



Physical Literacy in Aquatic Environments

A Discussion Paper

PHYSICAL LITERACY IN AQUATIC ENVIRONMENTS

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ISBN: 978-1-927921-86-9

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This project is funded in part by the Government of Canada.

Ce projet est financé en partie par le gouvernement du Canada.

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PHYSICAL LITERACY IN AQUATIC ENVIRONMENTS

Choosing to extend your life to 65+ years or shorten it to three minutes!

Much of the literature to date pertaining to physical literacy has been with an impetus to improve competence, confidence, and motivation in the acquisition of movement skills in order to increase participation in physical activity. Nearly every developed nation on the planet is grappling with an epidemic of physical inactivity and poor nutrition, which in turn is having dire effects on prevalence rates of many non-communicable diseases (e.g. obesity, diabetes). The need to change human movement behaviour to improve the prevention of health diseases is in fact one of the oldest studies of behavioural science we have. While we recognize this need to be competent, confident, and motivated to live a physically active life that improves your life expectancy beyond 65 years of age compared to someone with a sedentary lifestyle, we overlook the need to examine how competence, confidence, and motivation

of movement prevents the risk of imminent death. In the case of this Discussion Paper, how does learning to be competent, confident, and motivated to move in, through, and on water prevent death that can occur in under three minutes?

Then once that is achieved, how do people develop into competent, confident, and motivated movers in aquatic environments? That is the essence of this document which is designed for policy-makers, swim program designers, and swim instructors to rethink the traditional approach to developing competencies in aquatic environments. This is not designed to be a prescriptive guide for developing physical literacy in aquatic environments. Targeted at aquatics organizations, the purpose of this document is to introduce a new approach, a new way of thinking. This document is also a catalyst for discussion to increase the ability for people to be safe and enjoy aquatic environments.

Can we change the paradigm, the existing statistics, by taking an approach of developing physical literacy in the aquatic environment?

Preface from an Aquatic Perspective

Participation in physical activity and sport is a fundamental human right for all. With this in mind, we should also acknowledge that a significant amount of human physical activity, recreation, leisure, and sport takes place in water. Participation on, in and through water can be some of the most enriching and enjoyable forms of physical activity people can engage in. It is not only necessary for people's livelihood in many cultures, but many of the most enjoyable forms of recreation and leisure take place in pools, rivers, lakes, and in our oceans.

Unlike land-based forms of movement, however, aquatic environments often present a unique challenge. Injury and death from drowning is a global health concern. The World Health Organization estimates that 360,000 people every year will die from drowning, making it the third leading cause of unintentional death.

Preparing people to have the competence and confidence to survive in aquatic environments is the cornerstone of many of the world's lifesaving organisations. To date, as with any initiative, there has been a focus on the skills or competencies people require to prevent drowning. These initiatives alone have only been partially successful. Teaching people to swim, especially from a young age, has been the frontline strategy in drowning prevention for the past century.

However, these initiatives alone are having very minimal effects of reducing the drowning prevalence rate in both developed and developing nations. We are learning that many programs are not preparing people, especially our youth, to respond to aquatic environments other than those which are highly controlled and supervised (e.g. public pools). People are being taught to swim in highly controlled environments with buoyancy aids and goggles. Too often, these highly controlled swimming environments provide people and parents with the confidence that they can engage in a variety of aquatic environments where the conditions are far less stable.

This Discussion Paper is the first attempt I have seen to start a new conversation in water safety and connect people back to meaningful participation in our pools, rivers, lakes and oceans. New conversations and insight is desperately needed if the statistics and needless deaths that occur in water every day are going to be arrested.

I was first introduced to the concept of physical literacy by Dr. Dean Dudley in 2015 when he was the Director of Learning and Development for Surf Life Saving Australia. Dean is not only one of the world's leading thinkers in physical literacy, but he is a highly respected Surf Lifesaver with nearly two decades of experience working on Australian beaches. He has been recognized with several rescue citations and continues to volunteer his time working on Australian beaches and leading the thinking of the lifesaving fraternity.

This Discussion Paper is a culmination of his intellectual pursuits and passion for ocean sports and recreation. In this paper, he asks us to reconceptualise the origins of our Learn to Swim programs and the impact they are having. He also proposes a new model recently being employed by land-based sports across Australia, New Zealand, and in many school authorities, as a means of reorienting our instruction-based interventions in drowning prevention. Most importantly though, Dean does not demonize or instill fear of the water as the imperative of these changes. This Discussion Paper is about a journey that we all can take as individuals, organizations, and as a society to ensure that our families, members, and citizens all enjoy the fundamental rights of physical activity in the world's largest environment...the water.

Graham Ford, AM

President, International Life Saving Federation

Preface from a Physical Literacy Perspective

Interest in physical literacy is now global. Both the World Health Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have recently released documents that specifically reference physical literacy and how it is essential for increasing physical activity, improving health, and meeting sustainable development goals. Physical literacy is also cross-sectoral. It is the focus of inquiry and practice in physical activity and sport, in public health and health promotion, and in education. It is fair to say that physical literacy is a multi-disciplinary, global social movement, and that the Sport for Life Society has played—and continues to play—a foundational role in the understanding and promotion of the concept. This document is but another example of how Sport for Life is raising awareness of physical literacy and advancing practice in the field.

One of the cornerstones of physical literacy is the recognition that competent and confident movers do not exist independent of the environments in which they inhabit. In other words, to be a competent and confident mover requires the skills, motivation and knowledge to move in diverse, sometimes extreme, environments. Too often, however, our research and practice has tended to prioritize a narrow range of competences, of which many are associated with sports that tend to be land-based (e.g., football, cricket, track and field). Physical literacy demands we have the competence and confidence to move not only on land, but in the air and also in and through the water—in all its forms (ice, liquid). Central to the concept of physical literacy is fit with one's environment. Currently, I live in a country—Canada—where there is not only easy access to water, both natural and person-made, but where seasonal changes demand acclimation in the way in which I move. If I were to lack the competence and confidence to move across all these environments (land, water, and on ice during winter), I would not only be putting myself at risk for injury, but would also be limiting my opportunities for participation and social connectedness.

In this sense, physical literacy is not only essential for the prevention of injury or even death—in the case of aquatic physical literacy, drowning prevention—it is fundamentally a matter of participation. Participation in this context is more than sport or exercise. It is related to activities of everyday living, occupation as well as recreation. When a person possesses both the ability and the desire to move in varied and challenging environments, then opportunities for personal growth are created. Physical literacy can be the difference between living and living well. It is about creating resilient citizens.

In this impressive and ground-breaking document, the case for a physical literacy approach to aquatics is made. The approach advocated within is desperately needed. For too long, we have placed drowning prevention and safety approaches over learning to read, to anticipate, and to react to the challenges of the aquatic environment. The document is revolutionary in its implications. It challenges us to think differently about aquatics and our role in facilitating competent and confident movers in this environment. I hope you will find, as I have, many gems in here; ideas to provoke and signposts to begin to think about how we change practice. Let the journey begin!

John Cairney, PhD

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Aquatic Movement —a Skill for Life

Most physical activity advocacy messages state that adopting healthy physical activity habits early will prevent you from dying prematurely from a non-communicable disease usually decades from when the messages say you need to adopt them. However, the necessity in adopting movement that is adaptable to aquatic environments prevents deaths that are possible within *just three minutes*. Drowning (whether fatal or non-fatal) presents a significant public health concern in its own right.



Human Costs

In 2014, the World Health Organization (WHO) reported that drowning related injuries accounted for over 9% of total global mortality. Drowning is the third leading cause of unintentional injury death, accounting for 7% of all injury-related deaths. The global burden and death from drowning is found in all economies and regions, however:

- low- and middle-income countries account for over 90% of unintentional drowning deaths;
- over half of the world's drowning occurs in the Western Pacific and South-East Asia Regions; and
- drowning death rates are highest in the African Region, and are 15-20 times higher than those seen in Germany or the United Kingdom, respectively.

Data from high-income countries suggest these categorization methods result in significant underrepresentation of the full drowning toll by up to 50% in some high-income countries. Non-fatal drowning statistics in many countries are not readily available or are unreliable (*World Health Organization, 2014*).

Economic Costs

Despite limited data, several studies reveal information on the cost impact of drowning (*World Health Organization, 2014*). In the United States of America alone, 45% of drowning deaths are among the most economically active segment of the population. Coastal drowning in the United States alone accounts for US\$273 million each year in direct and indirect costs. In Australia and Canada, the total annual cost of drowning injury and death is US\$85.5 million and US\$173 million respectively.

What Activities Present the Most Drowning Risk

There is a wide range of uncertainty around the estimate of global drowning deaths. Official data categorization methods for drowning exclude intentional drowning deaths (suicide or homicide) and drowning deaths caused by flood disasters and water transport incidents. The following graph represents the percentage of drowning deaths in Australia by activity (*Royal Life Saving Society – Australia, 2017*).

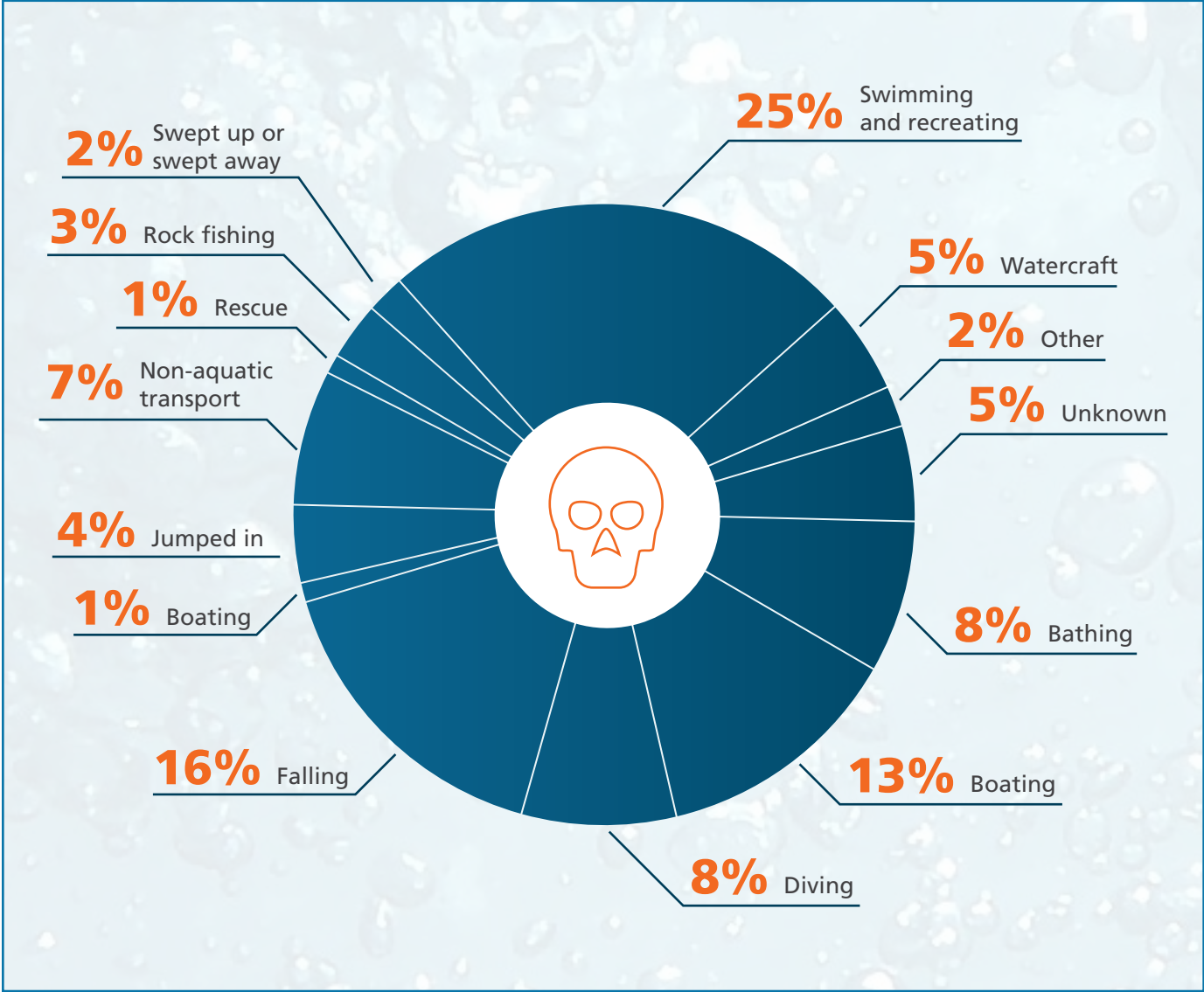


Figure 1: Drowning Deaths in Australia by Activity Immediately Prior, 2016/17

Definition of Physical Literacy

Physical literacy is the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life (*International Physical Literacy Association, 2014*).

Four Elements

The definition of physical literacy includes four essential and interconnected elements whose relative importance may change throughout life.

Motivation and Confidence (Affective)

Motivation and confidence refers to an individual's enthusiasm for, enjoyment of, and self-assurance in adopting physical activity as an integral part of life.

Physical Competence (Physical)

Physical competence refers to an individual's ability to develop movement skills and patterns, and the capacity to experience a variety of movement intensities and durations.

Knowledge and Understanding (Cognitive)

Knowledge and understanding includes the ability to identify and express the essential qualities that influence movement, understand the health benefits of an active lifestyle, and appreciate appropriate safety features associated with physical activity in a variety of settings and physical environments.

Engagement in Physical Activities for Life (Behavioural)

Engagement in physical activities for life refers to an individual taking personal responsibility for physical literacy by freely choosing to be active on a regular basis.

Five Core Principles

- Is an inclusive concept accessible to all
- represents a unique journey for each individual
- can be cultivated and enjoyed through a range of experiences in different environments and contexts
- needs to be valued and nurtured throughout life
- contributes to the development of the whole person.

(Canada's Physical Literacy Consensus Statement, 2015)

The following definition from Sport Australia:

Physical literacy is the skills, knowledge and behaviours that give us the confidence and motivation to move throughout our lives.

Sport Australia goes on to say:

"Developing your physical literacy can give you the confidence and capability to be active, and stay active for life.

This is because physical literacy gives you:

- the physical skills and fitness,
- the attitudes and emotions that motivate you to be active,
- the knowledge and understanding of how, why and when you move, and
- the social skills to be active with others.

Any person, at any life stage and circumstance, can improve their physical literacy" (*Sport Australia, 2019*).



Figure 2: Sport Australia's Physical Literacy Wheel

Together, these various definitions remind us that, while the definition of physical literacy may change and evolve, ultimately it is a concept made up of affective, physical, cognitive, and behavioural elements.



Does Learning to Swim Prevent Drowning and Promote Lifelong Physical Activity?

Simply “learning to swim” is an insufficient approach for society to take in order to prevent drowning prevalence. Furthermore, the data from many developed countries points to many contraindications in the current “learning to swim” regimes in place that are not conducive to people engaging in aquatic activity across their life course for health or as a source of meaningful movement. So, where do the areas of “concern” and “optimism” lie with “learning to swim”?

Concerns

The extent of evidence that supports current approaches of teaching children to swim in order to prevent drowning has only weak empirical support.

Brenner et al. (2006) recommended that “swimming ability be promoted as a necessary component of water competence, but with the understanding that swimming ability alone is [often] not sufficient to prevent drowning” (p. 116).

The 2014 WHO review of swimming and training curricula in high-income countries found little conclusive evidence of drowning reduction due to swimming (*World Health Organization, 2014*).

Optimism

The WHO review however did find three case-control studies showing associations between receiving swimming lessons or naturally acquired swimming ability and decreased drowning (*World Health Organization, 2014*).

The review also found one quasi-experimental trial, the SwimSafe Cohort Trial, whereby a reduction in fatal drowning among school children in rural Bangladesh was observed (*World Health Organization, 2014*).

What are particularly fascinating about these studies were the “natural” settings in which the aquatic skills were acquired.

We know from evidence being released in the “aquatically-driven” nations, even like Australia and New Zealand, that children are not staying in traditional Learn to Swim programs long enough to prevent their drowning risk or develop competence, confidence, and motivation to pursue aquatic activity for the rest of their lives.

Case in point, the chart below shows the age that Australian children are likely to exit from their Learn to Swim programs (Royal Life Saving Society – Australia, 2017). Based on this reoccurring data, over 50% will leave before their sixth birthday. Over 70% will leave as soon as their traditional Learn to Swim program assesses that they can swim 50 metres in a controlled pool environment.

Learning to Swim...is it worth it?

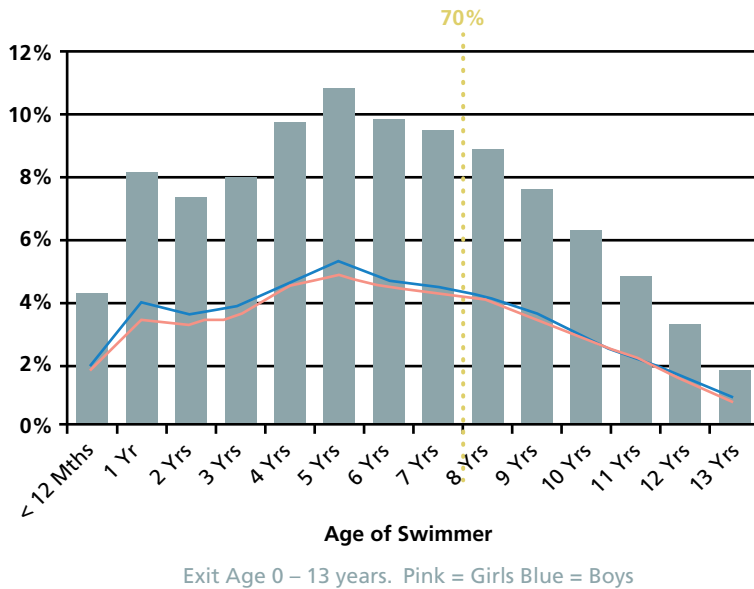


Figure 3: Exit Age of Australian Children Age 0 – 13 Years

With 70% of children leaving Learn to Swim programs at the point of being able to swim the length of an Olympic-sized swimming pool, it begs the question as to whether this constitutes sufficient competency to prevent drowning later in life? Given that most pool drownings occur in

children over the age of four, and most older drownings are more likely to occur in natural water environments, an incongruence between what we are teaching and what we are trying to prevent becomes self-evident.

Learning to Move in Aquatic Environments

Contrary to popular belief, purposeful aquatic movement (which includes swimming) has been observed in indigenous cultures since ancient times. Many may think of swimming and other aquatic movements as a fairly recent human endeavour. In fact, there are lots of examples of swimming in ancient contexts going back to nearly prehistoric times. These include a Japanese emperor's decree encouraging swimming 2000 years ago, Egyptian hieroglyphics portraying swimmers 4500 years ago, and 9,000-year-old cave paintings all depicting humans in some form of swimming or aquatic movement for sustenance or recreation. Clearly, there is a long history of people moving in, through, and on water for travel, food gathering, and exercise—not just simply for contemporary recreation or competition.



Photo: Roland Unger, 2011

Contrary to popular belief, swimming ability alone is not sufficient to prevent drowning (*Brenner et al., 2006*), and the extent of evidence that supports current approaches of teaching children to swim in order to prevent drowning has only weak empirical support. The 2014 WHO review found little conclusive evidence of drowning reduction due to swimming in high-income countries, but it did find three case-control studies and a trial where swimming lessons or naturally acquired swimming ability appear to lead to decreased drowning (*World Health Organization, 2014*). Of particular note about these studies were the “natural” settings in which the aquatic skills were acquired.

Brenner et al. (2006) recommended that “the concept of swimming ability be replaced by the more encompassing notion of water competence with regards to drowning prevention” (p. 116).

Like most forms of physical activity, hazards are present when teaching anyone to swim if appropriate safety measures are not in place, not just for children either. Unfortunately, this has resulted in the aquatic industry developing highly prescriptive formal programs to teach children swimming in highly controlled aquatic environments. Many of these highly prescriptive and controlled swimming programs are often supported by government and reinforced by school curricula. Their focus on “water competence” is negligent of a broader question. What does it take to develop an individual with the competence AND confidence to engage in meaningful aquatic movement for their whole life? To answer this question, we need a new approach to our current thinking of aquatics. The concept of physical literacy offers us some new and different insight to this question.

Change the Paradigm— Develop Physical Literacy in Aquatic Environments



...the concept of swimming ability be replaced by the more encompassing notion of water competence with regards to drowning prevention. [sic]

~(Brenner, Moran, Stallman, Gilchrist, & McVan, 2006, p. 116)



Where are we now?

1. The aquatic industry is developing highly prescriptive formal programs to teach children swimming in highly controlled aquatic environments.
2. Many of these highly prescriptive and controlled swimming programs are often supported by government and reinforced by school curricula.
3. Aquatic activity has been predicated on competencies being determined without scientific evidence by vested stakeholders.

What would need to change?

1. A questioning of the command and highly controlled learning model that is predominantly being used.
2. All competitive swimming would need to become model-based.
3. The early role of parents.

Where do we want to be?

1. Dynamic programs with exposure to multiple situations.
2. Model-based on a wide range of swimming competencies.
3. Models constructed on all four domains of learning.



What is Physical Literacy and What Does it Mean for Aquatics?

According to Dudley (2015), physical literacy should be viewed as an umbrella concept that captures the learning of knowledge, skills, and values related to taking responsibility for purposeful physical activity and human movement across the life course, regardless of physical or psychological constraint. Physical literacy, therefore, is a construct that is measured in terms of learning.

To assist policy-makers with the operationalization of physical literacy into their organizations, Dudley et al. (2017) proposed a model of four pillars of physical literacy that can be utilized by any organization seeking to influence the learning and movement behaviours of a given population. Before purposeful learning can occur within an organizational program, the policy conditions must be set. Physical literacy policy is initially concerned with the contribution and consideration paid to each of the pillars in supporting the construct. The physical literacy pillars for policy in this model provide relevant structural scaffolds in that each pillar becomes a necessary consideration for policy development. These pillars can be equally applied across health, recreation, sport, and education disciplines.

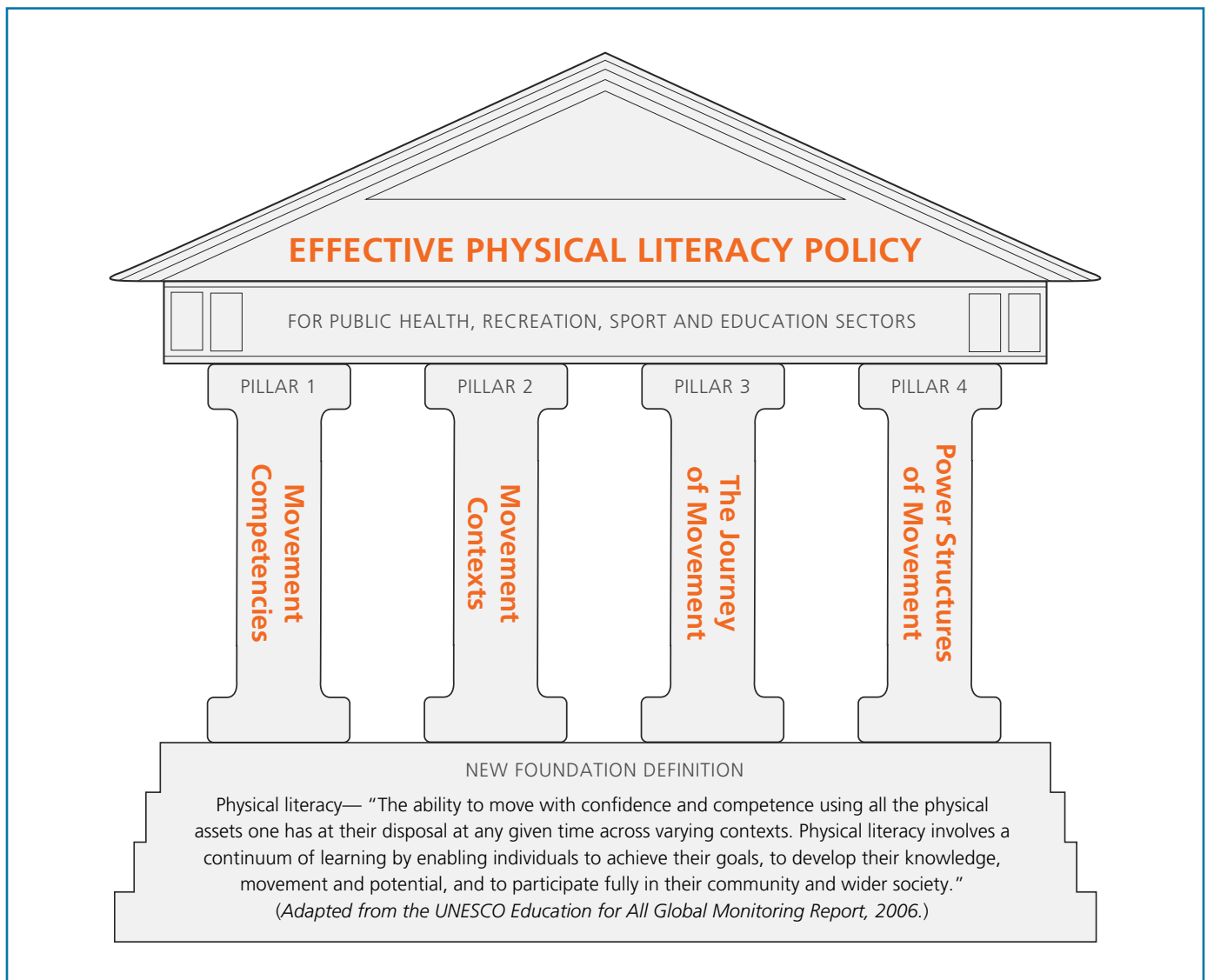


Figure 4: New Foundation Definition

Photo: BC Diving



Pillar 1: Movement Competencies

The key consideration for aquatic agency policy-makers pertaining to Pillar 1 of this model is that physical literacy includes and actively promotes movement skill development. However, physical literacy policy needs to ensure that the promotion and development of movement competencies

does not occur at the expense of wider lifelong physical activity pursuits and opportunities. In other words, the development of movement skills, for youth especially, needs to be broad and diverse. Physical literacy policy should actively discourage the early over-specialization of sport/activity-specific skills in favour of exposing youth to movement skills that have the greatest capacity for transferability and cross-activity participation. Some might refer to this as offering a diversification of skill acquisition opportunities. Aquatic agencies should collaborate in the mobilization of knowledge to ensure the development of movement competencies in, through, and on water to enable the widest possible participation outcomes across the life course.

Pillar 2: Movement Contexts

Each aquatic agency must consider both the environmental and social confounders conducive to promoting to their target populations a physically active lifestyle in water while ensuring movement competencies can be learned in such settings. If this does not occur, it is likely the relationship between the principals (those who define policy) and those expected to enact policy within agencies will almost certainly be limited by individual agency bias and protectionism.

In policy, aquatic agencies can ensure that the rules pertaining to participation are equitable and inclusive, that the tactical understandings needed to be successful are taught and encouraged, and that people are given the tools and time to reflect on the strategies one must employ to continue to grow and enrich their aquatic experiences. Furthermore, physical literacy-inspired policy pertaining to movement contexts should seek not only to serve its own interests, but also work closely with other agencies to ensure a transfer across contexts can be promoted. This might be addressed through identifying and promoting common rules and strategies across like activities. Policy-makers should also seek to host and promote dialogue across their respective fields to ensure that tactics and strategies being applied to one movement context may also promote movement in others. For this to occur, agencies may begin examining their natural dispositions for targeting physical literacy to certain contextual environments. For example, public health agencies heavily invested in the natural environments may wish to consider the social contexts that education institutions vest in or the cultural ones pursued by sport agencies. In any case, intellectual investment should extend beyond natural disposition.



Pillar 3: The Journey of Movement

For policy-makers in all aquatic disciplines, addressing the journey of movement should consider how movement is pursued throughout one's life. Policy-makers can accomplish much by ensuring that opportunities for physical activity participation are flexible, diverse, and available at different times and in different places. This particular pillar ensures that physical literacy crosses sectors—promoting movement beyond traditional institutional settings and throughout life. During this journey, policy-makers need to ensure that individuals are given the opportunities to acquire a vast array of movement competencies beyond the structured understandings of any one institution. People also need to be equipped with not only the competencies they require now, but the capacity to innovate and adapt their movement needs to future movement settings. And finally, addressing Pillar 3 requires policy-makers to collectively recognize that physical literacy contributes to a person's complete development. It, therefore, needs to actively support each person's capacity to live with others.

Pillar 4: The Power Structures of Movement

To achieve physical literacy's philosophical objectives, education, sport, recreation, and public health agencies must include specific efforts to transform inequitable gender structures so that every person can benefit equitably, regardless of their sex or gender identity. This is by far the most pressing priority of Pillar 4. Addressing the gender equity issue in physical literacy policy should have the largest initial impact on improving the quality and reach of all four sectors in this regard. All four sectors should also prioritize how their physical literacy policies facilitate those with disabilities or those from marginalized populations to overcome both the overt and covert power structures that exist within and between their sectors in terms of physical activity participation.

Physical literacy

is the...



Figure 5: Physical Literacy Cycle



Why We Need Physical Literacy Informing Our Aquatic Programs?

Decreasing levels of physical activity participation and increased drowning prevalence in many developed countries requires a new and genuine engagement in the co-production of competitive, recreation, and drowning prevention policy. The extent of evidence that supports current approaches of teaching people to swim in order to prevent drowning has only weak empirical support. Furthermore, in many countries, learning to swim has become an expensive endeavour with little effect. According to the Royal Life Saving Society – Australia (2017), more affluent families account for well over half of all children who attend swimming classes. The report found it took an average of 30 private lessons—at a cost ranging from \$15 to \$22 per lesson—over 12-to-15-months before a child could swim 50 metres. According to the same report, children who had regular weekly lessons were most likely to reach national safety and swimming benchmarks at age nine and 10. Yet, only 25% were staying in lessons long enough to reach this standard. The analysis also revealed that the numbers of children doing swimming lessons fall sharply from eight years of age to only 2% of children aged 12 still participating in swimming.

To change this model will require major shifts in the culture and operations of aquatic agencies. It demands new skills of public servants and industry leaders as enablers, negotiators, and collaborators. It demands of stakeholder agencies an orientation to the public good, a willingness to actively engage with each other, and the capabilities needed to participate and deliberate the four pillars of physical literacy development as articulated by Dudley et al. (2017). This is by no means an easy feat—especially if citizens are disengaged or certain groups within the population are marginalized. Effective engagement by aquatic agencies requires political support for the genuine devolution of power and decision making to interdisciplinary panels of these stakeholders with whom they engage. Ministers and agency executives also have a major leadership responsibility to play here.

As physical literacy becomes an integral part of the vernacular associated with aquatic agencies, the notion of “physically literate societies” will then become increasingly pertinent. These physically literate societies must be more than education, recreation, sport, and health agencies offering access to quality physical activity and drowning prevention. Each of these agencies should seek to clearly articulate in their policy statements how each of the four pillars of physical literacy are being addressed. In doing so, they will be well-positioned to provide an environment of diverse, rich, and prejudice-free physical activity participation opportunities across the life course.





Major Policy Associated with Physical Literacy

In previous aquatic instruction models, there has been a significant focus on teaching the competence component of aquatics. However, there has been a lack of focus on teaching people the affective, cognitive, and social benefits of aquatic activity. The challenge for aquatic-related professions is to consider, embrace, and implement physical literacy's holistic learning (physical, cognitive, affective, and social) approach to aquatic recreation, survival, and competition.

Focusing on the younger generation can have a substantial impact on the health of future generations. However, as the definition indicates, physical literacy is a broader construct than just participating in physical activities. In addition to developing the physical capacities and enhancing movement skill execution, there must be an accompanying and purposeful intervention aimed at instilling confidence to execute and intentionally use these movement skills in the real world. An additional concern is that there has been a

decrease in physical education programs around the world to include aquatics, an increase in early over-specialization in sport, and a greater focus on elite sport programs. This has all led to fewer opportunities to teach movement competencies and develop physical competence, to decreased participation for all levels of athletes (regardless of ability or experience), and to a secular trend of increasingly sedentary lifestyles and associated negative psychological outcomes (e.g. anxiety, depression) leading to an increased risk of injury in our young population. As a solution, physical literacy and its core elements of movement competencies, positive affect, motivation, and behaviour change can help support people to be active and maintain meaningful physical activity across the life course in and out of the water.

Enhancing the physical literacy levels of individuals will require unprecedented collective action among organizations and sectors to achieve success. Also, for the construct of physical literacy to continue its growth, more research beyond the sectors of physical education, recreation and sport needs to be stimulated and "physically literate societies", as indicated by Dudley et al. (2016), need to articulate in their policies how physical literacy can be addressed.



“Learning” in Aquatic Environments from a Physical Literacy Perspective



**PSYCHOMOTOR
LEARNING**



**COGNITIVE
LEARNING**



**AFFECTIVE
LEARNING**



**SOCIAL
LEARNING**

Figure 6: Learning Needed in Aquatic Environments

Typically, the teaching of aquatics behaviour occurs when instructors employ a simply error correction model of instruction whereby the learner is “passive”. The instructor in this model expects all learners, regardless of age or skill, to eventually swim or move through the water like an elite aquatic athlete. This approach corrects errors when teachers, instructors, or coaches remove those errors using command style or didactic teaching interventions. In this command style of teaching, the instructor will typically describe verbally what is required of the learner and then demonstrates the expected “expert” way of moving through the water followed by identifying the “errors” the learner makes that deviate from the “expert” way.

By contrast, a “physical literacy perspective” expects and anticipates changes to occur in aquatic behaviours based not only autonomous skills one needs in the water, but the environment and context in which aquatic activities occur, the moment they are occurring in one’s development (relative to one’s life course), and the degree to which one has been privileged or restrained from these types

of activities. From a physical literacy perspective, changes in aquatic behaviour occur as a result of interconnected learning interactions that occur between the individual, task, and environmental/social characteristics. To execute any aquatic behaviour, an individual calls upon their psychomotor, cognitive, affective, and social learning to solve the problem presented. For example, when adopting this view to something as simple as swimming, an instructor would expect that someone learning to swim on the front gradually and systematically will change the arm, leg, and breathing patterns they use to move through the water because their previous aquatic experiences, their body shape and size, their motivations to learn, and how empowered they become from the experience. Based upon their response to teaching or instructional intervention, the way they interact with the learning task needs to be changed.

This holistic understanding of what skills, knowledge, attitudes, and relationships are needed to thrive in aquatic environments is in stark contrast to previous approaches to aquatic teaching programs.



What are the Elements of Psychomotor Learning Needed in Aquatic Environments?

There are at least 12 elements of psychomotor learning evident in the physical literacy approach to learning in aquatic environments. They focus on the movements, motor skills, and health/fitness skills that a person acquires and applies through aquatic movement. It includes the coordination and application of these skills to perform the movements required in different situations and types of aquatic environments.

- 1.** Locomotor skills that allow the person to move independently from one spot to another through, on, or in the water.
- 2.** Stability/balance skills involving balance and weight transfer.
- 3.** Object manipulation skills involving the use of hands, feet, or another body part to move or manipulate an object.
- 4.** Object locomotor skills, which are manipulation skills that apply locomotion, coordination, and stability to move equipment and person from one place to another.
- 5.** Cardiovascular endurance or cardio respiratory endurance, which is the skill of developing the ability of the heart and lungs to deliver oxygen to working muscles during exercise over sustained periods.
- 6.** Muscular endurance, which is the skill of the muscle(s) to repeatedly exert force over a sustained period. Coordination is the skill of being able to move two or more body parts in a controlled, smooth, and efficient manner.
- 7.** Coordination, which is the skill of being able to move two or more body parts in a controlled, smooth, and efficient manner.
- 8.** Flexibility, which is the skill of a joint or muscle to move through or extend its full range of motion.
- 9.** Agility, which is the skill of being able to quickly change direction or body position.
- 10.** Strength, which is the skill to carry out tasks where resistance is a factor.
- 11.** Reaction time, which is the skill of reducing the length of time taken to respond to a given stimulus.
- 12.** Speed, which is the skill of being able to move the body quickly across, through, or under the water, and/or move limbs quickly.





What are the Elements of Cognitive Learning Needed in Aquatic Environments?

The elements of cognitive learning focus on the development of knowledge and understanding required for movement and physical activity in, through, and on the water. They involve the development of an individual's knowledge of how, when, and why to move in particular ways, and how to adapt and be innovative when faced with new movement challenges in aquatic environments. This includes critical decision-related knowledge, but also includes knowledge of the benefits of movement and physical activity in water.

- 1.** Declarative knowledge is the factual information one acquires about a particular aquatic environment and can convey on demand about their planning or experiences in aquatic movement.
- 2.** Awareness is the knowledge acquired through one's insight, intuition, emotion, and observations based on repetitive experiences in and on aquatic environments.
- 3.** Reasoning is the knowledge one acquires by applying logic, verifying facts, and justifying decisions based on new and existing information about an aquatic environment.
- 4.** Strategic knowledge is that in which one plans and describes how their end goals will be achieved by the means at their disposal. Strategic knowledge (as opposed to tactical knowledge) is enhanced through reflection on previous undertakings in aquatic environments.
- 5.** Tactical knowledge is the decisions by which one attempts to implement strategic knowledge but under the demands of the current environment/contextual situation. In other words, tactical knowledge is applied under strict time constraints governed by the ever-changing nature of aquatic environments.
- 6.** Rules are knowledge one applies to govern their aquatic experiences. These are often referred to as regulations, guidelines, or principles and can be overt or covert, explicit or equivocal, spoken or unspoken.





What are the Elements of Affective Learning Needed in Aquatic Environments?

The elements of affective learning focus on moods, values, and attitudes towards aquatic activity. It involves developing self-esteem, confidence, and motivation, and understanding the emotional responses linked to aquatic movement.

- 1.** Confidence is the learned belief in one's ability to perform a movement task in a given aquatic environment.
- 2.** Motivation is a complex affective learning element that involves one's reasoning for engaging in aquatic movement in response to internal or external stimuli.
- 3.** Self-regulation is a learned skill whereby one perceives, adjusts, and controls their movement in aquatic environments based upon physiological and emotional feedback stimuli (e.g. pain, fatigue, frustration, doubt).
- 4.** Self-awareness is the skill whereby one learns a "sense of self". They learn of their personal strengths and weakness in any given aquatic environment and what is needed to change these.



What are the Elements of Social Learning Needed in Aquatic Environments?

The elements of social learning focus on the development of social skills including collaboration, fair play, navigating safety and risk, and leadership and communication. The development of these skills can help us to enjoy participating and also interact more effectively with others including teachers, coaches, teammates, opponents, and officials.

- 1.** Ethics are an element of social development whereby one's learned moral principles govern their behaviour in any aquatic environment. They are informed by overarching ideals such as fairness, justice, inclusion, and respect for the aquatic environment itself and those with whom we share it.
- 2.** Relationships are an element of social development whereby one learns to build and maintain respect and responsiveness with people and their environment to improve the effectiveness of their movement in aquatic environments.
- 3.** Collaboration is a learned skill that one uses to successfully interact with people (and other animals) to achieve successful aquatic movement experiences.
- 4.** Safety is an applied and learned social skill whereby one moves in aquatic environments so as not to endanger themselves or others.
- 5.** Connectedness is a social learning one develops by appreciating aquatic environments and the belonging to a community of fellow aquatic participants.

Drowning “Immunity”

There may be some additional merit to re-examining the prevalence of drowning from a perspective other than simply providing individuals with Learn to Swim training. Many communicable diseases work on the principle that it requires more than the individual to prevent the onset of a disease. Since the modern medical era, many of our deadliest diseases have required civilisation to raise the resistance to these at a population level.

The notion of “herd immunity” is a form of immunity that occurs when the vaccination of a significant portion of a population provides a measure of protection for individuals who have not developed immunity. Whilst this thinking to date has been limited to conditions of contagion, it may provide insight into why certain groups of people have lowering instances of drowning despite their frequent exposure.

Surfers, for example, should be a population that is over-represented in drowning statistics based on their frequency

of exposure to hazardous aquatic environments. However, surfers generally all share and carry common attributes that reduce their drowning prevalence. Apart from them being tethered to a floating implement (e.g. surfboard), surfers more often than not surf in groups of common ability. Most, or if not all, members of a group of surfers have to be both confident and competent in the prevailing conditions. They quickly enforce through social interactions if people try and join the group but are not capable in terms of competence or confidence. They often will assist other surfers and swimmers who get themselves into distress. It is this collective competence and confidence in hazardous aquatic conditions that reduces their risk of drowning.

A little known fact is that many ocean rescues are performed by recreational surfers, and many professional surfers also go on to work in the ocean lifeguarding profession...Much more so than from professional swimming or other aquatic pursuits.



Figure 7 below indicates how herd immunity can work in an aquatic environment. If a group of people who do not have the competence, confidence and understanding to successfully navigate the water all go swimming together, and a couple of them become distressed and begin to drown (we will call them “contagious”), there is a good chance those contagious will “infect” others in the group who also lack the competence, confidence and understanding (“susceptible”) who try to save them, which could lead to a mass drowning. However, if even a few competent, confident and knowledgeable swimmers (“immunized”) join this large group, they can be the ones to save the contagious once they become distressed, and in doing so, indirectly protect the susceptible by coming between them and the danger.

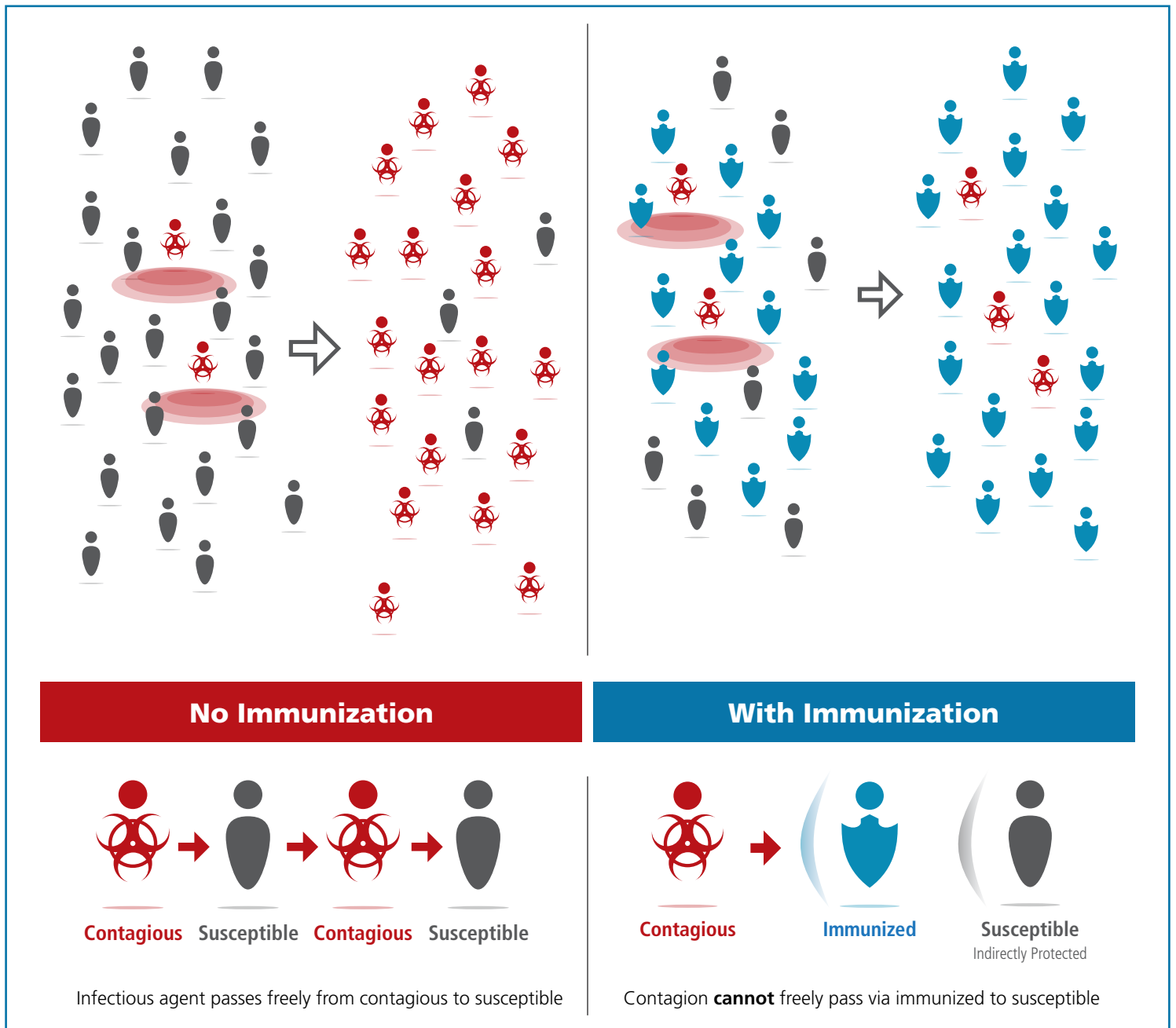


Figure 7: Herd Immunity

The Drowning Vaccine

Given the example of herd immunity, we need to consider how to vaccinate the population against the contagion of drowning. There is always some level of risk when taking part in activities in aquatic environments. The risk can be low, such as wading through a backyard pool, or it can be high, such as freediving through an underwater cave system. However, the risk in any activity is always higher when the participant's competence is lower. If we can increase the population's competence across all aquatic environments, then we will help reduce the risk of drowning.

1. Incremental risk based on confidence and competence (Consider outdoor recreation models, as cited in Martin & Priest, 1986).
2. Teaching applied principles of buoyancy: Floating, breath control, locomotion
3. Play introduced after survival: Delay parents, toys, goggles, buoyancy aids
4. Introduction of problem solving: Scenarios/activities
5. Stress importance of "social" learnings: Permission seeking, group participation, verbal and non-verbal communication

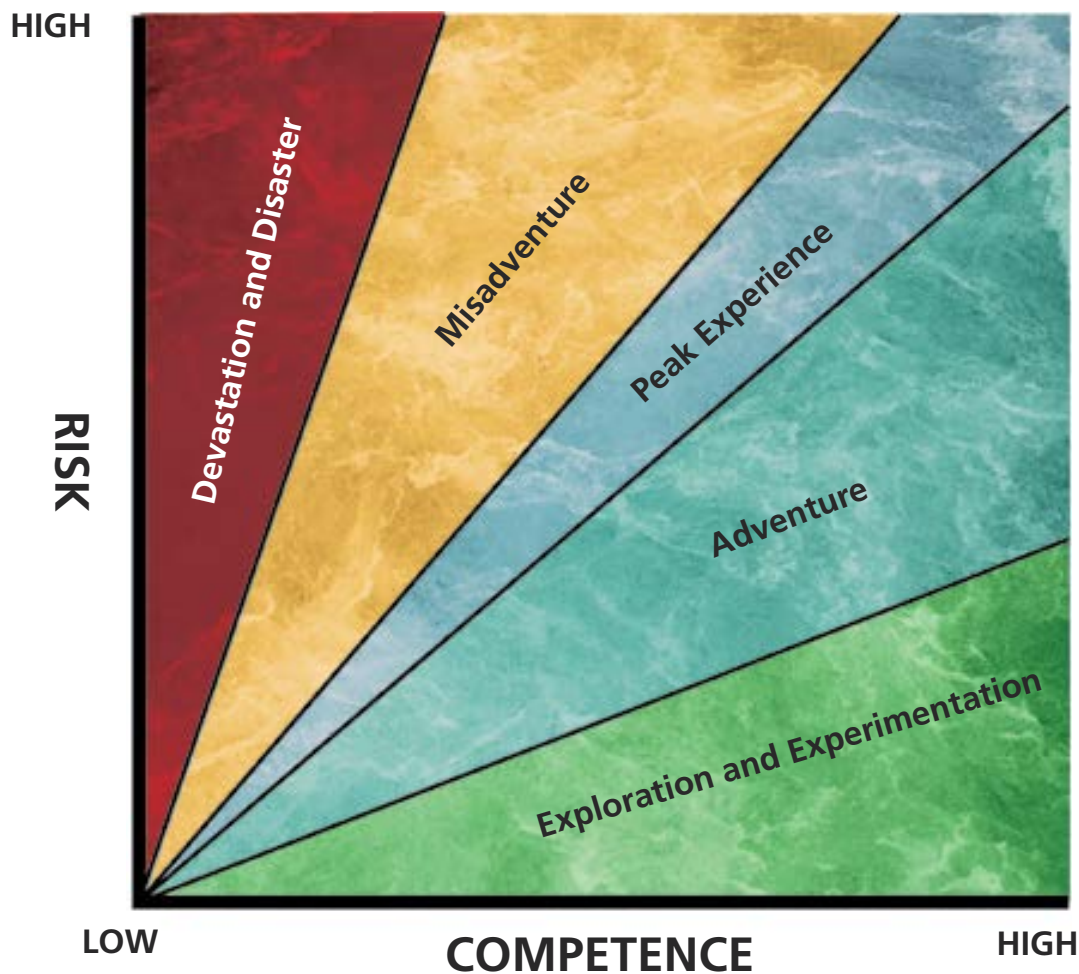


Figure 8: The Adventure Paradigm, modified from Martin & Priest, 1986.

CAN WE Change Aquatic Behaviour Using Physical Literacy?

As outlined earlier, the aquatic industry approach has been highly prescriptive in its formal programming to teach children swimming in highly controlled environments.

These government and education supported aquatic activities are predicated on teaching a level of ability that has neither scientific evidence regarding drowning prevention nor enjoyment in varied aquatic environments.

There is a need to look at the current command and highly controlled learning model, which is based on competitive swimming, through a developing physical literacy lens.

Can we find a better way to develop competent, confident, and motivated movers in aquatic environments?

Can policy-makers, swim program designers, and swim instructors rethink the traditional approach to developing competencies in aquatic environments?

Can aquatic organizations develop or share dynamic programs that expose participants to multiple situations to develop a wide range of swimming competencies?

Can new programs for moving in aquatic environments be constructed including all four domains of learning?



These are questions to consider and discuss.

Visit sportforlife.ca/PLIAE for more.

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