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Learning to Swim: What Influences Success?

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Learning to Swim: What Influences Success?

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Swimming and water safety skills are important life skills, particularly in Australia, where aquatic activities are regularly enjoyed. Little research has been undertaken exploring children's swimming and water safety skills, what level they can achieve, and what factors impact their ability to learn these skills. This study explores children aged 5–12 years who participated in the Australian Capital Territory Primary Schools Swim and Survive Program, 2009–2011. Children who were more likely to achieve higher levels were older, were female, attended private school, swam at least once a fortnight, had a swimming pool at home, or visited a public swimming pool. Those who were less likely were Aboriginal or Torres Strait Islander, had a negative experience, and swam less than once a fortnight.

Keywords: children, drowning, drowning prevention, learn to swim, swimming, water safety

Water safety skills developed in childhood provide a foundation for future aquatic activities. The acquisition of skills and knowledge provides a person with

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the competencies to be able to adapt and effectively deal with the challenges of everyday life. Known as a life skill or a life stages approach to learning, development of skills and knowledge occurs at all stages of life and builds on previous skills and knowledge gained (Moote & Wodarski, 1997). As water safety skills are mainly learned in childhood, it is important that these skills are acquired and a minimum level achieved before they are applied to a wide range of aquatic environments and activities in later life.

Development of children's water safety skills is achieved using a learning framework that provides active assistance from adults and peers who have greater knowledge and skills. These adults and peers provide the support that helps to facilitate learning, so that the child achieves the desired outcome; the support is slowly withdrawn as the child improves. This approach is often called "scaffolding," that is, a structure is put in place to help learners achieve learning outcomes (Dennen, 2004).

Development of water safety skills includes a range of skills such as swimming, entry and exit skills, floating skills, and knowledge of safe behaviors (Australian Water Safety Council [AWSC], 2008b, 2012; Moreno, Furtner, & Rivara, 2009; NSW Department of Education and Training, 2009). While there is no definitive set of core water safety skills and knowledge, the AWSC endorses the Water Safety Education Competency Framework (AWSC, 2004) as a guide to the minimum level of skills and knowledge children should achieve at each significant milestone of their life (i.e., infant and preschool—before starting formal school instruction—end of primary school, and before leaving secondary school).

At different stages in our life we face differing levels of risk associated with our aquatic participation, which is reflected in drowning patterns. In Australia, children under the age of 5 years predominately drown in home swimming pools (Franklin, Scarr, & Pearn, 2010); this is because such a pool is close to where they live (i.e., usually in the backyard). However, children 4 years old and younger also drown in bathtubs, buckets, dams, and other water sources where they are playing, reflecting both their exposure to the hazard and their inability to protect themselves. In contrast, children 5–14 years of age not only have the lowest rate of drowning in Australia but also highlight a shift in drowning location from home swimming pools and aquatic locations around the home to open water locations such as in rivers, in lakes, and at the beach (Franklin et al., 2010).

While it is not known exactly why the 5–14 years age group has the lowest drowning rate in Australia, it is likely to be a combination of developing physical and motor skills, increased swimming and water safety skills, increased cognitive skills (i.e., understanding of danger and rules), parental supervision, and decreased exposure to the aquatic environment as they attend school (Blanksby, Parker, Bradley, & Ong, 1995; Erbaugh, 1986).

As swimming and water safety skills and knowledge are seen as one of the pillars which underpin swimming and water safety in Australia (AWSC, 2008a), it is imperative that we have a better understanding of what is required to achieve minimum levels of skills and knowledge as well as of who is achieving these levels. To accomplish this, Royal Life Saving Society—Australia is undertaking a series of studies to explore children's swimming and water safety skills with a particular emphasis on benchmarking the current level of achievement among Australian primary school children against the AWSC's Water Safety Education Competency Framework.

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There has been concern in the swimming and water safety fraternity that there are decreasing swimming and water safety skills at a population level. In the 1970s and 1980s there was a major push for swimming and water safety to be included in school curricula across Australia; however, during the 2000s it was reported that some schools were no longer providing this education or including it in the curriculum (Peden, Franklin, & Larsen, 2009; Royal Life Saving Society—Australia, 2012).

Water Safety Education Competency Framework

In 1999 the Royal Life Saving Society—Australia developed a framework (Royal Life Saving Society—Australia, 1999) to provide advice about what level of swimming and water safety skills and knowledge (based on the Royal Life Saving Swim and Survive Program; Royal Life Saving Society—Australia, 2007) should be achieved at particular time points in the Australian education system (e.g., leaving primary school).

This framework (Royal Life Saving Society—Australia, 1999) was revised and success rates added to the levels. The framework with some minor changes was adopted by the AWSC in the 2004–2007 National (Australian) Water Safety Plan (AWSC, 2004). It has then been continued in subsequent strategies (AWSC, 2008a, 2012); however, there has been little information about whether these success rates are being achieved or are achievable. For this study we used Level 4 (Table 1), as

Table 1 Skills Within Level 4 of the Swim and Survive Program

1. Safely perform a compact jump and exit from deep water.
2. Demonstrate feet first sculling on the back.
3. Demonstrate rotation of the tucked body, keeping the face above the surface of the water.
4. Swim 50 meters freestyle with correct technique.
5. Swim 50 meters backstroke with correct technique.
6. Swim 25 meters survival backstroke with correct technique.
7. Swim 15 meters breaststroke with correct technique.
8. Demonstrate 10 meters sidestroke with scissor kick.
9. Dressed in swimwear, shorts and t-shirt, demonstrate the following sequence:
a) Sculling, floating or treading water for 2 min
b) Swim slowly for 3 min, changing survival strokes after each minute.
10. Float for 1 min using an open-ended flotation aid.
11. Surface dive, swim underwater and recover an object from water depth equivalent to the candidate's height.
12. Demonstrate a crouch dive.
13. Throw a rescue flotation aid to a partner at 5 meters distance and instruct the partner to kick to the edge.
14. Answer questions about dangers in the aquatic environment.

Note. The extension skill, not part of the 14 core components of Level 4 is this: Demonstrate introductory butterfly arm action for a distance of 5 m.

the benchmark for which skills primary school children should be achieving, as this level should be achieved by 100% of children before leaving primary school (AWSC, 2008a, 2012).

Aims

Using information collected from participants in a school-based program in Canberra, Australia, we aimed to explore the following:

- Can children achieve the levels set by the Water Safety Education Competency Framework?
- What factors enhance or limit achievement of these levels?

Method

Information for this study was collected from the Royal Life Saving Society—Australian Capital Territory (RLSS-ACT), which delivers the Swim and Survive Program in the ACT to primary school children (aged 5–12 years) during school hours. RLSS-ACT is responsible for the logistics of the program, enrollment, transport, program delivery, and reporting (the ACT government subsidizes the program).

For the data collected for this study the parent or guardian of each child who participated in the program was required to provide a signed enrollment form to allow their child to participate in the program. This form collected information on the child's date of birth, sex, class (year level at school), experience with water, and current level of swimming ability. The data were entered into a FileMaker Pro database system to help run the program. De-identified data (no names or address information) were extracted from the database into Excel and coded for ease of analysis in SPSS.

There were 8,621 children who participated in the program between January 1, 2009, and December 31, 2011. There were 146 (1.7%) records where the sex was missing, 272 (3.2%) records where age was missing, 465 (5.4%) records where the school level was missing, and no cases where the level achieved was missing. These 801 (9.3%) cases were removed from the analysis, as these variables were considered the minimum level of data required for analysis (note some cases had more than one data field missing). There were also 94 (1.1%) children in 2009 who, because the wrong form was used, did not answer any of the questions and so were also removed from the analysis. Therefore, the database for analysis had 7,726 (89.6%) cases.

Where questions were not completed, these were entered into the database as blank fields (i.e., missing). Where questions within the questionnaire were incomplete or unanswered, the variable within the record was deleted from the analysis. This approach is called complete-subject analysis and is a recognized data analysis technique to address missing information where the complete data are assumed to be a random sample of all of the participants in the study (Rothman & Greenland, 1998).

Data Coding

The question "How often did you take your child swimming (either in lessons or recreationally) in the last 12 months?" required coding. Where two options were

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listed (e.g., Twice/Quarterly), the first option listed was the one used when coding (e.g., Twice). Where an answer was recorded that did not exist as an option on the enrollment sheet (e.g., weekly in summer), the number of times this would equate to was calculated (e.g., 12 times per year), and this was then coded as "monthly."

For the question which asked about medical conditions or disabilities of program participants, responses were coded in accordance with the ICD-10 Tabular List of Diseases (World Health Organization, 2010). Therefore conditions such as asthma and large adenoids were coded as "Diseases of the respiratory system." All allergies (e.g., allergy to nuts, allergy to penicillin, hives) were coded as "Injury, poisoning and certain other consequences of external causes." Where a parent recorded the name of a medicine, rather than the name of a condition, this medicine was researched to determine the condition it was used to treat and then coded as per that condition (e.g., Pulmicort is a treatment for asthma and was therefore recorded as a "Disease of the respiratory system"). If the condition that the medicine was used to treat could not be determined, then the medicine was coded as "Other." The category of "Other" also includes conditions that could not be classified in accordance with ICD-10. This included conditions such as having low muscle tone, having only one kidney, and having dizzy spells.

The question that asked which aquatic venues the parent and child had visited over the last 12 months also required coding. The category of home pool includes parent's pool, grandparent's pool, other family members' pools, and friends' pools. The "Other swimming" category includes dams, rock pools, lakes and lagoons, and swim school pools.

The question that asked parents if the child has had a previous negative experience with water also asked parents to record details of the negative experience, and these answers required coding. Based on the information provided by parents, the negative experiences question was coded into 15 categories. These categories included scared of deep water, negative experiences during swim lessons, fell in the water, doesn't like the water, and so on. There was also an "Other" category which included "panics when floating on the back," "scared about jumping from heights," and "doesn't like being pushed past comfort zone."

The question about private after school lessons, "Has your child in the last 12 months participated in private/after school swimming lessons?" with answers of yes/no, was changed in 2011 to "Has your child in the last 12 months participated in nonschool organized swimming lessons?" with the possible answers Yes—after school/Yes—Holiday program/No/Unsure. To enable comparisons over time, those who answered either of the yes questions were coded to yes, and if they answered no or unsure, these were coded as "no."

ACT Department of Education—Primary Schools Swim and Survive Program

The ACT Department of Education—Primary Schools Swim and Survive Program is delivered by the Royal Life Saving Society—ACT Branch to primary schools in the ACT. The current program started in 2008 and had been in operation for 4 years (at the time of data extraction) with over 10,000 students participating in the program over this period. The program provides students in primary school with the opportunity to learn swimming and water safety skills.

The Swim and Survive Program aims to improve students' ability to be safe in and around water via a well-balanced and curriculum-focused program. It is hoped that participation in this program may help reduce their chances of being involved in an aquatic-related incident. Unlike regular learn-to-swim lessons that concentrate on swimming technique and stroke correction, the Swim and Survive program provides a broad, balanced program of swimming, water safety, and survival skills. The program provides direct links to the "Every Chance to Learn Curriculum Framework for ACT Schools—Preschool to Year 10" and the Australian School Curriculum.

The program is subsidized by the ACT government, and parents of students pay AU$76 for the entire 10-lesson program—for bus hire and pool entry as tuition is covered by the ACT government and donations.

Definitions

For the purposes of this analysis a primary school aged child was defined as a child aged 5–12 years. As the age a child can leave primary school can vary, the authors decided, as per the swimming and water safety framework, that by age 12 all children should be able to achieve Level 4, 75% should be able to achieve Level 5, and 50% should be able to achieve Level 6.

Analysis

Analysis was undertaken using IBM SPSS v19.0. Pearson's chi-square was used to determine difference in nominal categorical data. Analysis of variance was used to determine difference in the means. $p < .01$ was considered to be significant. Data were age standardized in the logistic regression to remove age as a bias to learning.

Limitations

This study only represents children who participated in this program. This study does not provide any information about children who might be participating in other programs or not involved in any program. As such, there may be selection bias in the data, such as including children with better or worse skills, wealthier children because their parents can afford lessons or poorer as parents cannot afford private lessons, parents who are concerned about their children's safety, or children with different academic levels. Also for this study each entry was treated as a unique child; however, it is known that some children participated in more than 1 year of the program. As data had been de-identified, it was not possible to remove these duplicates.

How often a child was taken swimming was averaged over the 12 months; as such, some children may have had intensive periods and others might have had it spread out over a year and this would be considered to be the same level of exposure. Nor did we ask how long ago this exposure occurred when compared with the time of the lessons. Also we did not ask for how long they spent swimming on each occasion nor what they actually did when they went swimming. Further work is required to understand actual exposure and its impact on swimming ability.

The authors make no judgment regarding the impact of a particular medical condition on a child's participation or achievement in swimming and water safety lessons.

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Results

Of the 7,726 participants in the ACT Department of Education—Primary Schools Swim and Survive Program between 2009 and 2011 with minimum data records required for analysis, 51.3% were female, 3.5% were Aboriginal or Torres Strait Islanders, 76.2% were from public schools (with the proportion increasing significantly over time, $p < .01$), and 10.3% had some form of medical condition. The mean age of participation was 7.7 years (mode = 8 years); however, the 2009 cohort were, on average, significantly older ($p < .01$) than the 2010 and 2011 cohorts. The mean class level at school was 1.9 (mode = Year 2); there was no difference between years (Table 2).

As the children aged, they, on average, achieved a higher level ($F = 466.17$, $p < .0001$) (Figure 1). The equation for the line is $y = 0.5405x + 0.414$, $R^2 = .9967$, demonstrating an almost linear progression by age (Figure 1).

At most ages females outperformed males and private school children outperformed public school children. Aboriginal and Torres Strait Islander children did not perform as well as non-Indigenous children participating in the program, especially for children 10 years of age or younger. In most age groups there was no statistically significant decline in the children's ability per annum (Table 3).

Children with a preexisting medical condition (801; 10.4%) did not achieve to the same level as children without; this was significant for 7–9 year olds and 11–12 year olds. Children who had a negative experience (316; 4.2%) with water achieved, on average, a lower swimming and water safety level; this was significant for 6–9 year olds. On the whole children with a swimming pool at home (870; 12.9%) were more likely to achieve a higher level, on average, as were children who participated in private learn-to-swim lessons (3531; 53.5%) (Table 4).

Visiting an aquatic location in the last 12 months, particularly the beach, also improves children's swimming and water safety skills. It should be noted that this question did not ask about how often they visited a particular location, nor if the child swam at the location or how long and how often they swam (Table 5).

Parents were also asked "On average how often does your child go swimming?" The data showed that those children who went swimming more often achieved higher levels than those who did not (Figure 2). This effect was seen across all age groups; however, it was more pronounced for the 6–10 year olds (Table 6).

The more often a child swam, the more likely he or she was overall to achieve a higher level on average. This finding applied to all ages in the data set. When swimming at least once a fortnight was compared with less than once a fortnight by level achieved, this is a statistically significant result for all ages (Table 6).

The proportion of children who were able to achieve Level 4 and above reached 77.5% of participants in the 12 years age group whereas only 56.3% of participants at age 12 achieved Level 5 or above (Figure 3).

The activities that were positively correlated, adjusting for age, with achieving Level 4 and Level 5 were being female, attending private school, swimming at least once a fortnight, having a swimming pool at home, visiting any aquatic location, and participating in private swimming lessons (Table 7).

Overall, being female (1.6 times; confidence interval [CI] 1.3–1.9), coming from a private school (3.1 times, CI 2.5–3.9), swimming at least once a fortnight (2.4 times; CI 1.9–3.1), having a swimming pool at home (2.2 times; CI 1.7–2.9),

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Table 2 Demographics by Year of Participation in ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011

	2009		2010		2011		Total	
Variables	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
Sex								
Female	843	51.1	1,473	51.8	1,647	51.0	3,963	51.3
Male	808	48.9	1,373	48.2	1,582	49.0	3,763	48.7
Aboriginal or Torres Strait Islander								
No			1,512	96.2	2,994	92.7	4,506	96.5
Yes			59	3.8	106	3.3	165	3.5
Age								
Average (years)	8.2	*SD* = 1.8	7.7	*SD* = 1.7	7.6	*SD* = 1.8	7.8	*SD* = 1.8
<5	1	0.1	10	0.4	18	0.6	29	0.4
5	3	0.2	195	6.9	236	7.3	434	5.6
6	315	19.1	615	21.6	720	22.3	1,650	21.4
7	370	22.4	639	22.5	716	22.2	1,725	22.3
8	318	19.3	576	20.2	675	20.9	1,569	20.3
9	267	16.2	336	11.8	364	11.3	967	12.5
10	167	10.1	263	9.2	249	7.7	679	8.8
11	118	7.1	140	4.9	173	5.4	431	5.6
12	81	4.9	69	2.4	63	2.0	213	2.8
>12	11	0.7	3	0.1	15	0.5	29	0.4

(continued)

Table 2 *(continued)*

	2009		2010		2011		Total	
Variables	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
Year level at school								
0	382	23.1	678	23.8	758	23.5	1,818	23.5
1	420	25.4	630	22.1	729	22.6	1,779	23.0
2	277	16.8	657	23.1	780	24.2	1,714	22.2
3	269	16.3	331	11.6	385	11.9	985	12.7
4	135	8.2	305	10.7	273	8.5	713	9.2
5	133	8.1	141	5.0	196	6.1	470	6.1
6	35	2.1	104	3.7	94	2.9	233	3.0
>6	0	0.0	0	0.0	14	0.4	14	0.2
School type								
Private	570	34.5	660	23.2	602	18.6	1,832	23.7
Public	1,081	65.5	2,186	76.8	2,627	81.4	5,894	76.3
Medical condition								
No	1,499	90.8	2,563	90.1	2,863	88.7	6,925	89.6
Yes	152	9.2	283	9.9	366	11.3	801	10.4
Total	1,651	100.0	2,846	100.0	3,229	100.0	7,726	100.0

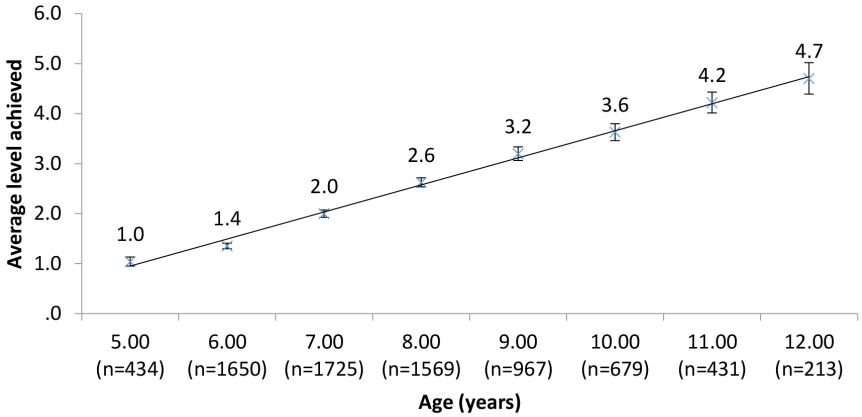

Figure 1 — Age versus level achieved ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011 (n = 7,668).

visiting a public pool (2.8 time; CI 1.9–4.1), visiting a beach (1.9 times; CI 1.6–2.4), and undertaking private swimming lessons (1.9 times; CI 1.4–2.5) increased the participant's likelihood of achieving Level 4. For every increasing year in age there is a 2.6 times increase in achievement of Level 4 (CI 2.5–2.8). Having a prior negative experience with water decreased the child's likelihood of achieving Level 4 by half (47%; CI 24–94%). Being Aboriginal or Torres Strait Islander was a confounder (Table 8).

Overall, being female (1.6 times; CI 1.2–2.0), coming from a private school (3.3 times, CI 2.6–4.2), having a swimming pool at home (2.3 times; CI 1.7–3.2), visiting a public pool (2.4 time; CI 1.5–4.0), visiting a beach (1.9 times; CI 1.5–2.6), visiting a lake (1.9 times; CI 1.4–2.7), visiting other aquatic locations (1.6 times; CI 1.1–2.1), and undertaking private swimming lessons (2.3 times; CI 1.7–3.2) increased the participant's likelihood of achieving Level 5. For every increasing year in age there is a 2.4 times increase in achieving Level 5 (CI 2.2–2.6). Having a previous negative experience with water decreased the child's likelihood of achieving Level 5 by half (47%; CI 24–94%; Table 9).

Discussion

Learning swimming and water safety skills is an integral part of ensuring children's safety when visiting an aquatic location (Rahman, Bose, Linnan, Rahman, & Mashreky, 2012); however, very little is known about the factors that have an impact on a child's ability to reach a skill level. While participation in swimming and water safety lessons is essential, this article also explored the other factors that might impact achieving a particular level of swimming and water safety skill.

The age of the child has a major influence on the level he or she achieves; with each year a child ages he or she has a 2.5 times greater chance of achieving Level 4. Participation in aquatic activity also has an impact on level of achievement, that is, the more time a child spends in the water, for example if the child has a

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Table 3 Average Level Achieved by Age and Gender, Year, Aboriginal and Torres Strait Islander Status, and School Type, ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011

	Gender			Year					Aboriginal and/or Torres Strait Islander			School type		
Age (years)	Female	Male	Sig.	2009	2010	2011	Sig. 2009 vs. 2010	Sig. 2009 vs. 2011	No	Yes	Sig.	Private	Public	Sig.
5	1.1	1.0		1.3	1.1	1.0			1.0	.8		1.2	1.0	†
6	1.5	1.3	*	1.5	1.3	1.4	*	*	1.4	1.0	*	1.5	1.3	*
7	2.1	1.9	*	2.0	2.1	2.0			2.0	1.4	*	2.4	1.9	*
8	2.8	2.5	*	2.8	2.6	2.6	†		2.6	2.2		3.3	2.5	*
9	3.3	3.1		3.4	3.2	3.0		*	3.2	2.1	*	4.0	2.9	*
10	3.8	3.4	*	3.8	3.6	3.6			3.6	2.4	†	4.5	3.3	*
11	4.3	4.1		4.4	4.3	4.0			4.2	3.6		5.0	3.7	*
12	5.0	4.2	*	4.8	4.7	4.5			4.7	3.8		5.2	4.4	*

Note. Sig. = significance.

*$p < .01$. †$p < .05$.

Table 4 Average Level Achieved by Reported Medical Condition, Negative Experience, Having a Pool at Home, and Participation in Private Swimming Lessons, ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011

	Medical condition			Negative experience			Private			Home pool		
Age (years)	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.
5	1.0	1.0		.8	1.1		1.2	0.9	*	1.1	1.1	
6	1.3	1.4		1.0	1.4	*	1.6	1.0	*	1.6	1.4	*
7	1.6	2.0	*	1.6	2.0	*	2.4	1.5	*	2.5	1.9	*
8	2.3	2.7	*	2.0	2.6	*	3.1	2.1	*	3.1	2.3	*
9	2.7	3.3	*	2.0	3.3	*	3.9	2.6	*	3.9	3.1	*
10	3.3	3.7		3.2	3.6		4.4	3.3	*	4.2	3.5	*
11	3.7	4.3	†	3.2	4.2		4.8	4.0	*	5.0	4.0	*
12	3.8	4.8	†	2.0	4.7	†	5.4	4.5	†	5.1	4.7	

Note. Sig. = significance.

*$p < .01$. †$p < .05$.

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Table 5 Age by Aquatic Location Visited in the Last 12 Months, ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011

	Public swimming			Beach			Lake			River			Other swimming		
Age (years)	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.
5	1.1	1.0		1.2	.9	*	1.1	1.1		1.3	1.0	*	1.1	1.1	
6	1.5	1.0	*	1.5	1.2	*	1.6	1.3	*	1.5	1.4		1.5	1.4	†
7	2.1	1.4	*	2.2	1.7	*	2.2	2.0	†	2.1	2.0		2.0	2.0	
8	2.8	1.9	*	2.9	2.3	*	3.0	2.6	*	2.9	2.6	*	2.9	2.6	†
9	3.3	2.6	*	3.5	2.7	*	3.9	3.1	*	3.5	3.2	†	3.4	3.2	
10	3.8	3.0	*	3.9	3.2	*	3.9	3.6		3.9	3.6		4.0	3.6	†
11	4.3	3.8	†	4.4	3.7	*	4.8	4.1	*	4.3	4.2		4.6	4.1	
12	4.9	4.2		4.9	4.2	†	5.0	4.7		4.9	4.7	*	5.0	4.7	

Note. Sig. = significance.

*$p < .01$. †$p < .05$.

Table 6 Age by How Often Swims Grouped, ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011

Age (years)	At least once a fortnight (1)	Less than once a fortnight (2)	Never (3)	Unknown/ Unsure	Total	Sig.1 vs. 2	Sig. 1 vs.3	Sig. 2 vs. 3
5	1.2	.9	.7	.9	1.0	*	*	
6	1.6	1.1	.7	1.2	1.4	*	*	*
7	2.4	1.6	1.0	1.9	2.0	*	*	*
8	3.1	2.2	1.3	2.3	2.6	*	*	*
9	3.9	2.6	1.9	3.0	3.2	*	*	*
10	4.3	3.3	2.5	3.6	3.6	*	*	*
11	4.7	3.7	4.1	4.5	4.2	*		
12	5.5	4.4	3.5	4.6	4.7	*	*	
Total	2.7	2.2	1.4	2.5	2.4	*		

Note. Sig. = significance.

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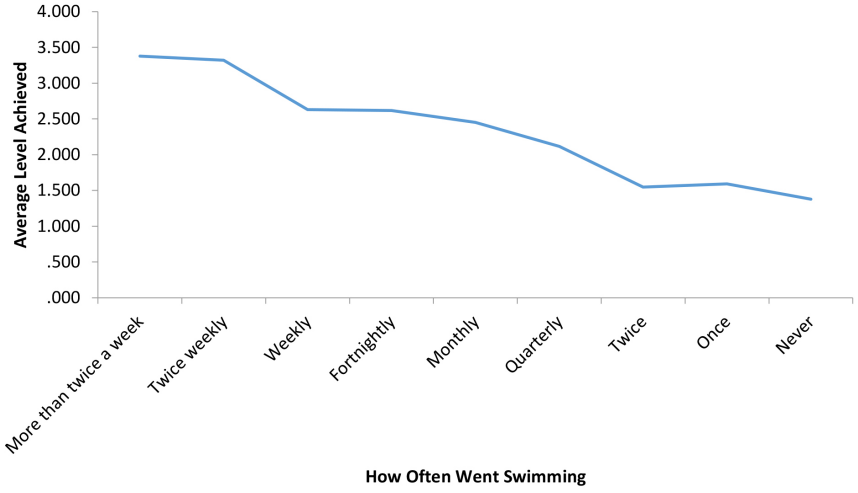

Figure 2 — How often swims by average level achieved ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011.

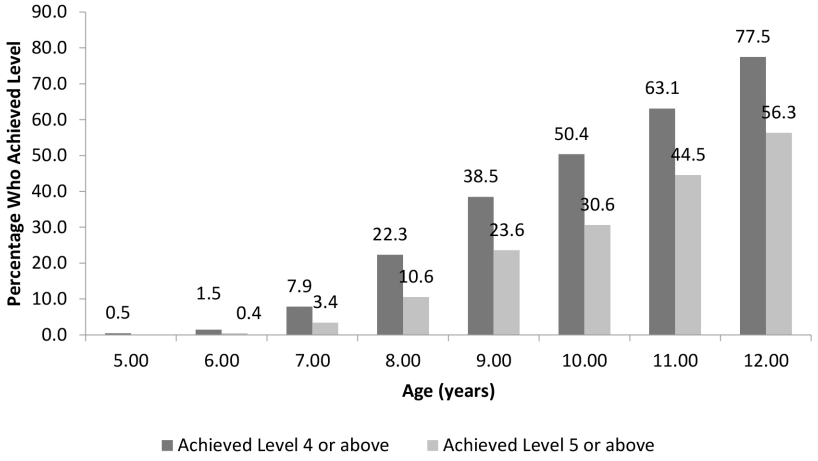

Figure 3 — Proportion of children by age who achieved Level 4 and above or Level 5 and above ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011 (n = 7,668).

swimming pool at home or visits other aquatic locations, the more likely the child will achieve Level 4 and Level 5. What the authors were unable to determine is the amount of aquatic participation that a visit to a river may mean, such as whether a person spends 10 min with their feet in the water or 4 hr vigorously swimming.

Some other factors impact children's ability to achieve a level: what gender they are, whether they attend a public school, whether they are an Aboriginal or

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DOI: 10.25035/ijare.09.03.02

Table 7 Correlation Between Variables and Achievement of Level 4 or Level 5, ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011 (*n* = 3,868)

	Achieve Level 4		Achieve Level 5	
Variables	**Correlation**	**Sig. (2-tailed)**	**Correlation**	**Sig. (2-tailed)**
Aboriginal or Torres Strait Islander	–.043	.007	–.048	.003
Negative experience	–.044	.006	–.047	.003
Female	.069	.000	.059	.000
Male	–.069	.000	–.059	.000
Public school	–.227	.000	–.219	.000
Private school	.227	.000	.219	.000
Medical condition	–.031	.054	–.028	.078
Swim at least once a fortnight	.117	.000	.128	.000
Swim less than once a fortnight	–.034	.032	–.054	.001
Swim never	–.084	.000	–.066	.000
Swimming pool at home	.112	.000	.122	.000
Visited public swimming pool	.104	.000	.078	.000
Visited a beach	.118	.000	.103	.000
Visited a lake	.064	.000	.096	.000
Visited a river	.019	.226	.022	.178
Visited other swimming location	.039	.015	.057	.000
Private swimming lessons	.170	.000	.166	.000

Note. Sig. = significance.

Table 8 Logistic Regression Model for Children to Achieve Level 4, ACT Department of Education—Primary Schools Swim and Survive Program 2009–2011 (*n* = 7,726)

		95% C.I. for OR		
Variables	**OR**	**Lower**	**Upper**	**Sig.**
Age	2.572	2.389	2.768	.000
Gender (female)	1.559	1.277	1.904	.000
School type (private)	3.107	2.504	3.856	.000
Aboriginal and/or Torres Strait Islander	.763	.385	1.511	.437
Negative experience	.477	.243	.935	.031
Swim at least once a fortnight	2.429	1.882	3.134	.000
Have a swimming pool at home	2.201	1.666	2.910	.000
Visited a public swimming pool	2.757	1.850	4.109	.000
Visited a beach	1.941	1.558	2.420	.000
Undertook private swimming lessons	1.893	1.449	2.473	.000

Note. CI = confidence interval; OR = odds ratio; Sig. = significance.

Table 9 Logistic Regression Model for Children to Achieve Level 5, 2009–2011 (*n* = 7,726)

		95% C.I. for OR		
Variables	**OR**	**Lower**	**Upper**	**Sig.**
Age	2.411	2.221	2.617	.000
Aboriginal and/or Torres Strait Islander	.534	.204	1.401	.202
Previous negative experience	.263	.094	.737	.011
Gender (female)	1.556	1.223	1.979	.000
School type (private)	3.270	2.558	4.180	.000
Swim at least once a fortnight	2.028	.877	4.688	.098
Swim less than once a fortnight	.766	.337	1.741	.525
Swimming pool at home	2.332	1.697	3.205	.000
Visited a public swimming pool	2.442	1.488	4.008	.000
Visited a beach	1.937	1.462	2.565	.000
Visited a lake	1.933	1.396	2.676	.000
Visited a river	.729	.529	1.005	.054
Visited other aquatic location(s)	1.552	1.121	2.148	.008
Participated in private swimming lessons	2.319	1.684	3.193	.000
Have an existing medical condition	.808	.544	1.200	.291

Note. CI = confidence interval; OR = odds ratio; Sig. = significance.

Torres Strait Islander, whether they have an existing medical condition, or whether they have a previous negative experience with water. Males have and continue to be overrepresented in the drowning statistics (Franklin et al., 2010); this may be related to the level they achieve as part of their formal exposure to swimming and water safety lessons as well as their propensity to undertake risky activities (Howland, Hingson, Mangione, Bell, & Bak, 1996).

This study does not cover all children in the ACT; proportionately on an annual basis it covers between 5–9% of children aged 5–12 years. There were 34,020 children aged 5–12 years in the ACT in 2011. In 2011 for children 6–8 years, 16% participated in the program, with the proportion decreasing sharply to 1.5% of 12 year olds. This is not to say children are not participating in other school-based swimming and water safety programs, and they could also participate in private or after school swimming lessons. Our best estimation is that there are another 8,000 children aged 5–12 years participating in private learn-to-swim programs; however, we know that at least a third of these also participate in the school program. As such, a large proportion of children are potentially missing out on swimming and water safety lessons in any given year. This lends weight to the argument by drowning prevention advocacy organizations for the reintroduction of compulsory swimming and water safety education during the primary school years (Australian Water Safety Council, 2012). The primary school years (5–12 years) are a key age for the acquisition of such skills and can provide a safety net as some children may not be able to afford or be likely to participate in any other form of instruction for the rest of their lives.

A child's readiness to learn to swim has been found to be around 5 1/2–6 years of age (Blanksby et al., 1995). As such, while swimming and water safety lessons before this age provide some basic skills, the ages of 5–8 years are a perfect time to ensure strong foundation skills are developed so that children leave primary school with a minimum level of swimming and water safety skills and knowledge.

This study highlights that there are some groups that need more help than others in achieving swimming and water safety milestones, such as Aboriginal and Torres Strait Islanders, those with an existing medical condition, those with a fear of water, and those from public schools. While this study did not collect information on socioeconomic status, those from potential high-income households were more likely to achieve the required levels, that is, they were attending private schools and or private swimming lessons.

One of the more interesting but obvious findings is the more often children are in the water, the more likely they are to achieve the set swimming and water safety levels. Children who swam at least once a fortnight were between 1.8 and 3.1 times more likely to achieve Level 4, thus demonstrating that more is indeed better. This finding was also reinforced with children who had visited a public swimming pool, beach, and lake being more likely to achieve Level 4. Interestingly, visiting a river had no impact on achieving Level 4. The next part of this study will entail exploring how well children who participate in this program over multiple years do, compared with children new to the program, as it has previously been found that children who participate in repeat programs achieve better outcomes than those who do not (Erbaugh, 1986).

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Differences in male and female motor characteristics for swimming training have previously been found (Pavić, Trninic, & Katic, 2008). Males performed better at explosive strength, throw strength, coordination, and aerobic endurance whereas females were better at flexibility and movement frequency, leg movement in particular (Pavić et al., 2008). In this study females, on average, outperformed males although this was only significant for 6–8, 10, and 12 year olds. Further work is required to see if there are other factors that influence males' ability to achieve the levels as opposed to females'. The findings may mean that the program needs to be modified to ensure that males are achieving as well as females.

This study demonstrated that children with preexisting medical conditions were less likely to achieve the same levels as their peers, especially in the 7–9 years age groups. This finding is especially concerning in that many children with medical conditions may prolong commencement, withdraw from swimming participation early, or not commence at all, placing themselves at a greater risk of drowning, as well as limiting their future enjoyment of aquatic recreation activities because of limited swimming and water safety skills. This study did not explore the severity or different types of medical conditions.

While swimming has been shown to be the least asthmatogenic challenge for asthma sufferers, and children with asthma can achieve improved swimming ability (Fitch, Morton, & Blanksby, 1976; Rosimini, 2003) and aerobic capacity (Matsumoto et al., 1999), it is however not clear if they require more lessons than others to achieve the same level. Ensuring that all children achieve a minimum level may mean that children with existing medical conditions may require more lessons, or lessons over a longer period of time, to achieve the minimum standard. This may create increased hardships on families already challenged with looking after their children, and, as such, having a fully funded or subsidized school-based program ensures these children can achieve the same level of swimming and water safety skills as their peers.

Conclusion

In Australia, swimming is a key life skill that all children should learn. Similarly, all children should be able to achieve a minimum level similar to reading, writing, and arithmetic standards. This is particularly important in Australia, where interaction with water plays a significant role in people's lives. The AWSC has set a minimum level (Level 4 of the Swim and Survive Program or the equivalent) that all children should achieve before leaving primary school. Ensuring all children receive these skills is a key challenge for state and territory education systems that are moving away from compulsory swimming and water safety skills as part of the curriculum.

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