

Physical Fitness Testing:

Over several weeks of practice we were able to do some physical fitness testing with the athletes to see where they need improvement. We were not able to give the athletes a consent form to sign in order to have their approval for doing the fitness testing. The reason for this was because the athletes may not understand what they are signing and it may be a liability issue having the athletes sign consent for something they may not understand. We asked the coach if we would be able to do physical fitness testing on the athletes, who then talked to the parents/guardians, as well as we talked to a Special Olympic representative and they both gave us the go ahead.

The Physical Fitness Testing page used for recording the fitness test results can be seen in Appendix A. During the testing, we filled out this form for each athlete. The athlete's names were kept confidential and the forms with their names on it were destroyed once the results were recorded.

The areas that we focused on in the testing were flexibility, strength, balance, and endurance. These components are all important in swimming. Flexibility is needed because as a swimmer the athlete needs to be able to move their arm and leg joints through the appropriate range of motion. Strength is important for a swimmer because they need to be able to propel themselves through the water while performing the different strokes. Balance is also an important factor for any swimmer because they have to be able to maintain correct body position while swimming in the pool. Endurance is also a very important factor for any swimmer because they need to be able to swim lengths up to 200 m when competing. The tests were chosen according to the equipment and space we were provided to work with.

We were not able to do some testing that may have been useful. The aerobic component of fitness would have been chosen, but since the area the testing was done in was on a pool deck, this was not able to be carried out due to safety issues from the wet floor, as well as not enough space.

For most of the athletes, their balance had a need for education, so we decided not to do the balance test with the athletes eyes closed due to safety reasons.

The testing took approximately ten minutes for each athlete and involved taking the athletes out of the pool one at a time to a corner on the pool deck. The equipment that was used were stopwatches, a measuring tape, a small and large goniometer, a towel, a hand dynamometer, a sturdy chair, a pen and the fitness testing forms. The testing was done by both Sarah and Michelle together.

Methods:

Hamstring Flexibility: Supine (Passive) Knee Extension: A towel was placed on a dry area and the athlete lied supine on the towel. The fitness tester squatted at eye level beside the leg being measured. The proximal arm of the goniometer was placed with the lateral midline of the fibula with the lateral malleolus as a reference. The center of the fulcrum of the goniometer was placed over the lateral femoral epicondyle. The athlete was instructed to hold the thigh of the leg being measured to ninety degrees of flexion and to relax the lower leg. One of the fitness testers held the thigh in place so that it did not move. The other fitness tester passively straightened the athlete's knee as far as possible without causing the athlete pain. The angle between the thigh and leg was measured, and this was performed on both of the athlete's legs. The values were recorded according to the flexibility of the leg. If the knee went fully straight, it was recorded as zero degrees. If the knee did not go straight, the value was recorded as negative, and if the knee went beyond being fully straight into hyperextension, the value was recorded as positive. If the athlete had a score of less than negative fifteen degrees or asymmetry, it was indicated that the athlete may need education.

Calf Muscle Flexibility: Supine (Passive) Ankle Dorsiflexion: A towel was placed on a dry area and the athlete was instructed to lie supine on the towel with their legs in front of them and arms at

their side. The fitness tester squatted at eye level beside the leg being measured. The proximal arm of the goniometer was placed with the lateral midline of the fibula using the fibular head as a reference. The distal arm of the goniometer was placed parallel to the lateral midline of the fifth metatarsal. The center of the fulcrum of the goniometer was placed over the lateral aspect of the lateral malleolus. The athlete was instructed to relax their foot and ankle on the side being measured. One fitness tester passively dorsi-flexed the ankle by grasping and pulling down on the athlete's heel, while pushing up on the foot with their forearm. The other fitness tester measured the angle between the leg and the foot, and this was performed on both of the athlete's legs. The neutral position was a right angle between the leg and the foot, and the angle was recorded in relation to this neutral position. If the athlete reaches neutral position, it was recorded as zero degrees. If the athlete could not reach neutral, value was recorded as negative and if the athlete was able to go beyond neutral, the value was recorded as positive. If the athlete had a flexibility of less than positive ten degrees or asymmetry, it was indicated that the athlete may have a need for education.

Anterior Hip Flexibility: Modified Thomas Test: A towel was placed on a dry area and the athlete was instructed to lie supine on the towel. The fitness tester squatted at eye level beside the leg being measured. The proximal arm of the goniometer was placed in line with the lateral midline of the pelvis. The distal arm of the goniometer was placed in line with the lateral midline of the femur. The fulcrum of the goniometer was placed over the lateral aspect of the hip joint with the greater trochanter as a reference. One fitness tester flexed the hip of the leg being measured to one hundred degrees and placed one hand on the anterior crest of the pelvis. The athlete was instructed to relax this leg. The fitness tester passively lowered the leg until the pelvis moved forward, and once it did, the test was done. The angle between the pelvis and thigh was measured, and this was repeated on both legs of the athlete. If the thigh lowered to the surface or ground, the value was

recorded as zero degrees. If the thigh did not reach the surface or ground, the angle was recorded as negative. If the athlete had a flexibility of less than negative ten degrees or asymmetry, it was indicated that the athlete may have a need for education.

Functional Shoulder Rotation: Apley's Test: The athlete was instructed to stand in an upright position and reach one arm behind their head and down the back, and reach the other arm behind their hip and up the back and to try to touch their fingers. One of the fitness testers demonstrated this test. The distance between the index fingers was measured, and this was repeated on both shoulders. If the athlete's finger tips were able to be touched, the distance was recorded as zero centimetres. If the fingers were not able to touch, the separation was recorded as negative, and if the fingers overlapped, the value was recorded as positive. It was also recorded if there was symmetry, which was if each arm reaches equally toward the middle, as well as if there was asymmetry, which was if the arms approximate the midline unevenly. The flexibility of the left and right side was marked as within normal limits, more flexible and less flexible. If the measurement was higher than negative fifteen or if there was asymmetry, it was indicated that the athlete may have a need for education.

Timed Stand Test: A chair with a firm straight back was placed on a dry surface. The athlete was instructed to sit on the chair and was told to stand from sitting and then sit down again ten times. One of the fitness testers demonstrated this to the athlete, and another fitness tester stood behind the chair and held it to ensure that it did not move during the test. As well, they counted so that the athlete knew how many more they had to go. The test was timed using a stopwatch, and the time was stopped once the athlete completed ten repetitions. If the time recorded was greater than twenty seconds or if the athlete was unable to perform ten repetitions, it was indicated that the athlete may have a need for education.

Hand-Grip Test: The athlete was instructed to stand in an up right position and was shown the hand grip dynamometer. One of the fitness testers demonstrated to the athlete to hold the hand dynamometer at their side with their arm straight and told to squeeze it with one strong squeeze for six seconds and then let go. The dial was set to zero, and the test was performed two times on each arm of the athlete. The result was recorded in pounds, and the highest score on each arm was used for the final measurement. The athlete's results were determined according to the table below (Heyward, 2006, p. 120).

Grip Strength										
Rating	20-29 years		30-39 years		40-49 years		50-59 years		60-69 years	
	M	F	M	F	M	F	M	F	M	F
Excellent	≥ 115	≥ 70	≥ 115	≥ 71	≥ 108	≥ 69	≥ 101	≥ 61	≥ 100	≥ 54
Very good	104-114	63-69	104-114	63-70	97-107	61-68	92-100	54-60	91-99	48-53
Good	95-103	58-62	95-103	58-62	88-96	54-60	84-91	49-53	84-90	45-47
Fair	84-94	52-59	84-94	51-57	80-87	49-53	76-83	45-48	73-83	41-44
Needs Improvements	≤ 83	≤ 51	≤ 83	≤ 50	≤ 79	≤ 48	≤ 75	≤ 44	≤ 72	≤ 40

Single- Leg Stance with Eyes Open: The athlete was instructed to stand with their feet shoulder width apart beside a wall or chair. A fitness tester stood on the other side of the athlete in case they needed support. The athlete was instructed to lift one leg and balance until they were not able to or until the maximum time of 30 seconds was reached. A fitness tester demonstrated the test to ensure the athlete understood. The athlete was timed using a stopwatch, and time was stopped at thirty seconds or if the athlete lost their balance (if their foot touched the ground or if they reached for the wall or fitness tester). If the athlete had a time of less than twenty seconds it was indicated that the athlete may have a need for education.

Muscle Fatigue after 300m swim (Front Crawl): The athlete was instructed to get into the pool and to perform six laps of front crawl (three hundred metres). The first fifty metres was timed, as well as the last fifty metres. Any observations made during the three hundred metre swim were recorded.

Resources: Special Olympics Healthy Athletes FUNfitness and Assessment of Human Fitness Textbook

Heyward, V. H. (2006). *Advanced Fitness Assessment and Exercise Prescription* (Fifth ed.). United States, AL: Burgess Publishing Company.

Results:

The results of the physical fitness testing are seen in the following charts. The Special Olympic Athletes results were tested in the areas of flexibility, strength, and balance. The endurance portion of the testing is located within the strength section of the results. Beginner athlete is represented by a 'B', an intermediate athlete is represented by a 'I', and an advanced athlete is represented by a 'A' in the following charts. These are following the subject letter.

Flexibility:

	Hamstrings – supine (passive) knee extension		Calf – supine (passive) ankle dorsiflexion		Anterior Hip – Modified Thomas Test		Shoulder – Apley's Test	
	Left	Right	Left	Right	Left	Right	Left	Right
Athlete A-I	8°	-3°	12°	11°	-16°	-10°	-23 cm	-22 cm
Athlete B-I	-25°	-11°	-30°	-14°	0°	0°	-6 cm	-4 cm
Athlete C-A	-19°	-25°	-5°	-5°	0°	0°	4.5 cm	4 cm
Athlete D-A	-3°	-20°	-5°	0°	0°	0°	-0.5 cm	4.5 m
Athlete E-B	-27°	-7°	-30°	-30°	0°	0°	-13 cm	0.5 cm
Athlete F-B	-15°	-20°	-10°	-11°	0°	0°	-11 cm	-10 cm
Athlete G-B	-43°	-40°	-30°	-30°	-20°	-17°	Unable to perform	Unable to perform
Athlete H-B	-35°	-40°	Unable to perform	Unable to perform	-15°	-7°	-22 cm	-30 cm
Athlete I-B	-10°	Unable to	-20°	-2°	Unable to	Unable to	-13 cm	-30 cm

		perform			perform	perform		
Athlete J-I	-35°	-30°	0°	-10°	0°	0°	2 cm	3 cm
Athlete K-I	-15°	-23°	-30°	-15°	0°	0°	-26 cm	-31 cm

Strength:

	Leg Muscles – Time Stand Test	Forearm and Hand Muscles – Grip Test			Muscle Fatigue after 300 m swim (front crawl)	
		Left	Right	Total	1 st 50 m	6 th 50 m
Athlete A-I	22.43 s	49 kg	50 kg	99 kg	97 s	100 s
Athlete B-I	32.19 s	33 kg	30 kg	63 kg	56 s	83 s
Athlete C-A	23.94 s	40 kg	60 kg	100 kg	49 s	50 s
Athlete D-A	19.10 s	70 kg	87 kg	172 kg	37 s	34 s
Athlete E-B	29.13 s	unable to perform	Unable to perform	Unable to perform	192 s	Unable to perform
Athlete F-B	43.02 s	20 kg	20 kg	40 kg	207 s	Unable to perform
Athlete G-B	33.4 s	79 kg	85 kg	164 kg	102 s	Unable to perform
Athlete H-B	32 s	8 kg	10 kg	18 kg	230 s	Unable to perform
Athlete I-B	35.41 s	9 kg	20 kg	29 kg	117 s	123 s
Athlete J-I	26.06 s	10 kg	15 kg	25 kg	75 s	88 s
Athlete K-I	19.34 s	24 kg	35 kg	59 kg	Unable to perform	Unable to perform

Balance:

	Eyes open single leg stance		Eyes closed single leg stance	
	Left	Right	Left	Right
Athlete A-I	30 s	30 s		
Athlete B-I	16.78 s	2.30 s		
Athlete C-A	6.59 s	3.65 s	5.0 s	3.34 s
Athlete D-A	30 s	30 s	22.25 s	27.21 s
Athlete E-B	30 s	30 s		
Athlete F-B	2.35 s	4.44 s		
Athlete G-B	1.5 s	4.35 s		
Athlete H-B	6.0 s	3.0 s		
Athlete I-B	5.0 s	2.0 s		
Athlete J-I	30 s	30 s		
Athlete K-I	6.0 s	5.0 s		

Overall Results for the Need for Education: This chart shows each athletes areas that they may have a need for education. An empty box shows that there is no need for education required for that particular skill, and a “Yes” indicates that they athlete may have a need for education.

Fitness Test	Subject										
	A	B	C	D	E	F	G	H	I	J	K
Hamstring-supine knee extension		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calf-Supine ankle dorsiflexion		Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Anterior Hip-Modified Thomas Test	Yes						Yes	Yes	Yes		
Shoulder’s Apley’s Test	Yes				Yes	Yes	Yes	Yes	Yes		Yes
Timed Stand Test	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes	
Grip Test		Yes			Yes	Yes		Yes	Yes	Yes	
Single Leg Stance		Yes	Yes			Yes	Yes	Yes	Yes		Yes

Overall, the athletes and coaches had positive responses to the fitness testing being done. The athletes mostly all enjoyed being taken out of the pool and participating in something different from their regular routine. The athletes also enjoyed having that one on one time with the testers who were also volunteering with the coaching. Most of the athletes understood the testing after demonstrations and instructions were given. Most of the time, a visual demonstration of the different tests was the best way for the athletes to understand what test was being done and what was expected from them. The coaches were all understanding and allowed for the athletes to be taken out of the pool and taken away from the practice time.

It was observed overall for flexibility that most of the athletes had flexibility in their hips that is acceptable. There is a large need for hamstring flexibility and calf and ankle flexibility as it was seen in the most of the athletes that they have a need for education in this area. For a little over half of the athletes, there needs to be increased shoulder flexibility. Overall, the flexibility of the athletes needs to be improved.

Furthermore, when looking at the balance of the athletes, it is seen that most of the athletes need to work on their balance, as a lot of the athletes were not able to balance at an acceptable length of time.

In the area of strength, it is seen that most of the athletes need education for the timed stand test as well as about half of the athletes need to increase their strength according to the grip test. As for the muscle fatigue test, it is seen that in general over the 300 m front crawl, the athletes are slower in the last 50 m compared to the first 50 m. Each athlete needs to improve their endurance and this is best attained by continually doing laps.