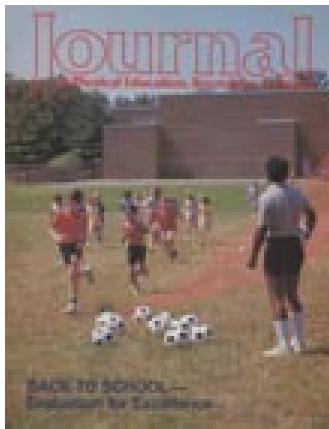


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Aquatics for the Young Child

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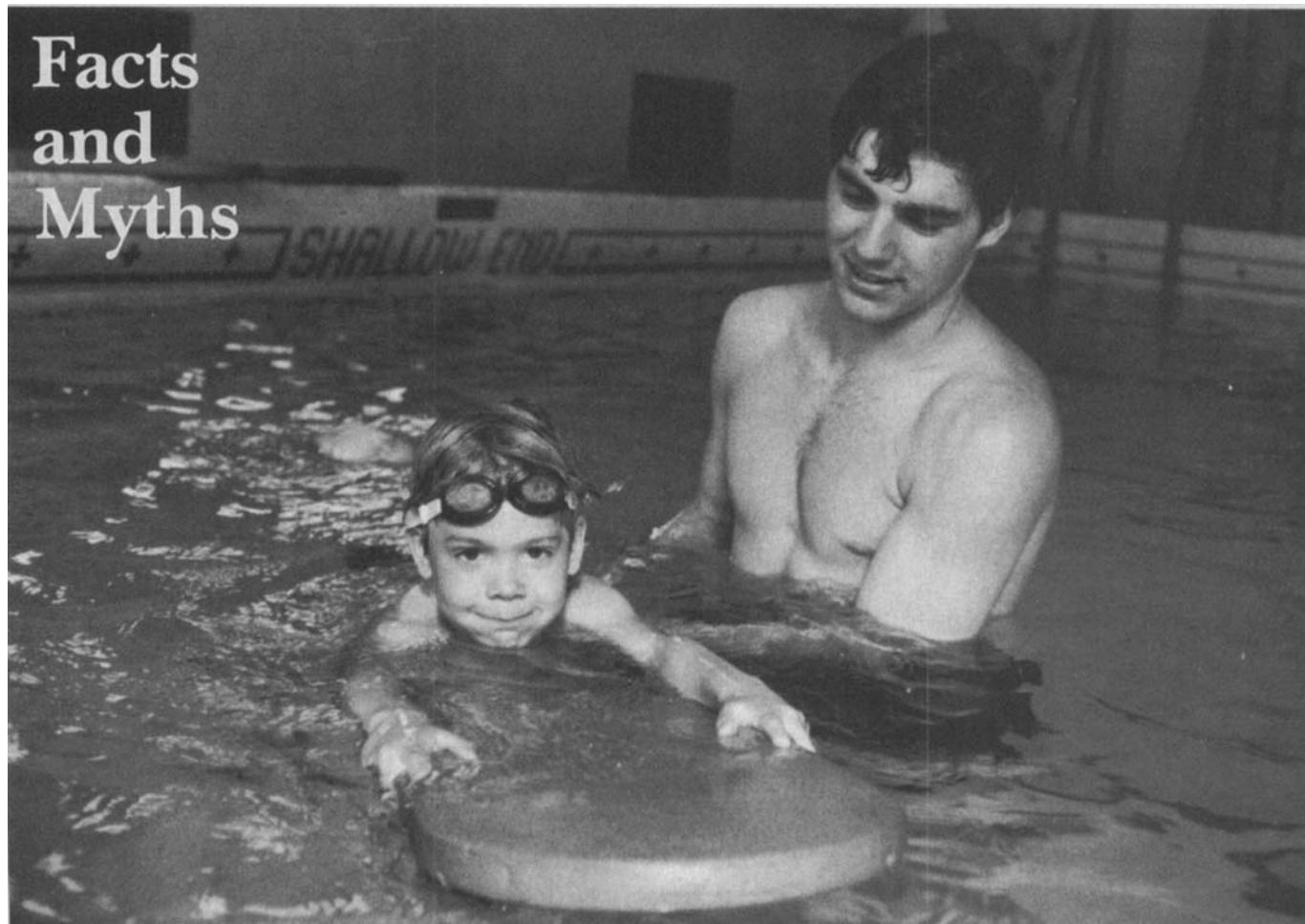
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AQUATICS FOR THE YOUNG CHILD

Facts and Myths

Photograph by Karen Krall



STEPHEN LANGENDORFER

Despite the growth in number and popularity of aquatic programs for young children (Hicks-Hughes & Langendorfer, 1986), numerous individuals and organizations have issued warnings about potential dangers and health concerns associated with young children and the water (Homan, 1974; Murphy, 1983; Nagle, 1984). Warnings have been issued by the Council for National Cooperation in Aquatics (CNCA) and the American Academy of Pediatrics (CNCA, 1973; American Academy of Pediatrics, 1982). "Aquatic Activity Programs for Children under the Age of Three," was recently pub-

lished in the new *National Aquatics Journal* (CNCA, 1985).

The debate surrounding aquatic issues has been conducted largely in the popular press and media and has focused on the opinions and beliefs of many so-called experts such as pediatricians and long time swimming instructors (Bory, 1971; Murray, 1980; Newman, 1983; Prudden, 1974; Timmermans, 1975). In addition, while the ACSM's *Position Statement* resulted from extensive research efforts, there has been minimal research to support the statements and guidelines issued regarding aquatics for young children. The purpose of this article is to illustrate

several controversial areas by contrasting fact with myth and to highlight the need for a comprehensive research effort to answer particular questions about aquatics for the young child.

Myths and facts

For the purpose of this article, a myth will be considered any opinion or statement which can be rebutted by established facts from research or repeated observations. These myths will be grouped according to the following areas: health and safety concerns; teaching/learning methods; and aquatic environments/equipment. For each myth or understand-

ing, a discussion of facts and the need for research will be examined.

Safety and health concerns

Myth #1. Young children can be made "water safe."

Fact. No person, regardless of age or skill level, can be completely safe in the water without supervision. This is especially true for young children who operate at more primitive levels of cognitive and motoric developmental functioning. The terms used to describe many aquatic programs for young children ("drownproofing," "water proofing," "water safe") unfortunately suggest that the physical skills acquired by a young child may guarantee safe participation without close and careful parental supervision (CNCA, 1985).

The "water safeness" of young children raises several important issues which are the source of claims and counterclaims by many persons. There has been little empirical evidence to support whether swimming lessons for young children reduce the incidence of drowning among young children. National safety councils of several nations have extensive statistics on rates and places of drownings of young children. No one has demonstrated empirically how a young child actually gets into a drowning situation and whether physical water safety skills are sufficient to actually prevent the drowning. One argument suggests that teaching young children to swim actually contributes to increasing the likelihood of drowning (e.g., swimming lessons provide an "attractive nuisance") (Homan, 1974).

Comprehensive studies by aquatic and public health researchers need to ascertain whether aquatic programs increase, decrease, or alter the risk of drowning to young children. Of particular importance would be studies to discover the actual means by which young children get into drowning situations.

Myth #2: Children's faces and heads must stay dry during lessons to prevent "water intoxication."

Fact. There is no evidence as yet that casual and infrequent submersions during lessons can cause hyponatremia, or so-called "water intoxication." Nevertheless, hyponatremia has been labeled by some as a potentially serious condition resulting from an electrolyte imbalance (Murphy, 1983; Bennett, et al., 1983).

Reported clinical symptoms in infants and young children have included lethargy, crying, vomiting, convulsions, or coma resulting from a significant intake of fluid, loss of electrolytes, or both. Body size, the number of submersions, amount of water intake, length of time in the water, and fatigue all may be precipitating factors in the reported case studies (Stewart, 1985). Literature on hyponatremia is limited to a few medical case studies. There is little empirical research to demonstrate which mechanisms may interact in the swimming environment to precipitate a case of hyponatremia. There is little information on how widespread the incidence of the condition is, especially in the presence of the "soft" signs (e.g., crying, lethargy, irritability).

Several carefully controlled studies which identify factors contributing to hyponatremia and its frequency are needed immediately. These should be conducted in concert with trained medical and pediatric physiological personnel.

Myth #3. Submersion of infants and young children is not dangerous since the epiglottal or "breathholding" reflex prevents water from entering the lungs.

Fact. While an epiglottal reflex indeed does exist and permits even the youngest infant to swallow food without choking or aspirating food or fluids, it functions neither to prevent drowning nor to control the amount of water swallowed [see *Myth #2*]. The epiglottal reflex may be elicited either consciously or unconsciously by submersion of both mouth and nose areas of the face. The unconscious reflex may follow a developmental course of inhibition over the first six months

and comes under relatively voluntary control.

Regardless of whether the reflex is stimulated unconsciously (in a young infant) or consciously (in an older child) and regardless of how effectively the breath is held, the young child can swallow large amounts of water and/or lose consciousness without demonstrating any coughing or distress that would mark inhalation of water. Even adults who have drowned often have little if any quantities of water in their lungs, indicating that the epiglottal reflex works all too well (Langendorfer, 1985).

Since the developmental course and function of primitive reflexes like the epiglottal are still poorly understood, further research such as that currently being conducted by Esther Thelen at Indiana University is needed. In addition, the specific role of the epiglottal and swimming reflexes in acquisition of aquatic skills needs to be investigated carefully.

Myth #4: Infants will contract serious diseases in swimming pools.

Fact. There is little evidence that young children and infants are any more susceptible to disease from swimming than persons of other ages. Despite occasional references to increased susceptibility to colds or inner ear infections due to exposure to swimming programs, swimming in chlorinated pools (as opposed to fresh water) cannot be linked to increased prevalence of otitis externa (Springer & Shapiro, 1985) or the acquisition of other common infections such as enteroviruses (common viral infections) (D'Allessio, et al., 1981) or parasites (giardiasis) (Harter et al., 1984).

Obviously, it is vitally important that swimming facilities be maintained according to proper operating procedures including adequate levels of residual chlorine, pH balance, and sufficient circulatory turnover rates. In addition, it is recommended that individuals with obvious illness symptoms (runny nose, rash, fever) be excluded from swimming groups.

There is, however, no indication that well maintained swimming pools are "disease carriers." Most viruses and other common infections are spread through the air through group contact and not from the pool water.

There is a need for some comprehensive public health education programs related to disease transmission, especially as related to public swimming facilities and with young children. It will be crucial for aquatic professionals to have command of the existing medical information about the likelihood of disease transmission through group contact (and not the water itself) in order to combat rumors or charges.

Myth #5: Infants and young children contaminate swimming pools and throw off the chemical balance.

Fact. According to Dave Thomas, a pool chemistry expert, infants and young children have a relatively small potential output of urea and fecal matter in relation to the total water volume of a large institutional pool and they "would have a negligible influence on the pool chemistry" (Thomas, 1975). He said, "the most important question is not what the infants do to the water, but what the water does to the infant."

There appears to be divergent opinions about desirable pool chemistry such as residual chlorine levels, total alkalinity, pH, water and air temperature, and relative humidity. Studies focusing on these factors as they interact with the age, skill, and activity levels of swimming participants are needed to resolve the differences of opinion.

Teaching/Learning concerns

Myth #6: Young children are unable to learn to really swim.

Fact. The term "swimming" should not be limited solely to traditional swimming strokes, but should include any form of intentional aquatic locomotion (i.e., any body movements that purposefully propel the body through the water). Some children as young as one

year or so can demonstrate rudimentary forms of aquatic locomotion (e.g., beginner or human stroke, "dog paddle," back float). Certainly before age three most children with sufficient experience can demonstrate some elementary modes of aquatic locomotion. This physical proficiency should not be confused with the "water safe" claim in *Myth #1*.

primitive level of the nervous system similar to the level which controls breathing, sucking, and eye blinking. However, the infant is unable to lift his or her head and cannot get a breath. The behavior generally disappears over the first three to six months of life and has no survival value for either the infant or the young child. Although the infant is displaying the reflex-

The standard institutional swimming pool usually is too deep, too cold, too noisy, and too crowded for optimal aquatic learning by most infants and young children. The home bathtub or small backyard pool can provide a significantly superior learning environment.

Motor skill acquisition, particularly aquatic skills, is still poorly understood. The existence of an optimal age or amount of time required to learn swimming skills is unknown.

Studies exploring age and amount of experience as factors in aquatic learning efficiency are desperately needed. Are there relationships between terrestrial motor development and acquisition of aquatic skills? Is it more beneficial for young children to begin aquatic experiences at certain ages?

Myth #7: Young children have a reflex that allows them to swim.

Fact. The existence of a swimming reflex in newborn infants was demonstrated by Myrtle McGraw (1935; 1939) over 50 years ago. However, the swimming reflex seems to operate only in very young infants and, importantly, does not fit our definition for "intentional" aquatic locomotion (*Myth #6*).

The movement behavior of a swimming reflex displays alternating flexion and extension of the arms and legs with concomitant lateral trunk flexion when an infant is placed prone in the water. This activity is controlled involuntarily at a

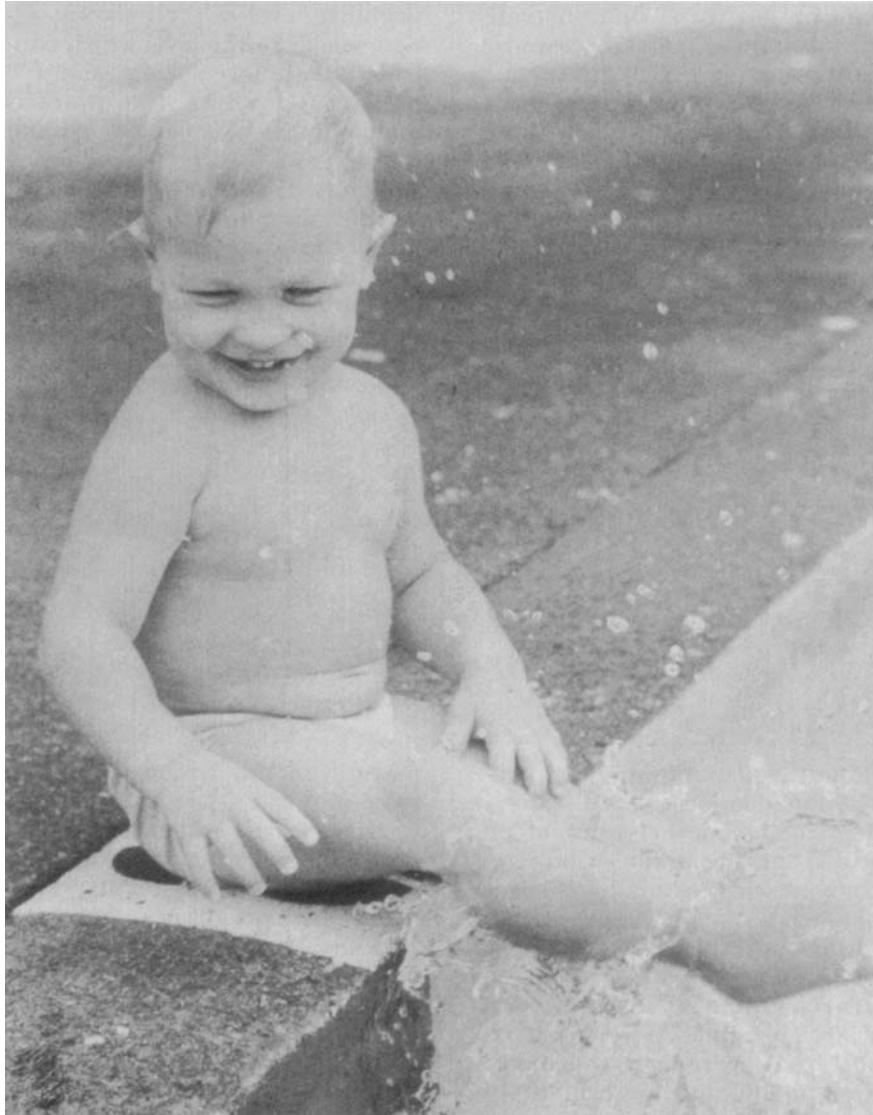
primitive level, he or she is not swimming in any actual sense.

The research evidence is divided regarding whether early experience and elicitation of the swimming reflex can integrate the reflexive movement into later intentional swimming behaviors. Research to determine the actual process through which an infant or young child acquires aquatic and other motor skills is needed. Particular emphasis on the role of reflexes in the control of later voluntary movements is of interest.

Myth #8: Proper techniques are crucial in teaching infants and young children advanced swimming strokes and water safety techniques.

Fact. Acquisition of aquatic skills is primarily the function of the active learning of the individual, not the specific teaching technique employed. Swimming instructors use a great variety of methods and techniques and yet children learn to swim under all of them. Probably, they learn to swim *in spite of* the methods rather than *because of* them! Current motor development research suggests that motor skills (including swimming) are acquired in gradual developmentally-

Photograph courtesy of Stephen Langendorfer



Children can learn on their own and in play situations without formal teaching.

ordered sequences of change (Bruya, Langendorfer, & Reid, 1986). Each sequence level is hierarchically prior to and less well integrated than later levels. No known teaching or behavioral techniques can override the sequence order, although well-founded techniques can accelerate the rate of acquisition of the sequence levels (Bruya, et al., 1986).

Little is known about the developmental sequences through which aquatic skills pass as a young child or any-aged person acquires them. Serious cross-sectional and longitudinal studies need to be conducted to observe how children actually learn to swim. These

studies need to be conducted both independently of and in conjunction with existing programs and methods of instruction in order to determine how robust the developmental sequences actually are.

Myth #9: The focus of lessons should be on the work of strokes and water safety, not on fun and play.

Fact. Contrary to some opinions, children very definitely can learn on their own and in play situations without formal teaching. Many child development experts feel the work of childhood is play. The focus of the swimming lessons probably reflects the instructor's concept of learning and teaching as

well as his or her philosophy on the purpose of swimming lessons. The instructor or parent who feels infant swimming lessons are provided for accelerating the competitive swimming potential for the child, drownproofing the child, or improving the child's status in relation to her or his peers is likely to adopt a strict work ethic in relation to lessons (Bruya, et al., 1986).

In contrast, instructors and parents who see the aquatic experience as enhancing the child's total movement repertoire or as a place for important parent-child interactions are more likely to adopt the play philosophy within lessons. Several theories in physical education suggest that the young child needs a wide variety of movement experiences of which the aquatic environment is but one. Movement exploration in a variety of situations can provide a strong and broad foundation of movement upon which to later specialize. Early specialization in movement produces not an athletic prodigy, but an easily-frustrated and poorly educated individual.

Since most of the existing swimming methods and programs are based upon teaching strokes and are teacher-centered, new methods and techniques are needed. Methods for encouraging children to explore the aquatic environment safely are urgently needed to help teachers shift the emphasis of aquatic programs for young children from "teaching swimming strokes" to "learning watermanship."

Aquatic environments/equipment

Myth #10: The best place for an infant or young child to learn to swim is in a standard swimming pool.

Fact. The standard institutional swimming pool usually is too deep, too cold, too noisy, and too crowded for optimal aquatic learning by most infants and young children (Shank, 1983). While most swimming programs for infants and young children have been organized by swimming instructors in conjunction with a public pool, these facilities are far from optimal,

or even desirable, for learning. The home bathtub or small backyard pool can provide a significantly superior learning environment for the young child. The cleanliness, clarity, and temperature of the water often can be better controlled while keeping the child in close proximity to the parent.

Because the home environment is better known to the young child than a public facility, she or he is more likely to actively explore and learn on her or his own. This home aquatic environment does radically alter the traditional notions surrounding swimming lessons. It is, however, an excellent site for acquiring such basic aquatic concepts and skills as breath control, flotation, and relaxation in an exploratory manner. Books like Carolyn Shank's *A Child's Way to Water Play*, (1983) can provide many excellent activities for home fun. Parents also must be cautioned about the dangers of home water environments and the need for extra vigilance.

The effect of water depth, water and air temperature, noise level, and chemicals are factors that have received little attention by researchers. They would appear to be relatively easy factors to investigate in current programs and facilities. In such studies, age and skill should be carefully controlled since infants and young children may be affected in radically different ways than older children or adults.

Myth #11. *Young children become dependent upon flotation devices and they should not be used in swimming lessons.*

Fact. Like any teaching method or piece of learning equipment, flotation devices have their place. They should not be substitutes for a good teacher, teaching progressions, or parental supervision. On the other hand, they can provide the instructor with an avenue for demonstrating water buoyancy to a fearful young child and a means for the unskilled child to practice arm and leg locomotor movements without submerging. Any supposed dependency is only temporary and can be controlled by

a skillful teacher and parent.

Methods for using flotation devices effectively with other teaching methods are always needed. Controlled studies comparing the use of flotation devices with methods not using them also are needed. Studies comparing the effective-

ness of different types of flotation such as inflatable cuffs and the new flotation suits also will be helpful for teachers.

Myth #12: *Early aquatic experience leads to superior cognitive and motor development.*

Fact. There is little evidence

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about the effect of early experience, including aquatics, on the overall development of young children. Diem (1982) has demonstrated enhanced development due to early aquatic and movement experiences. On the other hand, Langendorfer (1974) was unable to show any enhanced developmental effects resulting from either early movement or aquatic experience. While many aquatic professionals and parents fervently believe that early experience enhances development, the research evidence is lacking.

Long-term developmental studies of infants and young children who have experienced aquatic programs are needed to answer this most crucial question: does early aquatic and/or movement experience really enhance the total development of the young child?

Summary

It is evident from the examples of myths discussed that opinions both on the pro and con sides of aquatics for young children often are based on little factual information. This area desperately needs comprehensive research efforts by aquatic professionals, and developmental and medical researchers. The Executive Board of the Council for National Cooperation in Aquatics recently formed a National Advisory Committee on Aquatics for Young Children. The purpose of the National Advisory Committee (NAC) is to address the numerous unresolved issues in aquatics for young children, to encourage research in the area, and, perhaps, to update and/or reaffirm existing guidelines. The desired end is to provide accurate, factual information to instructors and parents so that aquatic programs for the young child may be the best possible.

The NAC will attempt to encourage and coordinate activities by many aquatic organizations (such as AAHPERD's Aquatic Council, the YMCA of the USA, American Red Cross, the United States Swimming Foundation, and

the National Recreation and Parks Association) to promote as many unified efforts as possible for the benefit of aquatics for young children. Persons interested in this effort are urged to contact the NAC via the CNCA, 901 W. New York St., Indianapolis, IN.

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