When Are Children Ready to Learn to Swim? A Study of age-readiness for swimming

Introduction:

Motor development of humans has been a topic of study for many years. Motor development refers to the continuous, age-related process of change in movement. [1] A child's motor development is directly linked to when precisely they can master a specific skill. Motor learning and motor control are two dimensions of motor development where one refers to the relatively permanent gains in motor skill that comes from practice or experience and the other is a study of the neural, physical and behavioral aspects of movement. The chart found in the Red Cross Assistant Water Safety Instructor Manual (2010)[2] on Learner Characteristics of Children is one such example of when certain stages of learning development have been observed.

Many land-based locomotor skills such as walking, running, hopping, skipping, and jumping have been shown to have definite stages and ages in learning and mastering those skills. One area that has not been studied as much is that of swimming and more specifically when a child has the corresponding motor control to master the various water-based skills. Typical swimming lessons include a variety of children of different ages and stages of development. In the various swimming levels there is a definite trend in terms of specific ages when the children can achieve certain skills. This study was completed first to determine if there is an age readiness for when a child can learn and become competent at specific water skills and second to compare the findings to the current Red Cross Swim Preschool program to determine if the skills are achievable within the age bracket assigned.

Method:

The program of swimming lessons used in this study is Red Cross Swim, with a focus on the non-parented Preschool levels, and included the first three levels of the Swim Kids program. Worksheets, filled in by the instructors who taught the levels, were collected over a period of two years. The data that was collected from these worksheets was the age of the children and if they completed or did not complete the level they were registered in. The total sample size is 4,274 children. The data was entered into a Microsoft Excel spreadsheet and analyzed using the tools in that program.

Data:

Sea Otter Sample Size: 1461 *Skills learned*: opening eyes underwater, rhythmic breathing (3 times), assisted floats on front and back, glides on front and back, swim 1 meter and age-appropriate water safety skills.	2 yr 3 yr 4 yr 5 yr 6 yr	14% C* 32% C 55% C 66% C 68% C	86% IC* 68% IC 45% IC 34% IC 32% IC

*C = complete; IC = incomplete

Salamander Sample Size: 996 *Skills learned*: rhythmic breathing (5 times),	3 yr 4 yr 5 yr	16% C 33% C 53% C	84% IC 67% IC 46% IC

[1] Haywood, Kathleen M.; Getchell, Nancy. (2009) *Life Span Motor Development*, 5th ed. p.5
[2] Canadian Red Cross (2010). *Assistant Water Safety Instructor Manual*, p.4.5

independent front and back floats, front and back glides with kick, roll-over glides, swim 2 meters, and age-appropriate water safety skills	6&7 yr	53% C	42% IC

Sunfish Sample Size: 548 *Skills learned*: rhythmic breathing (5 times, 2 ways), glides with kick for 5 meters, assisted side glide with kick for 2 meters, swim 5 meters, and deep water activities, and age-appropriate water safety skills	3 yr 4 yr 5 yr 6 yr.	26% C 34% C 52% C 55% C	74% IC 66% IC 48% IC 45% IC

Crocodile Sample Size: 237 *Skills learned*: rhythmic breathing (10 times, 2 ways), glides with kick for 7 meters, side glide unassisted for 5 meters, front crawl type swim for 5 meters and a distance swim of 10 meters, more deepwater activities, and age-appropriate water safety skills	4 yr 5 yr 6 yr	35% C 42% C 35% C	65% IC 57% IC 65% IC
Whale Sample Size: 116 *Skills learned*: rhythmic breathing while doing a front glide to side glide with kicking, front, back, and side glides for 10 meters, front crawl type swim for 10 meters, a distance swim of 15 meters, deep water activities including a sitting dive and surface support for 20 seconds.	4 yr 5 yr 6 yr	38% C 46% C 65% C	63% IC 54% IC 35% IC

Swim Kids 1 Sample Size: 817 *Skills learned*: rhythmic breathing 5 times, front and back floats for 3 seconds, front and back glides for 5 seconds, front glide with kick 5 meters, roll over glide for 5 seconds, and a front swim for 5 meters	5 yr 6 yr 7 yr 8 yr 9 yr 10-12 yr	38% C 50% C 63% C 61% C 83% C 88% C	62% IC 50% IC 37% IC 39% IC 17% IC 13% IC	6-6.5 yr 6.6-6.9 yr	47% C 57% C	53% IC 43% IC

Swim Kids 2 Sample Size: 99 *Skills learned*: rhythmic breathing (10 times, 2 ways), front glide with kick for 10 meters, back glide with kick for 5 meters, assisted side glide with kick for 5 meters, rollover glide for 5 meters, front crawl type swim for 5 meters, a distance swim of 10 meters, as well as deepwater activities.	6-6.9 yr 7-7.8 yr 8-8.9 yr 9-10 yr	66% C 66% C 83% C 100% C	33% IC 33% IC 2% IC

Swim Kids 3 Sample Size: 78 *Skills learned*: rhythmic breathing 15 times, front glide with kick 15 m, back glide with kick 10m, side glide with kick 10 m, front glide/side glide combination 10 m (assisted), 10 m. front crawl type swim, 15 m distance swim, deep water floats, surface support, sitting dives.	6 yr 7 yr 8 yr 9-12 yr	59% C 65% C 63% C 86% C	41% IC 35% IC 37% IC 14% IC

Limitations:

There are a few limitations to this study. The data was taken from worksheets that the instructors handed in at the end of a session, and only those worksheets that were completed properly could be used. The study was based on the age of the student and whether they completed the level or not. Some students were registered in twice-a-week lessons, while others only went once-a-week. These were not differentiated in the study. Nor was it noted as to how many times a child attempted the levels.

The experience of the instructors ranged from new/first time instructors to quite seasoned/mature instructors. This could affect the outcomes in that newer instructors may complete more children whether or not the child has technically mastered the skills; more mature instructors are more critical in their assessment of the skills and look for mastery more often.

There was a large sample size for the Sea Otter level as the facility was running a “split” of “first time” Sea Otters and “Repeat” Sea Otters. This was done as there was a need to separate the younger children (3-year-olds) with little water comfort from those who had done the level once or twice already and needed to focus, and were more able to focus, on learning the skills. The sample sizes for the other levels were smaller.

Discussion:

The Sea Otter level is the first level where the children attend without their parents in the water with them. It is a level designed primarily for water orientation where the children learn about buoyancy and become accustomed to having their faces in the water while they are blowing bubbles and learning to float or glide. Most of the skills in this level are assisted, meaning the instructor can help the child to do

them. Children have more success in completing the level once they reach the age of 4. The completion rate jumps to 55% for 4-year-olds where 3-year-olds only had a 32% completion rate. There could be several factors affecting this. The most influential factor may be the social maturity of the children where they are more comfortable being away from their parents and doing activities independent of them. They are also able to relate better to a swim instructor as a leader and focus on the activities presented to them. This is consistent with what is stated in the "Learner Characteristics of Children" from the AWSI manual under the "major feature" item: "still clings to an adult at ages 2-3; at ages 3-4, becomes more confident and independent" [3].

The Salamander level is much more challenging where there are quite a few skills that the children have to master. The skills are now all unassisted, so the children have to learn independent floats, add kicking their legs into their glides and learn to do roll-over glides. Children who are 5 and older have more success in this level as seen by the percentages in the charts above where 5-year-olds have a 53% chance of completing the level as compared to a 33% completion rate for 4-year-olds. This is an indication that the motor development for these skills is present around 5 years of age and that the skills may be too difficult for a 4-year-old. Referencing the AWSI manual's "Learner Characteristics of Children" for ages 4-7 under the "physical characteristics" it states that "coordination for refining skills is poor; little endurance; gets cold quickly"[4]. This is often observed in the children enrolled in the program as they seem to get "stuck" in this level for a long time, and parents get frustrated at having to constantly re-register their children into it. Many children "age out" in this level and typically move onto Swim Kids 1 when they are 6.

The Sunfish level has increased distances for the glides with kicking requiring the students to go 5 meters for both front and back glide with kicking. They learn an assisted side glide and do some deep water activities like floating. With this level, the age for completion is again at 5 years with a 52% chance of success. This is very closely linked to their physical development in that this age group has little endurance and their kicking is probably not the most streamlined.

This trend continues with Crocodile and Whale levels where the skills and distances become more difficult and farther which is very challenging for this age group to the point where most children do not complete Crocodile and if they do move on to Whale it's typically only the 6-year-olds that can achieve it.

The Red Cross Swim Kids program has an entry age level at 5 years but the completion rate for 5-year-olds in Swim Kids 1 was only 38%, strongly indicating that children at that age do not yet have the motor development to be successful. For the 6-year-olds it was at 50% and on a further breakdown of that age group, it was found that success came when children reached 6.6 years of age. Children enrolled in Swim Kids 2 had a 66% chance of completion if they were 6 – 7 years old and the greater success rate came at age 8 with an 83% completion rate. Swim Kids 3 was similar but with a slightly less chance of completion at 6 years (59% completion) and the greatest success at age 9.

The ages at which students can achieve a level is strongly correlated with their physical growth and development. This indicates that a review of the Red Cross Swim Preschool program is needed. The skills that are included in many of the preschool levels are too complex and difficult for the children to learn.

[3] Canadian Red Cross, AWSI manual, p 4.5
[4] Ibid.

This causes much grief on the part of the parents who have to keep registering their child into the same level several times. The parents see it as a "cash grab", or they get discouraged and drop out so the child never gets to achieve the skills. This indicates that there is a need to adjust the program requirements such that the children can achieve the levels a little more easily and not be rushed into the Swim Kids program. The program should be aligned with the growth and development stages of the children.

The Royal Lifesaving Society of Australia has done some research on the swim schools that are run in that country investigating the swimming and water safety ability of children attending these programs. The third report that they completed was on children aged two to four years old. As four-year-old children made up the biggest cohort in the study their focus was on that age group. The method they used was very similar to this study where they utilized the swim school assessment records for completion rates for various water competency skills. The results of the study found that the skills "most frequently being taught and achieved by children under five are the foundation level skills such as floatation and learning to breathe in water before progression to more complex motor skills...Results of this study showed that four-year-old children in this cohort are not yet competent in moving through the water, or formally swimming for more than 3 m"[5]. This is consistent with what is being presented in this study—that more complex skills such as kicking in a glide and adding arms in a front swim are not readily achievable until a child is much older.

There have been studies done to show that children can master swimming skills at very young ages, and it has been said that children can learn to swim by the time they are 2 or 3 years old. Children do have a reflex when they are born that occurs when they are either immersed in water or just held above water: their little arms and legs move such that they look like they are swimming. With much repetition and practice and time spent in the water this reflex can become a learned pattern and the children will be swimming when they are 2 or 3 years old. Many studies were done on very young children learning to swim utilize a large amount of time spent in the water and a greater frequency of the lessons to help these children learn the skills. These studies usually have the children in the water for two hours at a time, two or three days a week, with one on one instruction. The time and money required for such lessons would be a great limitation to the average family with young children.

Parents are also a large factor in how early the child will learn to swim. If parents are comfortable in the water with their children, and bring them swimming often at a young age, or have access to their own private pool, these children are more comfortable in the water and have already started to acquire some skills of floating and swimming. This tends to be a very small part of the average Canadian population. Most Canadian parents look to a public swimming facility to offer lessons and enroll their children in lessons that run only once or twice a week. For many children their half-hour lesson once or twice a week is all the time they have in the water, so practice is limited and mastery is slower to come. With learning any skill or activity the more practice that can be done the sooner mastery of that skill can happen.

Parents' attitudes toward swim lessons are important as well. Many parents see swimming as a life skill that their children must learn. Some want to start their children as early as possible and have it mastered at a young age so they can do other activities when they are older. It has been observed that

[5] Pidgeon S; Peden, AE; Larsen, P (2019) *Benchmarking children's water safety and swimming skills: Swim school data part 3: children aged two to four years.* Royal Life Saving Society – Australia. Sydney.

children who “stop” lessons when they are 5 or 6 years old do not necessarily maintain those skills through life and when they are older find that they can no longer swim. So it is important if swimming is to become a life skill that the lessons that are taken are age-appropriate and encourage children and parents to continue throughout their life.

Conclusion:

There is a definite need for a preschool swim program as seen by the number of parents who register their children in the hopes that they will learn the important life skill of swimming. With some adjustments, the Red Cross Swim Preschool program would help children and parents become more comfortable in the water so when the children are physically ready to learn to swim they will be more successful. Some changes to consider are as follows: The Sea Otter level should have more of a focus on the first 3 progressions in the Developing Swimmer progressions[6] where they concentrate on shallow water movement, buoyancy and movement, submersion, breathing, and a start on floating. The Salamander level should be simplified to have more of a focus on independent floats and introducing glides on front and back as well as reinforcing the submersion and breathing skills. Move the roll-over glides to Sunfish and introduce glides with kicking reducing the distances to 3 meters. The side glide could be introduced in the Crocodile level and the distances for the front and back glides with kick in Crocodile should be reduced to 5 meters. The Whale level could be similar to what now exists but with shorter distances. A chart of changes will be included at the end of this paper.

The main advantage of the preschool program is that it encourages comfortability in the water which is a major stepping stone to success once the children reach the Swim Kids program. There is a definite advantage for children who enter the Swim Kids program after taking some preschool lessons as they are more comfortable in the water than the 6-year-olds who are just beginning their swimming lessons and have no previous experience in the water.

The Red Cross Swim program is one of the best, if not the best learn to swim program in Canada. It has a long history of 75 years through which it has been updated and changed to meet the needs of Canadians and based on research which has led to a decrease in drowning deaths. Changing the Preschool Swim program slightly to ensure water comfortability with more success in the program will help to ensure that swimming does become a life skill for all Canadians for life.

Suggested Changes to the Preschool Swim Curriculum

Sea Otter – current	Sea Otter - changes
Play and Songs	Play and Songs (emphasizing shallow-water
Kick on Front with Buoyant object 1 m	movement, buoyancy and movement)
Distance swim 1 m	Facility/Site orientation and active supervision
Facility/Site orientation and active supervision	Stop! Look! Ask! (find the adult)
Stop! Look! Ask! (find the adult)	Safe Entries and exits
Safe Entries and exits	PFD/Lifejacket and me (assisted)
PFD/Lifejacket and me (assisted)	Open eyes underwater (attempted)
Open eyes underwater (attempted)	Rhythmic Breathing 3 times

[6] AWSI manual, p.8.6

Rhythmic breathing 3 times Front float and recovery 3 sec. (assisted) Back Float and Recovery 3 sec. (assisted) Front glide 3 sec. (assisted) Back Glide 3 sec. (assisted) Front Swim 1 m (assisted)	Front float and recovery 3 times (assisted) Back float and recovery 3 times (assisted)
Salamander – current	**Salamander – changes**
Play and Songs Kick on Front with Buoyant Object 2 m Distance Swim 2 m Facility/Site Orientation and Active Supervision Stop! Look! Ask! (find the adult) Weight Transfer in Shallow Water Jump into chest-deep water PFD/Lifejacket and Me (assisted) and HELP Buoyant objects Surface Support 5 sec. (assisted) Open Eyes Underwater (attempted) Rhythmic Breathing 5 times Front Float and Recovery Back Float and Recovery Front Glide with Kick 2 m Back glide with Kick 2 m Roll-over glide, front to back, 2 m Roll-over glide, back to front, 2 m Front swim 2 m	Play and Songs Facility/Site Orientation and Active Supervision Stop! Look! Ask! (find the adult) Weight Transfer in Shallow Water Jump into chest-deep water PFD/Lifejacket and Me (assisted) and HELP Buoyant objects Surface Support 5 sec. (assisted) using floating skills such as a roll-over float from front to back Open Eyes Underwater (attempted) Rhythmic Breathing 5 times Front Float and Recovery Back Float and Recovery Front Glide 2 m Back glide 2 m
Sunfish – current	**Sunfish – changes**
Kicking with buoyant object 5 m Distance Swim 5 m Facility/Site Orientation and Active Supervision Stop! Look! Ask! Weight Transfer in Chest-deep water Slip into Deep Water PFD/Lifejacket and Me and swim 5 m Change Direction in Shallow Water Surface support in chest-deep water 5 sec Jump into chest-deep water, surface support 5 sec. Front float and recovery in deep water 5 sec. Back Float and recovery in deep water 5 sec. Rhythmic Breathing 5 times, 2 ways Front glide with kick 5 m Back glide with kick 5 m Rollover glide with kick 5 m Side glide with kick 2 m (assisted) Front Swim 5 m.	Kicking with buoyant object 3 m Distance Swim 3 m Facility/Site Orientation and Active Supervision Stop! Look! Ask! Weight Transfer in Chest-deep water PFD/Lifejacket and Me and swim 3 m Change Direction in Shallow Water Surface support in chest-deep water 5 sec Jump into chest-deep water, surface support 5 sec. Front float and recovery 5 sec. Back Float and recovery 5 sec. Rhythmic Breathing 5 times Front glide with kick 3 m Back glide with kick 3 m Rollover glide, back to front 3 m Rollover glide, front to back 3 m Front Swim 3 m. (can resemble dog-paddle)

Crocodile – current	Crocodile – changes
Kicking with Buoyant object 10 m Distance Swim 10 m Facility/Site Orientation and active supervision Stop! Look! Ask! PFD/Lifejacket and Me in Deep Water Surface Support 10 sec Jump into Deep Water, Surface Support 10 sec Stop! Call for Help! Rhythmic Breathing 10 times, 2 ways Front Glide with Kick 7 m Back Glide with Kick 7 m Side Glide with Kick 5 m Front Swim 5 m Back Swim 5 m	Kicking with Buoyant object 5 m Distance Swim 5 m Facility/Site Orientation and active supervision Stop! Look! Ask! PFD/Lifejacket and Me in Deep Water Surface Support 10 sec Slip into Deep Water Front Float in Deep Water Back Float in Deep Water Rhythmic Breathing 10 times, 2 ways Front Glide with Kick 5 m Back Glide with Kick 5 m Rollover glides with kick 5 m Side Glide 3 m (assisted) Front Swim 5 m
Whale – Current	**Whale – Changes**
Kicking 15 m Distance Swim 15 m Facility/Site Orientation and Active Supervision When and Where to Swim Stop! Look! Ask! Sitting Dive Surface Support 20 sec. Jump into Deep Water, Swim 5 m, Stationary Surface Support 20 sec. Stop! Call for Help! Throwing Assist Rhythmic Breathing, front to side glide with kick, 10 times Front Glide with Kick 10 m Back Glide with Kick 10 m Side Glide with Kick 10 m Front Swim 10 m Back Swim 10 m	Kicking with buoyant object 7 m Distance Swim 7 m Facility/Site Orientation and Active Supervision When and Where to Swim Stop! Look! Ask! Surface Support 20 sec. Jump into Deep Water, Surface Support 10 sec. Stop! Call for Help! Rhythmic Breathing, 10 times, 2 ways Front Glide with Kick 7 m Back Glide with Kick 7 m Side Glide with Kick 5 m Front Swim 7 m
Some notes: • The back swim was removed because it was repetitious with the back glide with kick for all levels. If a back swim is wanted then add some arm movement like finning or sculling to go with it and only in Whale.	• There should be no need to push kids to "jump ahead" into the Swim Kids program as physically they are not ready for the skills being asked of them. If they can do the skills of Swim Kids 3 when they are 6 years old they will probably stall out in Swim Kids 4 or 5 because their physical development is not where it needs to be to accomplish the skills/distances in those levels.

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