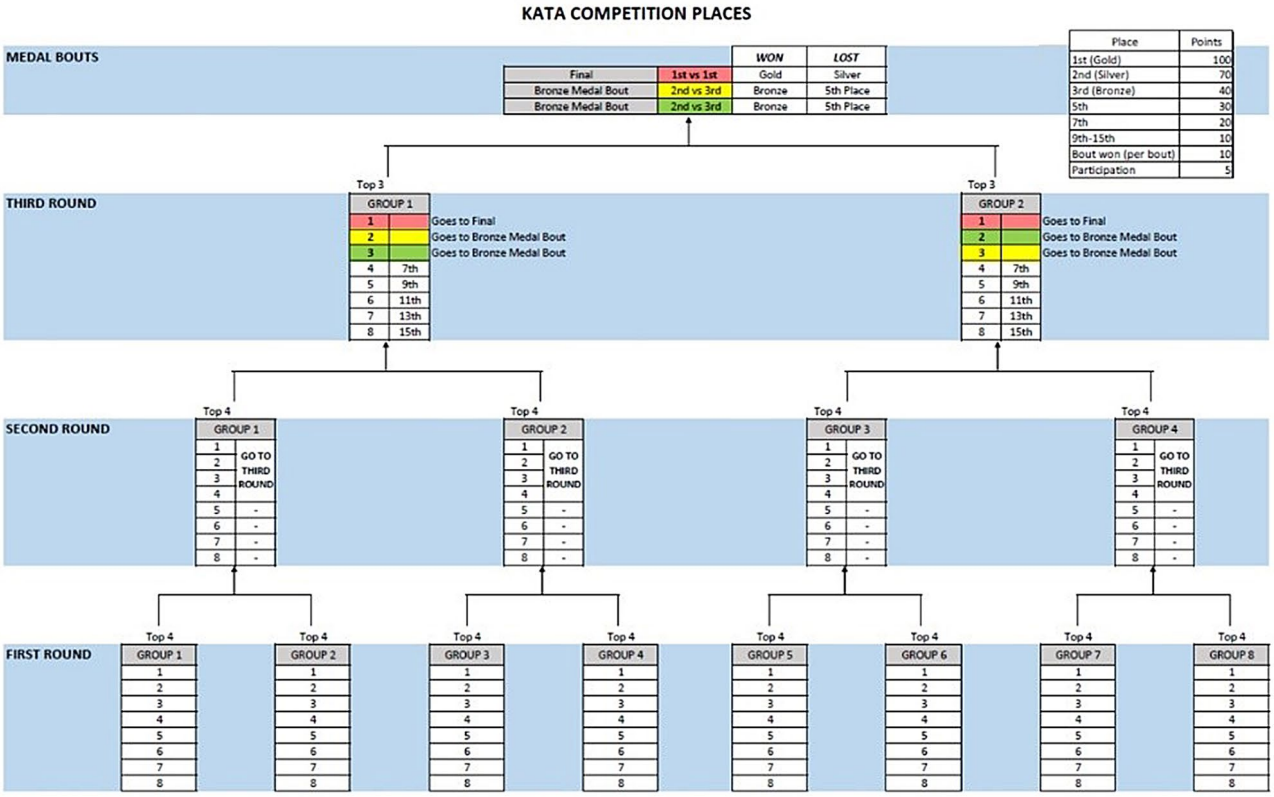

Fig. 1 Example of 8 groups (49–96 competitors) kata competition format [15]

5 kicks, and 41 transitions (21 fast and 20 slow) [24]. It features no jumps or 360-degree rotations, and many of the techniques are repeated in different directions. This makes the kata of medium difficulty, and it is often chosen by young able-bodied top-level competitors or used in the early rounds of competition [25].

Studies such as those by Argajová et al. [24], which conducted time-motion analysis of frequently performed katas (Table 2), and Augustovičová, who performed physiological assessments (Table 3) [26], provide useful insights into the technical and physiological demands of these katas. These findings suggest that technical and physiological factors could play a crucial role in kata selection strategies for para-karate athletes.

This study aims to address the current knowledge gap by providing a detailed analysis of the types and frequencies of katas performed by para-karate athletes in four consecutive World Championships (2016, 2018, 2021, 2023) and five European Championships (2018, 2019, 2021, 2022, 2023). By examining data from multiple high-level competitions, we seek to identify patterns in kata selection across different sport classes—visual impairment (K10), intellectual impairment (K21 and K22), and physical impairment (K30). Additionally, this study explores whether athletes in specific sport classes favour particular katas based on their technical composition, level of difficulty, or adaptability to the athletes' functional abilities.

The findings of this study provide a baseline for developing an evidence-based classification system following Mann's 5-step approach [27, 28]. This aims to close the gap in para-karate by accurately classifying athletes based on functional abilities, promoting fair competition. The study emphasizes the urgent need for a structured, evidence-based classification method specific to para-karate.

Methods

From the draw records of nine top-level events—four consecutive World Championships (2016, 2018, 2021, 2023) and five European Para-Karate Championships (2018, 2019, 2021, 2022, 2023) (see Table 4)—we collected data on all performed katas. For each performance, we extracted sport class, gender of an athlete and the name of the kata. A chi-square test and descriptive statistics were conducted by IBM SPSS 23 for Windows. The level of statistical significance was set to 0.05. A total of 906 kata were performed (567 in the male and 339 in the female category).

Table 2 Technical analysis of the 5 most performed katas at the WKF top-level events

	Gojushiho Sho	Chatanyara Kushanku	Suparinpai	Unsu	Anan
Block	6	21	22	9	18
Punch	24	10	18	12	14
Strike	3	25	4	3	5
Pull-Grab-Throw	11	3	3	0	6
Upper limb fast techniques	**44**	**59**	**47**	**24**	**43**
Block	12	10	22	8	14
Punch	0	0	15	0	0
Strike	0	0	0	0	0
Pull-Grab-Throw	0	1	5	2	0
Upper limb slow techniques	**12**	**11**	**42**	**10**	**14**
High	1	7	32	6	6
Middle	0	16	0	7	25
Low	33	33	13	22	8
Number of stances	**34**	**56**	**45**	**35**	**39**
High Kick	2	4	0	4	0
Low kick	0	0	0	1	3
Midle kick	3	5	4	0	6
Number of kicks	**5**	**9**	**4**	**5**	**9**
Jump	0	2	1	1	5
Rotation	3	9	6	10	4
Same place	0	7	2	1	0
Shift	7	12		2	11
Step	11	19	18	9	14
Number of fast transitions	**21**	**49**	**27**	**23**	**34**
Rotation	4	1	4		3
Same place	0	1			1
Shift	6	5	8	5	5
Step	10	1	12	5	6
Number of slow transitions	**20**	**8**	**24**	**10**	**15**
Total	**136**	**192**	**189**	**107**	**154**

Table 3 Physiological response, time-motion analysis of the kata performance

Kata	Paiku	Gojushiho Sho	Nipaipo	Ch-K	Suparinpei	Heiku	*p*
Duration [s]	112 ± 9	143 ± 8	116 ± 12	147 ± 19	204 ± 13	105 ± 16	**0.05**
HRmax [bpm]	180 ± 13.5	187 ± 8.2	185 ± 3.5	186 ± 6.4	185 ± 9.6	183 ± 5.3	ns
HRavg [bpm]	160 ± 13.3	170 ± 11.2	166 ± 11.7	171 ± 9.9	166 ± 11.3	170 ± 12.7	ns
La [mmol.l^{-1}]	4.5 ± 1.2	5.7 ± 1.2	4.8 ± 0.3	8.3 ± 2.9	4.9 ± 1.7	5.7 ± 0.8	**0.05**
Movement per second		0,9		1,26	0,93		
Fast/slow ratio		2.19		6.16	1,18		
Average score		22.99		**23.78**	23,09		

Results

Out of 102 katas in the official WKF kata list, top-level para-karate athletes used 462 different katas (61%) during the championships. The five most performed katas were Gojushiho Sho (19.9%), followed by Unsu (11.5%), Kanku Sho (9.5%), Suparinpai (6.7%), and Jion (6.2%). There is a significant relationship between sport class and choice of katas ($p \leq 0.05$). Visually and physically impaired athletes prefer kata Unsu (16.6% and 15%), while intellectually impaired athletes prefer kata Gojushiho sho (30.3% of the katas used in particular sport class). The overview of the most performed katas in para-karate per sport class is in Table 5.

Discussion

Recent round by round analysis of all performed katas during European and World Karate Championships confirms narrower repertoire of used katas of the able-bodied counterparts. For example, in the seasons 2019 (30%) [21], and 2021 (32%) [29] of officially listed katas by able-bodied athletes were performed while 61% of them by para-karate athletes.

Table 4 Overview of performed katas per sport class and championship

Championships	Sport class			Total
	K10	K21 & K22	K30	
EKF Novi Sad 2018	14	16	13	43
EKF Guadalajara 2019	17	24	26	67
EKF Porec 2021	18	27	39	84
EKF Gaziantep 2022	30	37	24	91
EKF Guadalajara 2023	25	57	24	106
WCH Linz 2016	12	27	24	63
WKF Dubai 2021	42	50	46	138
WCH Madrid 2018	36	52	36	124
WKF Budapest 2023	53	76	61	190
Total	247	366	293	906

When we consider all sports classes together, the kata Gojushiho Sho is the most frequently performed kata by para-karate athletes. It has a medium number of 56 upper limb techniques, 34 stances, only 5 kicks and 41 transitions (only 20 fast) resulting in total of 136 techniques. What is interesting, we know from previous research, this kata has also low ratio of 0.9 movements per second, and fast to slow movement ratio 2.19. It is therefore easier to remember and execute compared to other popular katas among able-bodied athletes. For instance, Chatanyara Kushanku with total of 192 techniques with 70 upper limb techniques (59 fast) and 56 stances and 49 fast transitions in similar time has higher ratio of 1.26 movements per second and fast to slow movement ratio 6.16 which makes it barely comparable [18, 19]. Gojushiho Sho is a most frequent choice among disabled karatekas, which is not surprising. It is so probably due to lower physical and cognitive difficulty with fair arrangement of techniques, that makes this kata very popular, from which can para-athletes across sports classes benefit and show their qualities as well.

More, for comparison, in the 2021 season, kata Gojushiho sho was the popular choice of healthy athletes when it comes to executing their routines [25]. It was the most performed kata by young cadets (U14) and cadets (U16) too [21]and in the past during the era of the flag system of the competition, Gojushiho Sho was the most performed kata in the 1st round of the competitions of 2019 [25, 30].

Intellectually impaired sport classes (K21 and K22)

Gojushiho Sho was the most performed kata in II sport classes. Popularity is understandable when considering the kata's emphasis on stances and upper limb techniques [20], primarily punches, along with its balanced ratio of fast and slow transitions [24], and the absence of jumps. Such a composition makes Gojushiho Sho not only physically appropriate but, more importantly, intellectually accessible for these athletes. The kata presents a suitable level of cognitive demand that allows athletes to perform effectively without becoming overwhelmed.

In contrast, advanced katas such as Chatanyara Kushanku, Unsu, and Suparinpei present considerable challenges for intellectually impaired athletes due to their length, complexity, and high technical demands

Table 5 The most performed katas of top-level para-karate athletes per sport class

Kata	Sport class		Kata	Sport class		Kata	Sport class		Kata	Total	
	K10			K21 + K22			K30				
	N	%		*N*	%		*N*	%		*N*	%
UNSU	41	16.6%	GOJUSHIHO SHO	111	30.3%	UNSU	44	15.0%	GOJUSHIHO SHO	180	19.9%
GOJUSHIHO SHO	32	13.0%	SANSAI	32	8.7%	KANKU SHO	42	14.3%	UNSU	104	11.5%
KANKU SHO	31	12.6%	SUPARINPEI	30	8.2%	GOJUSHIHO SHO	37	12.6%	KANKU SHO	86	9.5%
JION	16	6.5%	CHATANYARA KUSHANKU	27	7.4%	GOJUSHIHO DAI	26	8.9%	SUPARINPEI	61	6.7%
SUPARINPEI	15	6.1%	JION	24	6.6%	SANSAI	18	6.1%	JION	56	6.2%
BASSAI DAI	15	6.1%	KUSANKU	23	6.3%	KANKU DAI	17	5.8%	SANSAI	52	5.7%
SOCHIN	10	4.0%	UNSU	19	5.2%	SUPARINPEI	16	5.5%	CHATANYARA KUSHANKU	41	4.5%
ENPI	9	3.6%	NISEISHI	14	3.8%	JION	16	5.5%	GOJUSHIHO DAI	38	4.2%
GOJUSHIHO DAI	8	3.2%	KANKU SHO	13	3.6%	CHATANYARA KUSHANKU	13	4.4%	BASSAI DAI	36	4.0%
ANAN	8	3.2%	BASSAI DAI	12	3.3%	BASSAI DAI	9	3.1%	KUSANKU	25	2.8%
OHAN DAI	6	2.4%	ENPI	8	2.2%	GANKAKU	7	2.4%	ENPI	23	2.5%
PAIKU	6	2.4%	SEIENCHIN	8	2.2%	ENPI	6	2.0%	KANKU DAI	20	2.2%
GANKAKU	5	2.0%	GOJUSHIHO DAI	4	1.1%	SOCHIN	5	1.7%	SOCHIN	17	1.9%
KURURUNFA	5	2.0%	KANKU DAI	3	0.8%	ANAN DAI	4	1.4%	NISEISHI	15	1.7%
SHISOCHIN	5	2.0%	KOUSOUKUN DAI	3	0.8%	GOJU SHIHO DAI	4	1.4%	GANKAKU	12	1.3%
Others	35	14.17%	**Others**	35	9.6%	**Others**	29	9.9%	**Others**	140	15.5%

and the karateka must have first mastered the basic kata [17, 20, 31]: These katas involve long sequences with rapid directional changes and intricate coordination between hand and foot movements. For athletes with intellectual impairments, these sequences can be overwhelming. Difficulties with memory retention and attention make it challenging to remember and accurately execute the precise order of movements. The advanced coordination required for these katas involves synchronizing upper and lower body movements, maintaining balance, and generating power. Intellectual impairments often affect motor planning and fine motor skills, making it difficult for athletes to perform complex techniques like high kicks, spins, or jumps with precision. The sudden changes in speed, intensity, and posture in these katas can lead to sensory overload, particularly for athletes who have co-occurring sensory processing difficulties. This can result in anxiety or stress, hindering their ability to focus and execute movements fluidly, thereby impacting performance.

Additionally, athletes with Down syndrome could suffer with other additional impairment, Down's syndrome lag behind their intellectually disabled peers in many areas of motor coordination [32] and postural stability [33]. In the study of Camacho [34], 25.5% of participants had physical disabilities, 44% obesity, 18.3% sensorial disability, 6.3% had serious health problems, and 4.9% had sleep disorders. It may be less challenging for these athletes to practise for the competition katas with a small number of elements and simpler ones. Development in the sport of para-karate forces athletes and their coaches learn and perform more challenging katas which does not always lead to success [35].

Visually impaired sport class K10

Visually impaired athletes often prefer katas such as Unsu, Gojushiho Sho, and Kanku Sho, with Unsu being the most frequently performed. Unsu contains 34 upper limb techniques, 35 stances, 5 kicks, and 33 transitions, totaling 107 techniques—one of the lowest counts among advanced katas. The kata's relatively straightforward embusen (pattern of movement) and fewer complex directional changes help minimize the risk of disorientation, making it easier for visually impaired athletes to navigate the limited space of the tatami. Additionally, the moderate pace and absence of overly complex steps reduce learning difficulties, as athletes can focus on balance and orientation rather than managing fast shifts. This strategic choice allows visually impaired athletes to maintain stability, ensuring a safer and more controlled performance during competitions.

Physically impaired sport class K30

Athletes in the wheelchair category (K30) frequently perform katas such as Unsu (15%), Kanku Sho (14.3%), Gojushiho Sho (12.6%), Gojushiho Dai (8.9%), and Sansai (6.1%). Unsu is the most popular kata for this category, as it is for visually impaired athletes, due to its lower number of techniques (as mentioned earlier), making it a preferred choice among K30 athletes. For instance, the widely performed Suparinpei has 89 upper limb techniques, 51 transitions, and a longer duration, which may be too demanding. In contrast, Unsu features a limited number of transitions, particularly fewer rapid shifts and complex movements, reducing the need for extensive wheelchair maneuvering and conserving energy during the execution of upper limb techniques, which can be physically exhausting. The shorter duration and moderate complexity of Unsu allow for dynamic yet controlled performances, making it a strategic selection for wheelchair athletes.

Interestingly, some athletes in this category also select katas like Gankaku, which involve balance techniques such as simulated sidekicks while balancing on the rear wheels. This kata showcases wheelchair mobility and balance—key factors in para-karate evaluation criteria—and can earn high scores when performed successfully. Furthermore, it is possible that more able athletes choose katas incorporating jumps and kicks (like those found in Unsu) to demonstrate their athletic capabilities and earn additional points from referees, as these elements highlight their physical abilities and technical skill.

Practical implications for coaches

Based on our findings, coaches working with **visually impaired athletes** are advised to prioritize katas with linear embusen patterns and minimal rapid transitions, such as **Unsu**, to reduce the risk of spatial disorientation on the tatami. Shorter katas with fewer movement requirements are also recommended to enhance spatial control and execution precision.

For **intellectually impaired athletes**, training programs should focus on the consistent practice of a single, balanced kata like **Gojushiho Sho**, which offers an ideal ratio of fast and slow movements. This approach minimizes cognitive load and promotes performance stability. Gradually introducing and repeating a limited number of katas is recommended to build procedural memory and increase confidence.

For **physically impaired athletes** (K30 class wheelchair users), coaches should select katas that require lower upper-limb exertion and involve minimal directional changes to effectively manage energy levels and minimize the physical demands of wheelchair maneuvering. Emphasizing katas that showcase dynamic upper-body techniques without extensive mobility requirements

will better align with competition evaluation criteria and optimize scoring potential.

This study emphasizes the importance of understanding how different impairment types influence kata selection in para-karate. It underscores that tailored training interventions, which address the specific physiological and functional challenges faced by para-athletes, are crucial for optimizing performance outcomes.

Implications for enhancing the para-karate classification system

Using Mann's 5-step process for the research [27, 28] as a foundation, the development of a classification system for para-karate should not only categorize athletes based on physical and functional criteria but also consider how these impairments specifically impact key technical and tactical aspects of kata performance. By analyzing the katas preferred by athletes with different impairments (e.g., Unsu for visually impaired and wheelchair users, Gojushiho Sho for intellectually impaired athletes), we can identify the critical performance determinants unique to each impairment class. This knowledge is essential for designing a classification system that accurately reflects the specific demands of kata and ensures fair classification and competition.

With a detailed understanding of the most frequently practiced katas for each impairment category, the next step is to develop classification criteria that align closely with these technical and physiological demands, opening opportunities for future research to design tests that accurately evaluate the skills most relevant to para-karate performance—such as balance, spatial awareness, coordination, endurance, and adaptability to rapid movement transitions. An evidence-based classification system ensures a fair and transparent process where athletes are evaluated not merely by impairment type but by how these impairments affect their performance of specific kata components. By grounding the classification system in the technical and physiological requirements specific to para-karate and validating it through athletes' kata preferences and performance data, the system becomes not only more relevant and fair but also scientifically rigorous. This approach guarantees that the classification criteria are directly aligned with the actual demands faced by athletes in competition.

Limitations of the study

This study focused on a specific population of high-level para-karate athletes with qualifying impairments competing under the WKF Paralympic style. While the findings offer valuable insights into this group, some limitations restrict how broadly we can apply these conclusions:

Sample

The study only included top-tier athletes. This means the results may not be representative of lower-performing para-karate athletes competing at national or regional levels, nor can they be automatically applied to athletes with more severe impairments. Additionally, the research solely examined athletes competing under the WKF Paralympic style, so it cannot be generalized to other para-karate styles or competitions under different organizations.

Data

The study design did not collect information on two potentially influential factors: training quality and volume, as well as the specific details of the athletes' impairments. Training intensity and structure could play a role in kata selection, and a deeper understanding of the athletes' impairments might provide further insights into their performance. Training quality can influence an athlete's ability to adapt their skills to more challenging katas. High-quality training programs that incorporate drills for memory enhancement, balance, and coordination could enable athletes to attempt more advanced katas. Athletes with higher training volume (more frequent and longer practice sessions) may have greater familiarity and proficiency with a broader range of katas, potentially expanding their kata choices beyond the most frequently performed ones. Conversely, athletes with lower training volume may stick to simpler or familiar katas like Gojushiho Sho to minimize cognitive and physical demands.

Due to these limitations, the generalizability of the study's findings is restricted. Future research should consider incorporating a wider range of athletes, competition styles, and potentially explore the impact of training and impairment specifics on kata selection in para-karate.

Conclusions

The choice of kata in para-karate depends significantly on the type and severity of the athlete's impairment. Top-level para-karate athletes used 62 katas (61%) out of the 102 available during championships, with **Gojushiho Sho** being the most popular (20%). The selection pattern is similar to that of non-impaired athletes, but there is a significant relationship between sport class and kata choice for competition. Visually and physically impaired athletes predominantly choose **Unsu**, while intellectually impaired athletes favor **Gojushiho Sho**. Intellectually impaired athletes and their coaches tend to select this challenging kata for its lower fast-to-slow movement ratio, aiming to optimize performance and increase their chances of success.

Author contributions
D.A. wrote the main manuscript and prepared the data. R.H. analyzed the data and finalized the manuscript and tables. A.M. reviewed the manuscript from his para-karate coach experience point of view. D.V.B. reviewed the manuscript as an expert in II sports science. M.H. reviewed the manuscript from his non-disabled karate coach experience point of view. All authors reviewed the manuscript and agree with the submission.

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Data availability
The results tables are available online at: https://www.sportdata.org/wkf/set-online/calendar_archiv_main.php?active_menu=calendar#center_outer_middle.

Declarations

Ethics approval and consent to participate
Ethical Committee of the Faculty of Physical Education and Sport of Comenius University in Bratislava, Slovakia (UK5/2023) "Model of sport specific classification of top-level para-karate athletes".

Consent for publication
This study utilized draw records of athletes, originally obtained from a publicly accessible database. To protect the privacy of the individuals, all data was anonymized, ensuring that no personal identifiers remained within the dataset. As the data was both anonymized and publicly available, ethical approval was not required for this study. The anonymization process adhered to relevant guidelines, includinghe General Data Protection Regulation (GDPR) (EU) 2016/679, ensuring the confidentiality and privacy of the individuals involved. The data was fully anonymized, preventing any possibility of individual identification.

Competing interests
The authors declare no competing interests.

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References

1. World Karate Federation. Para-Karate. 2023;: 1–6.
2. WKF. World Karate Federation Kata Competition Rules. World Karate Federation. 2024;1(1):13.
3. Pavlova I, Bodnar I, Mosler D, Ortenburger D, Wasik J. The influence of karate training on Preparing preschool girls for school education. Ido Mov Cult. 2019;19. https://doi.org/10.14589/ido.19.2.3.
4. Valdés-Badilla P, Herrera-Valenzuela T, Ramirez-Campillo R, Aedo-Muñoz E, Báez-San Martín E, Ojeda-Aravena A, et al. Effects of olympic combat sports on older adults' health status: A systematic review. Int J Environ Res Public Health. 2021;18. https://doi.org/10.3390/ijerph18147381.
5. Bhattacharya P, Chatterjee S, Mondal S. Effect of karate on neurocognitive physiology: A focused review. Neurol India. 2022;70. https://doi.org/10.4103/0028-3886.338688.
6. Mastnak W, Karate. Interdisciplinary perspectives and benefits for health. J Combat Sports Martial Arts. 2016;7. https://doi.org/10.5604/01.3001.0009.9078.
7. Witkowski K, Piepiora PA, Lesnik M, Migasiewicz J. Social status of karate and personal benefits declared by adults practicing karate. *Archives of budo science of martial arts and extreme sports* 2017; 13.
8. Lima RF, Da Silva VF, De Oliveira GL, De Oliveira TAP, Filho JF, Mendonça JGR, et al. Practicing karate May improves executive functions of 8-11-year-old schoolchildren. J Phys Educ Sport. 2017;17. https://doi.org/10.7752/jpes.2017.04283.
9. Pinto-Escalona T, Gobbi E, Valenzuela PL, Bennett SJ, Aschieri P, Martin-Loeches M, et al. Effects of a school-based karate intervention on academic achievement, psychosocial functioning, and physical fitness: A multi-country cluster randomized controlled trial. J Sport Health Sci. 2021. https://doi.org/10.1016/j.jshs.2021.10.006.
10. Gallotta MC, Franciosi E, Giorgi M, Guidetti L, Cerbara E, Pes G, et al. Benefits of inclusive sport training on fitness and health of athletes with and without intellectual disability. Sci Rep. 2024;14:1–11.
11. Quinzi F, Vannozzi G, Camomilla V, Piacentini MF, Boca F, Bortels E, et al. Motor competence in individuals with down syndrome: is an improvement still possible in adulthood?? Int J Environ Res Public Health. 2022;19:1–15.
12. Kim J, Kim Y, Piatt J, Ji M. Perspectives of parents on health benefits associated with Taekwondo for adolescents and young adults with intellectual and developmental disability. South Afr J Res Sport Phys Educ Recreation 2021; 43.
13. Carter K, Horvat M. Effect of Taekwondo training on lower body strength and balance in young adults with down syndrome. J Policy Pract Intellect Disabil. 2016;13. https://doi.org/10.1111/jppi.12164.
14. WKF. WKF joins Virtus to further develop Para-Karate. 2023;: 13–16.
15. World Karate Federation. Para-karate Kata Competition Rules. 2023.
16. WKF. Para karate classification rules. 2021https://www.wkf.net/structure-statutes-rules
17. Masatoshi Nakayama. Best karate: Unsu, Sochin, Nijushiho.pdf. Kodansha USA; First Edition; 1990.
18. Hopkins G. Suparinpei: the last Kata of Goju-Ryu karate. Blue Snake Books; 2021.
19. Nakayama M. Best karate comprehensive. Kodansha USA; First Edition; 1977.
20. Nakayama M. Best karate, vol.11: Gojushiho Dai, Gojushiho Sho, Meikyo. New York: Kodansha USA; 1989.
21. Novosad A, Argajova J, Augustovicova D. New kata evaluation in top-level karate: analysis of frequency and score of katas in k1 premiere league. Archives Budo. 2020;16:153–60.
22. Augustovicova D, Argajova J, Rupcik L, Thomson E. Development of a reliable and valid kata performance analysis template. 2020; 20: 3553–9.
23. Augustovicova Cierna D, Argajova J, Rupcik L. TE S. Inter and intra-rater reliability of the kata performance analysis template. ECSS: Seville,; 2020.
24. Argajova J. Time-motion analysis of the most performed katas at the top-level karate competition. European colbook of abstracts. European Colledge of Sport Sciences: Seville,; 2020.
25. Augustovicova D, Stefanovsky M, Argajova J, Kampmiller T. The issue of early specialization in karate: the same pool of katas in all top-level WKF competition age categories. Archives Budo. 2019;15:241–8.
26. Augustovičová D, Hadža R, Štyriak R, Barinec P. Physiological response to different Kata performances. Acta Facultatis Educationis Physicae Universitatis Comenianae. 2021;61. https://doi.org/10.2478/afepuc-2021-0002.
27. Tweedy SM, Mann D, Vanlandewijck YC. Research needs for the development of evidence-based systems of classification for physical, vision, and intellectual impairments. In: *Handbook of Sports Medicine and Science: Training and Coaching the Paralympic Athlete*. 2016 https://doi.org/10.1002/9781119045144.ch7
28. Mann DL, Tweedy SM, Jackson RC, Vanlandewijck YC. Classifying the evidence for evidence-based classification in paralympic sport. J Sports Sci. 2021;39. https://doi.org/10.1080/02640414.2021.1955523.
29. Augustovicova D, Hadza R. Kata selection after the full adoption of the scoring system at the top-level karate competitions. 2022; 22: 71–9.
30. Augustovicova D, Stefanovsky M, Argajova J. The issue of early specialization in karate: the same pool of katas in all top-level WKF competition age categories. 2019; 15: 241–8.
31. Masatoshi Nakayama. Best karate, vol. 2: fundamentals. Kodansha International Ltd; 1978.
32. Startin CM, Hamburg S, Hithersay R, Davies A, Rodger E, Aggarwal N, et al. The LonDownS adult cognitive assessment to study cognitive abilities and decline in down syndrome. Wellcome Open Res. 2016;1. https://doi.org/10.12688/wellcomeopenres.9961.1.
33. Blomqvist S, Olsson J, Wallin L, Wester A, Rehn B. Adolescents with intellectual disability have reduced postural balance and muscle performance in trunk and lower limbs compared to peers without intellectual disability. Res Dev Disabil. 2013;34. https://doi.org/10.1016/j.ridd.2012.07.008.
34. Camacho R, Castejón-Riber C, Requena F, Camacho J, Escribano BM, Gallego A, et al. Quality of life: changes in self-perception in people with down syndrome as a result of being part of a Football/soccer team. self-reports and external reports. Brain Sci. 2021;11. https://doi.org/10.3390/brainsci11020226.

35. Augustovicova DC, Argajova J, García MS, Rodríguez MM, Arriaza R. Top-level karate: analysis of frequency and successfulness of katas in K1 premiere league. IDO Mov Cult J Martial Arts Anthropol. 2018;18:46–53.

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