

Classification changes in para swimming and their impact on the Czech Para Swimming Team

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ABSTRACT

This aim of this article is to describe up-to-date polices and main classification issues in Paralympic sport with focus on Paralympic swimming. Using narrative review, it determines the influence of recent classification changes by reviewing available research data on how the classification system works and what direction it has taken after January 2018 when the new Classification Manual for swimming was published. It analyzes those changes in Czech Para Swimming Team during 4-year-period leading up to Tokyo Paralympic Games 2020 including 3 major swimming competetions and Paralympic Games itself. The results show the changes directly influenced the performance of Czech para swimmers in mentioned major competetions in a positive way. Czech Para Swimming Team added two more medals and gained more spots for both men and women for Tokyo Paralympic Games 2020 effectively extending relatively small Czech Paralympic Team in Tokyo.

KEYWORDS

disability sport; impairment; Tokyo 2020; Paralympic games

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INTRODUCTION

A type of any classification is being used in most sports. The most common classification units in sport are age, gender and body weight. However, the classification in para sport is a key difference between Olympics and Paralympics (Burkett et al., 2018) providing a fair competition for athletes with a range of physical disabilities (Oh et al., 2013). This enables an equitable starting point for competition by minimizing the impact their impairment has on the outcome of the event (Payton et al., 2020). On the other hand, it belongs among the most challenging issues in Paralympic sports (Jaeken, 2020).

Para sport classification systems define eligibility for para sport and provide a competition structure (Vanlandewijck et al., 2011; Tweedy et al., 2018). In other words, classification systems should ensure para sport is not dominated by those athletes with the least impairment, but rather athletic excellence is the key determinant of success (Ungerer, 2018). Based on the testimonies of athletes and competition observations, sometimes this is rather wish than a reality.

Within each sport, there is a general drive towards evidence-based classification. The reason is that classification is a critical aspect of Paralympic sport (Tweedy et al., 2014). It determines who is and who is not eligible to compete in Paralympic sport. As public or media awareness of Paralympic movement grows, so does the importance of classification decisions that determine the eligibility and allocation of athletes into classes.

The aim of this article is not only to describe up-to-date classification in para swimming, but to present emerging issues in this field and raise questions to increase the awareness of this topic among sport scientists. Furthermore it focuses on classification changes after January 2018 when an evaluated Classification Manual was published causing all internationally competing swimmers to undergo classification evaluation again. It is well known that the classification class assigned to an athlete has a significant impact on the level of success that an athlete can achieve. This further proves individual classification systems should not be created solely based on the judgement of classifiers, but should be supported by evidence and validated studies (Tweedy et al., 2011; Vanlandewijck et al., 2011).

The article analyses the effects of the classification changes process in Czech Para Swimming Team regarding the results of 4 major competition events from European Championships 2018 up to 2020 Tokyo Paralympic Games with the goal of confirming or denying the significance of classification changes in relation with both individual and team performance.

To accomplish that we must answer following questions:

1. What system is used to evaluate athlete's performance and who is eligible to compete?
2. How are the athletes evaluated?
3. How is the classification system further evolving?
4. What are the effects of recent classification changes?

METHOD

To analyze and summarize most important information for this topic, a narrative review is used. Sources included official documents from World Para Swimming, documents from classification seminars and scientific literature retrieved searching within

the following electronic bibliographic databases: WoS, PubMed, SPORTDiscus and ERIC (via EBSCO) and Scopus in the time period of last 10 years, i.e. from 2011 to 2021 (key words: “para sport”, “paralympic”, “classification”, “para swimming”). The search was limited to papers published in English language.

REVIEW

Paralympic classification process

Currently, the classification system in para sport can be broadly described using functional performance limitations assessment of the disability rather than its medical classification. As a milestone of this major change in perspective the Barcelona Paralympic Games in 1992 is considered (Jaeken, 2020). The functional system is rather dynamic and allows individuals with originally different medical diagnoses to compete together in categories. Thus, for different sports, classification classes may differ for the same athlete if the level of disability’s impact on the sport performance is different (Štefák, 2017; Tweedy et al., 2011).

However, the medical point of view is still necessary to describe the minimum disability threshold an athlete must have to be eligible. These criteria determine who can participate. Examples of minimum handicap criteria include maximum height for an athlete with a height impairment, or amputation height for an athlete with a missing limb. Each sport has specific minimum handicap criteria (International Paralympic Committee, 2021b [online]).

Ten eligible types of impairment for Paralympic sport involve 8 of them being physical disability (reduced muscle strength, limited passive range of motion, limb loss, differences in lower limb length, stature disorder, hypertonia, ataxia and atehostosis), the 9th area being visual impairment and the 10th area being intellectual impairment. World Para Swimming accepts all ten of the above mentioned disabilities. So in conclusion to answer our first question – an athlete must have at least one of the listed disabilities to participate in para sport. Further expansion would have to be decided by the IPC (International Paralympic Committee) General Assembly (International Paralympic Committee, 2021a [online]), International Paralympic Committee, 2021b [online]).

Evaluation methods

Once the eligibility and minimal handicap are confirmed, next step is to separate athletes into groups with similar activity limitations in their specific sports in order to minimize the impact of impairments on sport performances (Jaeken, 2020). Based on the “clinical” assessment, the athlete is assigned to one of the classification classes. (International Paralympic Committee, 2021a [online]). The main classification differences lie in the way these impairments are evaluated during the classification process. Nevertheless, precise evaluation is a crucial point of the classification.

The classification is not open to the public and only the athlete is allowed to participate. It is usually conducted by two to three classifiers (i.e. classification panel), at least one of whom has a medical background, called a medical classifier, and at least one of whom has a sport background, called a technical classifier (International Paralympic Committee, 2021a [online]).

In swimming, the classification process consists of two parts – a dry land test (bench test) and an in-water test. For physically disabled athletes, classes 1–10 are designated with prefixes S for backstroke and freestyle, SB for breaststroke and SM for medley events. Thus, the classification result is a numerical class with prefixes, for example S7/SB7/SM7.

The SM prefix is not assigned according to the extent of the disability but is calculated according to the formula $SM = (3S + SB)/4$, while for the lower classes, S1 to S4, the formula $SM = (2S + SB)/3$ applies, due to the absence of a butterfly section in the medley event (World Para Swimming, 2018c). The result of the SM class is rounded up or down by the classifiers subjectively according to the swimming performance evaluated. It applies that the lower the class number is, limitations of the disability and the overall effect on athlete's performance increases.

If classifiers assign an athlete a classification class, they must also determine the athlete's sport classification status, i.e. whether the athlete will have to undergo further classification in the future. Basically, there are 4 statuses. The New (N) status is assigned to the athlete before the athlete takes part in a classification. It describes that this athlete must first participate in a classification before he/she can compete in his/her first international competition. The Confirmed (C) status gets the athlete who has both a qualifying impairment and a stable (i.e. unchanging) ability to perform the specific tasks and activities that are essential to the particular sport. Moreover, such athlete is not required to undergo further classification (except in situations involving protests, medical review and changes to the criteria for the classification class in which he/she is placed). The Review (R) status is provided when the Classification Panel believes that further classification will be required. It may make this determination based on several factors, e.g., when an athlete has recently transitioned from an Olympic sport to a Paralympic sport, has an unstable or progressive impairment that, while permanent, is not stable, or has not reached physiological maturity due to the athlete's young age. An athlete with R status must undergo further classification at the next major international competition or before a fixed date (certain year is always used) in case of Fixed Review Date (FRD) status (International Paralympic Committee, 2021a [online]).

Within the bench test, World Para Swimming (2018c) recognizes several tests. Those need to be reliable, ratio-scaled, and resistant to training (Beckman et al., 2017).

Muscle Strength Test is conducted on a six-point scale from zero to five, assessing the functional range of motion of the test subject when applying the resistance of the classifier to the far end of the limb of the muscle being tested. The scale is well described. However, certain level of subjectivity is present as the classifier is measuring muscle strength against his/her resistance. As such there is a need of great experience from the classifier. Especially for athletes with cervical spinal cord injuries, assessment of manual muscle power is mostly used as the starting point for classification (Ungerer, 2018). As Beckman et al. (2017) suggest the most appropriate voluntary strength assessment method for inferring strength loss in para-athletes should be multi-joint, isometric tests performed at joint angles that facilitate maximum force production.

Similarly, Coordination Test (especially important for swimmers with ataxia, atetosis, hypertonia or a neurological disorder such as cerebral palsy, formerly cerebral palsy) uses a six-point scale from zero to five, which again needs a certain level of experience as it looks at the quality of the movement.

The six-point scale is also used in passive joint range of motion testing and the individual grades are awarded based on the so-called Passive Functional Range of Motion for Swimming (PFROMS scale), where the movement performed is rated as a percentage. The movement is not performed by the examinee but is performed passively by the classifier.

Perhaps rather quantitative measurements could be more precise and undoubtable, like measurement of loss of limb length which is measured precisely, often with the use of X-rays. The measurement is taken twice, if the difference between the first and control measurement is greater than 1%, a third measurement is taken. The amount of limb loss is then scored according to the table in the classification manual. For people with dwarfism, it is important to measure height of the swimmer with different levels for males and females.

All above mentioned methods should be valid and reliable which is fundamental demand for fair and evidence-based classification (Hutchinson et al., 2021). However, minimal consensus exists for assessing impaired strength, coordination and range of motion. In the light of evidence-based approach, a systematic review on this topic showed “moderate” confidence in using isometric strength for assessing strength impairment, tapping tasks for the assessment of coordination had “low” confidence rating. Moreover, some other identified measures gained “very low” confidence rating (Hutchinson et al., 2021). The problem of reliability in coordination measurements was confirmed by study of Smith et al. (2021) who evaluated trunk coordination, range of motion (ROM), and strength in non-disabled participants.

Future research direction based on current classification issues

Because of high subjectivity of the tests, rather objective methods were suggested. Especially physical assessment of hypertonia, ataxia and athetosis is scored by subjective clinical judgment. The study of Maia et al. (2021) used practical and more objective measures of movement smoothness, rhythm error and accuracy. To quantify smoothness of the movement, an accelerometry was used. For rhythm error and accuracy, the researchers used video. The authors confirmed difference in these parameters between para swimmers and able bodied swimmers and concluded that most important predictors in classifying participants were movement smoothness at both movement speeds, and rhythm error at 120 bpm.

The classification process also needs to take into account asymmetry in the movement and other (more global) factors as asymmetry in movement could reduce optimal performance (Dingley et al., 2014). Biomechanical and coordination measurements were also considered to be useful tools to assess swimming performance (Feitosa et al., 2019).

Recent study of Dos Santos et al. (2021) evaluated kinematic variables of para swimmers' performance and their relationship with functional classification using four underwater cameras. Swimming velocity, stroke length, and submerged phase were positively correlated with the para swimmers functional classification. Nevertheless, stroke rate, velocity hand for each phase, coordination index, and intracyclic velocity variation were not related to the classification.

The most important in the para swimming classification however, is evaluation of swimming propulsion (Hogarth et al., 2020). Possible way, how to evaluate this pa-

parameter is to use a 30second maximal fully tethered freestyle swim test. In the study with 80 elite swimmers, para swimmers with physical impairment had lower absolute and normalized tether forces than able-bodied swimmers, and there were moderate positive correlations found between tether forces and sport class (Hogarth et al., 2020). Interestingly, para swimmers with limb deficiency showed stronger relationships between tether force and maximal freestyle swim speed than did para swimmers with hypertonia and impaired muscle power. The authors concluded that physical impairments affect para swimmers' tether forces during maximal fully tethered freestyle swimming, explaining a significant proportion of their activity limitation. It was recommended that maximal fully tethered swimming be included in Paralympic swimming classification as an objective assessment of swimming propulsion (Hogarth et al., 2020).

The ability to overcome drag (both active and passive) is also an important factor for swimming as well. Active and passive drag is higher in swimmers with central motor and neuromuscular impairments in comparison to nondisabled swimmers. It is associated with sport class (i.e. severity of swim-specific impairment) and maximal freestyle performance. As such, swimmers with other non-neurologic (e.g. anthropometric) impairments might have advantage over those with “neurological” ones (Payton et al., 2020). For this reason, it is suggested that drag measures should be considered for classification for these swimmers, but not for those with anthropometric impairments.

A specific issue which arised recently is the impact of age and maturation on performance and classification. Hogarth et al. (2021) reported age having the most noticeable influence on performance between the ages of 12–20 years before performances stabilize and peak in the twenties. As for gender, women are faster during early adolescence and their performances stabilize, peak and decline at younger ages. The most interesting is that swimmers from different sport classes show differences in age-related trajectories in performance after maturation and when training-related factors are more likely to explain competitive swim performance. According to the authors, results of this study can help to inform decision-making on the allocation of sport class and its status in para swimming classification.

Although scientifically valid and reliable methods must be used primarily to classify the degree of disability, these measurements alone cannot be the sole criteria for classification. This is because although some impairments are permanent, they can be influenced to varying degrees by exercise and training. For example, individuals with partial spinal cord injury and spastic hypertonia may have permanently limited muscle strength that is influenced to varying degrees by exercise and training. It is therefore extremely important that athletes who, through exercise and training, perform better in the classification process than those who have the same impairment but, for example, do not exercise at all and therefore perform less well in classification, are not disadvantaged by being assigned a classification class for a lesser degree of impairment. Ensuring that well-trained athletes are not disadvantaged in this way requires methods that allow classifiers to distinguish these athletes from untrained athletes. A battery of reliable tests for identifying limitations based on the consequence of disability level will provide classifiers with a way to differentiate these athletes (Reina, 2014).

Also, we might expect that athletes who are taller, i.e. have greater muscle mass and longer arm span, swim faster. However, is this truth also for athletes with a physical disability? In a study of Dingley et al. (2015), this was truth for midsevere disability females but not for female from no-disability and low-severity-disability groups, greater muscle mass was associated with slower velocity. Also, lighter females (with less frontal surface area) in the low-severity group were faster. This however didn't pay for male swimmers. This might have impact on coaching as these authors recommend low-severity male swimmers and midseverity female swimmers to develop muscle mass and upper-body power to enhance their performance.

Another issue might be specific health conditions of athletes with quadriplegia and high paraplegia due to spinal cord injury. Mills & Krassioukov (2011) suggested the inclusion of autonomic nervous system parameters into classification of athletes with high-level spinal cord injury. Based on this assumption, Squair et al. (2018) recommended incorporating assessments of cardiovascular capacity in classification of elite wheelchair rugby athletes.

In conclusion sport classification in swimming and its methodology is evolving and World Para Swimming has gradually implemented significant changes to the classification system, based on numerous research studies, e.g. Hogarth et al. (2018). Further and deeper research is definitely needed to advance evaluation methods and improve the classification system as a whole.

Classification class allocation changes in the Czech Paralympic Swimming Team from 2018

After World Para Swimming published revised Classification Manual in January 2018, all internationally competing swimmers were obligated to undergo new classification evaluation at the closest opportunity regardless of swimmer's current classification status (Confirmed, Review or Review with the Fixed Date) due to the significant changes in evaluation methods as mentioned above. If the athlete failed to comply it was forbidden for that athlete to participate in any major World Para Swimming competition (European or World Championships and Paralympic Games) going forward (World Para Swimming, 2018c). Following the rule Czech Para Swimming Team sent 17 swimmers to undergo the process and all of them successfully qualified (met Minimum Qualification Standard time for participation) for European Championship in Dublin, Ireland later that year, however only 16 decided to participate (World Para Swimming, 2018a). There were major changes in classification for three Czech swimmers in 2018, two males and one female. One male swimmer previously classified in S4 was allocated S5 class with "Confirmed" status and decided shortly after not to participate in Dublin. The other male swimmer previously classified in SB5 was allocated SB4 class with "Review in 2020" status, causing him to compete with more severely disabled swimmers than before and effectively giving him a chance to fight for the medal podium in his main 100 m Breaststroke event. And eventually he had hugely successful race and won the third place and the bronze medal in 2018 European Championship. In comparison, if he had competed in his "old" class SB5, he could have finished in the seventh position with the same performance. Similarly, one female swimmer went from SB4 to SB3 with "Confirmed" status and once again there was a real chance for her to fight for the medals. And she has won silver medal

in 50 m Breaststroke. In SB4 class she would not have only had to compete in 100 m Breaststroke instead of shorter 50 m, but she would have presumably finished in the seventh place instead of that silver medal position. These major changes had a great impact to the performance of both individual swimmers and the Czech Team overall gaining two more medals (to total of five) in Dublin that year (World Para Swimming, 2018b). There were minor to no changes in classification class allocations for other Czech swimmers undergoing classification evaluation in 2018 and those changes had little to no impact to the European Championship results.

So although not all the classification changes had a positive impact on the team, the overall results in 2018 European Championship were directly affected in a positive way. A year later, 8 Czech swimmers qualified to the World Championships in London and the two reclassified swimmers mentioned above made it to the finals (World Para Swimming, 2019). The male swimmer had even met Minimum Qualification Criteria (MQS) times for Tokyo Paralympic Games effectively helping to gain more male slots for the Games. Had they both stayed in their original classification classes, they would not even met the MQS times to participate in London World Championships. This fact once again shows how changes in classification can have strong and direct impact to the individual performance of all the para swimmers.

In April 2021, the Czech Republic had a total of eight swimmers with the MQS times met for the one-year postponed Tokyo Summer Paralympic Games. These were 3 women and 5 men (World Para Swimming, 2020b). The quota the Czech Republic received for the Games in Para Swimming was 2 women's and 3 men's slots. The number of slots is calculated based on the results from the 2019 World Championships and the annual world rankings (World Para Swimming, 2020a).

The male swimmer, who was classified in 2018 with the Review status had to undergo the process again and he was allocated his SB5 class back, thus losing his MQS limit and eliminating the chance to compete in Tokyo Paralympic Games. The question then remains: Are the results of this Czech para swimmer from 2018 to 2021 just and fair? The answer may be unclear for many of his coswimmers, opponents and himself alike. This shows there currently are significant classification changes throughout the whole duration of Paralympic cycle. These changes in turn affect the chances of success of individual athletes and may completely prevent or, on the contrary, allow the participation of swimmers in the Paralympic Games not on the basis of deterioration or improvement of sporting performance, but purely on the basis of changes in classification procedures, which are by no means yet perfectly objective and universally applicable. The described situation illustrates the erratic nature of the current classification system which World Para Swimming has been using since 1992 and the fairness of it is regularly questioned (Hogarth et al., 2019).

CONCLUSION

Paralympic classification system is the only way to officially participate in international competitions in any para sport. The article sums up the effects of classification changes on the performance of Czech para swimmers in recent years and although there is a great effort to make classification methods (not only in swimming) as fair as possible, desperately needed research is still underway and new methods are being

currently tested to achieve classification process objectification, especially reducing the influence of classification personnel on the relevance of assessment results. The review shows it still is a major issue in Paralympic sport. But despite the fact that the classification system not only in para swimming has been strongly criticized in recent years by athletes, coaches, officials and the professional public, so far it remains the only means of comparing the sports performance of not only physically challenged swimmers. Nevertheless, in the period before the Paralympic Games, there was a significant impact on performance and success of Czech para swimmers in major competitions due to the results of the classification. Therefore, it is necessary to work on the objectification and stabilization of the entire system.

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