SHORT-DISTANCE FREESTYLE PERFORMANCE OF SWIMMERS WITH INTELLECTUAL DISABILITIES AT THE SYDNEY 2000 PARALYMPIC GAMES

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The purpose of this investigation was to compare the short-distance freestyle swimming performances of male and female swimmers with an intellectual disability and to examine gender-specific differences in technique between the 50 m and 100 m freestyle events. Data were collected at the Sydney 2000 Paralympic Games using a video-based competition analysis procedure. Several performance variables were measured during the four phases (start, free swim, turn, finish) of each event. In general, men swam, started, turned and finished the race more quickly than the women. Although the men performed most race components faster, the strategies used by men and women changed in similar ways across the two freestyle distances.

KEY **WORDS:** Paralympics, mental handicap, disability sport, swimming, competition analysis

INTRODUCTION: The two most recent Paralympic Games in Atlanta (1996) and Sydney (2000) were the first to include competition for individuals with intellectual disabilities. To be eligible for competition, participants must have a recognized intellectual disability as defined by the international standards of the World Health Organization (WHO). The criteria outlined by WHO are utilized by the International Sports Federation for Persons with Mental Handicap (INAS-FMH) in its role as the international sports governing body.

To ensure fair and equitable competition at the Paralympic Games an athlete classification system is used which places individuals into distinct classes. Paralympic swimming competition includes classes for persons with physical, visual, and mental impairments. Swimmers with physical disabilities and visual impairments are divided into several groups while those with an intellectual disability compete together within a single class (S14).

Previous studies have examined the performance of swimmers with physical disabilities (Daly, et al., in press; Daly, et al., 2000) as well as those with visual impairments (Malone, et al., in press; Malone, et al., 2000). One group of swimmers whose performance has not been examined is persons with an intellectual disability. The purpose of this investigation was to compare the short-distance freestyle swimming performances of male and female swimmers with an intellectual disability in the 50 m and 100 m races and to examine gender-specific differences in technique between these events.

METHODS: Performances of the top eight finalists in the 50 m and 100 m freestyle events for swimmers with an intellectual disability competing at the Sydney 2000 Paralympic Games were recorded using the Australian format for biomechanical competition analysis (Mason & Cossor, 2000). Five video cameras suspended over the length of the pool recorded the performances of all swimmers in each event. Individual races were broken down by lap into 25 m segments and analyzed in four phases: start phase, free swim phase, turn phase, and finish phase. The start phase began at the official starting signal and finished when the swimmer's head crossed the 15 m mark. The turn phase started when the swimmer's head passed a point 7.5 m from the wall until the swimmer's head crossed the same point coming out from the turn. The finish phase began when the swimmer's head crossed a mark 5 m out from the wall until hand touch. The remainder of the race was considered the free swim phase, during which time stroke rate (SR) and stroke length (SL) were determined. Final result time was obtained from the official timing system

To compare the competitiveness between the groups, the final race time for each swimmer was converted to a point score (Daly & Vanlandewijck, 1999). The point system was based on a function in which the World Record (WR) for each event – gender, stroke, and distance –

receives 1000 points (Van Tilborgh, et al., 1984). A constant (C_{event}) specific to each event was then calculated as follows:

$$C_{event} = WR^3 \cdot 1000$$

When all constants were determined, each individual time was assigned a point score specific to the event:

$$\text{Individual Performance Point} = C_{event}/\text{Individual Event Time}^3$$

Using the SPSS 10.0 statistical package, independent t tests ($p < 0.05$) were computed to identify if differences existed in the swim performances of men and women, and to determine whether gender-specific differences existed between the two freestyle events.

RESULTS AND DISCUSSION: In comparing the swim performance of men and women (see Table 1), no significant differences in stroke rate or stroke length were observed in the 50 m and 100 m freestyle events. A significant difference in point score was found between males and females in the 100 m event, with the men's group being more competitive. In general, men swam faster, started, turned and finished the race more quickly. An analysis of the men's events revealed significant differences in swim speed, turn time, free swim time, and race result between the 50 m and 100 m freestyle events. No significant difference was found between the events on stroke length or competitiveness. For the men's 100 m event no significant difference was found in stroke rate, start time, or finish time. For the 50 and 100 m events, there were no significant differences in start time. Analysis of the women's events revealed significant differences between the two freestyle distances in swim speed, turn time, free swim time, and final race time. No significant differences were identified between the events on stroke length or competitiveness. For the 100 m event no significant difference was found in stroke rate, start time. and finish time. For both the 50 m and 100 m events no significant difference was observed on stroke rate.

Table 1 Swimming Performance Variables of Men and Women in the 50 m and 100 m Freestyle Events (mean ± SD)

	50m		100m	
Variable	Men	Women	Men	Women
World Record (s)	25.42	29.11	56.40	1:03.26
Point Score[A]	896 ± 65	903 ± 69	946 ± 40'	867 ± 73
Swim Speed (mls)	1.79 ± .05*	1.58 ± .04	1.67 ± .04*[a]	1.44 ± .04[a]
Stroke Rate (strk/min)	60.15 ± 6.82	59.01 ± 10.22	52.67 ± 5.57[a]	50.43 ± 7.42
Stroke Length (m)	1.80 ± .18	1.65 ± .28	1.92 ± .18	1.74 ± .28
Start Time (s)	7.00 ± .16*	8.06 ± .15	7.25 ± .21*	8.37 ± .24[a]
Turn Time (s)	nla	n/a	8.53 ± .31*	9.81 ± .34
Finish Time (s)	2.56 ± .12*	3.04 ± .19	2.95 ± .08*[a]	3.32 ± .24[a]
Free Swim Time (s)	16.82 ± .45*	19.06 ± .50	39.10 ± .89*[a]	45.39 ± 1.32[a]
Total Race Time (s)	26.39 + .64*	30.15 ± .77	57.48 ± .84*[a]	66.95 ± 2.05[a]

* Significant difference between men and women

[a] Significantly different than 50m

[A] A point score of 1000 is equal to the world record for that event

Although the men swam more quickly overall, most race components changed in a similar manner for men and women across the two freestyle events. For example, both gender groups had a slower start, free swim and finish time in the 100 m race than in the 50 m race. Meanwhile, a consistent stroke length was used by males and females across the distances, with the men using a quicker stroke rate in the 50 m event. Greater variability in both stroke rate and stroke length was seen in the women's events.

In comparing the results of the present study with those previously reported for Paralympic swimmers with physical disabilities (Daly, et al., 1999) and visual impairments (Malone, et al., in press; Malone, et al., 2000) in the 100 m freestyle some similarities as well as differences can

be identified. In all three disability groups, race result, start, free swim, turn and finish speeds were significantly faster in men than women, with no significant difference between the genders in stroke rate. Stroke length was found to be significantly different between the genders in the swimmers with physical disabilities and visual impairment but not those with intellectual disabilities. While the male swimmers with intellectual disabilities were found to be more competitive than the women, there was no gender difference in competitiveness in swimmers with physical disabilities.

CONCLUSION: The 50 and 100 m freestyle performances of swimmers with an intellectual disability competing at the 2000 Paralympic Games showed significant differences between the genders as well as between events. The men were found to swim more quickly than the women, however, no significant difference was found in stroke rate or length between the genders. Analyses of similar performance components in the middle-distance and distance freestyle events, as well as in the other strokes (i.e., backstroke, butterfly, breaststroke), are recommended for future investigation.

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