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Understanding Factors That Influence Fear of Drowning in Children and Adolescents

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Fear of drowning is a strong predictor of no/low swim ability. This study's purpose was to better understand fear of drowning among youth by examining personal, behavioral, and environmental factors. Links between swimming participation, desire to improve swimming skills, swimming instruction method, and fear of drowning were explored. Youth ($n = 1,909$) in six urban markets were surveyed at local YMCA branches. Level of agreement with fear of drowning (high fear [HF]; low fear [LF]) was cross analyzed with participation, desire to improve skills, instruction method, and selected personal, behavioral, and environmental factors. Significant differences emerged between LF and HF youth regarding participation, desire to improve skills, and instruction method. Several personal, behavioral, and environmental factors were significantly related to fear of drowning. Findings can help explain how drowning fear develops and possibly guide intervention design to enhance swimming competence.

Keywords: drowning, fear, swimming participation, swimming instruction, drowning prevention, swimming competence

Swimming competence has been noted as a valuable life skill for the prevention of fatal and nonfatal drowning (Brenner, Taneja, Haynie, Trumble, Qian, Klinger, & Klebanoff, 2009; Yang, Nong, Li, Feng, & Lo, 2007). Numerous public health groups recommend all children learn how to swim from certified aquatic experts as soon as parent/caregivers believe their child is ready for structured lessons (Centers for Disease Control & Prevention [CDC], 2012; Safe Kids Worldwide, 2013;

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American Academy of Pediatrics [AAP] & Weiss, 2010). Despite this cohesive call for swimming lessons, drowning is still considered a leading cause of death by injury in the United States and worldwide (CDC, 2014a; World Health Organization [WHO], 2014).

Approximately 359,000 die of drowning each year around the world (WHO, 2014). Drowning death is a significant concern among children under 5 years of age. In Australia, drowning is the leading cause of unintentional injury death for children between ages 1–3. In China, drowning is the leading cause of injury death for children ages 1–14. In Bangladesh, 43% of all deaths in children between 1–4 years of age are the result of drowning (WHO, 2014).

Approximately 4,000 people die in the United States (U.S.) each year due to unintentional drowning (Gilchrist & Parker, 2014; Xu, 2014). Between 2005–2009, an average of 3,533 unintentional drowning deaths occurred in the U.S. that were not related to boating (Laosee, Gilchrist, & Rudd, 2012). Drowning is the second leading cause of death for U.S. children ages 1–4 following congenital anomalies (CDC, 2014a; Laosee, Gilchrist, & Rudd, 2012). For children age 1–14, drowning is the second leading cause of unintentional injury related death (CDC, 2014a). For each child who dies as a result of drowning, five additional children receive care in the emergency department for a nonfatal drowning event (CDC, 2014a). Nonfatal drowning can result in brain damage and a have long-term impact on a person's life, from memory problems to learning disabilities to permanent loss of basic functions (Cummings & Quan, 1999).

In the U.S., drowning disproportionately impacts racial/ethnic minority groups. American Indian/Alaska Native children and young adults (≤ 29 years old) have the highest rates of drowning (Gilchrist & Parker, 2014). African American children are three times more likely to have a fatal drowning when compared with Caucasian children (CDC, 2014b). Studies have also shown that African American children are more likely to be at risk for drowning due to no or low swimming competence when compared with Caucasian children (Irwin, Irwin, Ryan, & Drayer, 2009a).

Swimming competence can reduce the risk of drowning, yet many adults and children have reported low swimming competence (Brenner, 2003; Brenner et al., 2009; Gilchrist, Sacks, & Branche, 2000; Irwin, Irwin, Ryan, & Drayer, 2009a; Yang et al., 2007). In nationwide studies in 2008 and 2010, researchers found that parent/caregiver swimming competence and parental/caregiver encouragement to swim were associated with children/adolescents swimming competence (Irwin, Drayer, Irwin, Ryan, & Southall, 2008; Irwin, Irwin, Martin, & Ross, 2010). Children and adolescents whose parent or caregiver had no or low swimming competence were more likely to also have no or low swimming competence and to be at risk for drowning. Children and adolescents whose parent or caregiver did not encourage them to swim also reported no or low swimming competence. In their 2010 report for USA Swimming, Irwin et al. found fear of drowning to be the strongest predictor of no or low swimming competence (Irwin et al., 2010). Fear of drowning was a stronger predictor of swimming inability than family finances or access to swimming facilities. In addition, the qualitative findings from another study (Ross, Irwin, Irwin, Martin, & Ryan, 2014) revealed that parents who had fear about their children drowning kept their children from taking part in any formal swimming lessons.

Purpose of the Study

Fear of drowning is a considerable factor for lower swimming competence, which may put children/adolescents at high risk for fatal and nonfatal drowning. Because of this, we sought to develop a greater understanding about the role that fear of drowning may play during childhood and adolescence. Specifically, we wanted to understand what factors within the child/adolescent and within the child/adolescent's environment influenced their fear of drowning. To do this, we used *personal*, *behavioral*, and *environmental* categories as a guide and as a method to propose solutions to this deadly dilemma (Pajares, 2006). Research questions included (1) What *personal factors* affect a child's fear of drowning?; (2) What *behavioral factors* influence a child's fear of drowning?; (3) What *environmental factors* impact a child's fear of drowning?; (4) To what extent do children who have a fear of drowning want to improve their swimming skills?; (5) Does fear of drowning differ based on who taught the child to swim?; and (6) Do children who have a fear of drowning swim less frequently than children who do not have a fear of drowning?

Method

An interdisciplinary team of researchers from health and sport sciences fields was assembled to accomplish this project, which employed a survey research design. Approval to conduct this research was granted by the University of Memphis Institutional Review Board before data collection.

Survey Development

A survey instrument used for this study was based on the previously validated questionnaire used in a 2008 study (Irwin et al., 2008). Minimal changes were made to the survey. The modified questionnaire was designed in collaboration with representatives from USA Swimming; this panel of representatives was comprised of adolescent research experts, aquatic specialists, and consultants from the CDC (Irwin et al., 2009a; Irwin et al., 2009b; Irwin et al., 2011). A pilot study of 100 respondents, ages 12–17 years, was conducted to determine evidence for content/face validity for the newly-modified survey instrument. For parents of children ages 4–11, a slightly altered version of the adolescent survey was created. The survey for younger children also was tested for content/face validity (Irwin et al., 2010). The majority of the questions on the survey were on a 4-point Likert scale. Participants indicated whether they *strongly disagreed*, *disagreed*, *agreed*, or *strongly agreed* with a series of statements. Participants were asked to estimate their swimming competence and the number of times that they swam per month.

Data Collection

Data were collected between February 1 and March 31, 2010. Data collection sites included Atlanta, GA; Boston, MA; Denver, CO; Memphis, TN; Minneapolis/St. Paul, MN; and San Diego, CA. Within each city, Young Men's Christian Association (YMCA) branch facilities were identified and targeted for data collection. The YMCA was chosen for data collection because the organization has access to

diverse youth populations, an interest in youth swimming and drowning prevention, and had assisted with similar data collection in 2008. Trained YMCA staff assisted the research team with the data collection using sites and programs within their facility that were not associated with aquatics (i.e., daycare and after-school care, basketball leagues, martial arts classes, soccer leagues, gymnastics classes).

Data Analysis

Data were entered into the Statistical Package for Social Sciences (SPSS 21). Analyses of variance (ANOVA), odds ratios, and chi square tests were used to determine significant differences with an alpha of 0.05. When ANOVA was significant ($p \leq .05$), a Fisher's least significance differences (LSD) post hoc test was used to compare groups. For odds ratio tests, the 4-point Likert scale was dichotomized with agree and strongly agree representing "yes" or 0 and disagree or strongly disagree corresponding as "no" or 1.

Results

Approximately 2,000 surveys were distributed in English and Spanish. From this, a total of 1,909 surveys were useable, with 1,305 completed by an adolescent (age range of 12–18 years) and 604 completed by a parent or caregiver of a younger child (age range of 4–11 years). Demographic results are displayed in Table 1.

Fear of Drowning and Number of Days of Swimming—ANOVA Results

To determine fear of drowning for participants, we analyzed their answers to the following statements "I don't swim much because I am so concerned about drowning" or "My child doesn't swim much because he or she is concerned about drowning." Participants who strongly agreed with this statement were considered to have a high fear (HF) of drowning while participants who strongly disagreed with this statement were considered to have low fear (LF) of drowning.

An ANOVA was calculated to determine if there was a difference in the number of days per typical summer month that children swam based on their fear of drowning. The ANOVA result was significant ($p \leq .01$) and LSD post hoc test findings showed a significant difference between groups ($p \leq .01$). Respondents with LF of drowning reported having swum significantly more days per summer months (mean = 11.9 days) than those with HF (mean = 6.0 days).

Fear of Drowning and Desire to Improve Swim Skills/Swimming Instruction—Chi Square Results

A chi square test was calculated to determine if there was a difference in the adolescents' desire to improve their swimming competence and their fear of drowning. While a high percentage of adolescents either agreed or strongly agreed with the statement "I would like to improve my swimming skills" (43%), there was a significant difference between the groups ($p \leq .01$). Adolescents with HF of drowning had the highest percent (62%) who strongly agreed with the statement about improving their competence to swim.

Table 1 Demographic Characteristics of Children and Adolescents

	12–17 years (n = 1,305)	4–11 years (n = 604)	Total (n = 1,909)
Sex			
Male	43.6%	47.8%	45.0%
Female	56.4%	52.2%	55.0%
Race			
African-American	52.2%	52.5%	52.3%
Hispanic/Latino	19.3%	14.7%	17.9%
Caucasian	6.7%	17.7%	10.2%
Multiracial	7.0%	6.6%	6.9%
Asian	7.1%	4.1%	6.1%
American Indian/Alaska Native	2.0%	1.6%	1.9%
Native Hawaiian/other Pacific Islander	3.8%	1.1%	3.0%
Other	1.9%	1.6%	1.8%
Parent education			
Some elementary/middle school	23.5%	3.6%	17.2%
Some high school, did not finish	20.8%	6.0%	16.1%
High school diploma/GED	19.8%	31.4%	23.5%
College or technical school degree	14.7%	47.1%	24.9%
Advanced college degree- masters/PhD	21.1%	11.6%	18.1%
Unknown	0.1%	0.4%	0.2%
Lunch program status			
Free lunch	54.8%	44.4%	51.5%
Reduced lunch	13.0%	14.0%	13.3%
No lunch program	20.9%	36.1%	25.7%

Another chi square test was used to determine if there was a difference in fear of drowning based on who taught the adolescent to swim. We observed significant differences ($p \leq .01$) with LF adolescents having been taught to swim by a swim instructor/life guard (24.3%) or family member (31.8%) more often when compared with adolescents with HF (swim instructor/life guard 8.9%, family member 14.6%).

Factors Influencing Fear of Drowning—Odds Ratios

Personal factors. Several personal factors were associated with a significant odds ratio (OR) for fear of drowning. Factors that decreased ORs included family swimming (e.g., most family members know how to swim, parent/caregiver knows how to swim, swimming with members of family), encouragement to swim (e.g., parent’s or caregiver’s encouragement to swim), and friends who swim (e.g., best friend

likes to swim; best friend is a good swimmer). Personal factors that were positively associated with a child's fear of drowning were a lack of physical fitness, displeasure with appearance in swimsuit or appearance after getting wet, parent/caregiver fear of drowning (e.g., parent/caregiver afraid child will drown, parent/caregiver afraid of drowning), and nervousness of the child when swimming (Table 2).

Behavioral factors. Behavioral factors found to have a significantly lower ORs concerning fear of drowning included enjoyment of swimming (i.e., swimming is activity child enjoys doing, would like to swim more, and could be successful swimming athlete), high swimming competence (e.g., able to swim in deep water) and water safety knowledge (e.g., knowing how to be safe around water, following water safety rules). Factors in this category that produced higher ORs for fear of drowning were no or low swimming competence and a preference to participate in other sports (Table 3).

Environmental factors. Environmental factors associated with significantly lower ORs for fear of drowning were the child feeling welcome and safe at the pool and the local pool being in good condition. Factors that increased the odds for fear of drowning were the family not being able to afford swimming (e.g., family budget not having money for swimming, free or reduced lunch program status, cost of swimming). Interestingly, access to a pool (e.g., pool close, able to get to pool easily, pool open year around) did not significantly impact ORs (Table 4).

Discussion

Swimming competence is considered a life skill; however, approximately 10 individuals in the U.S. and more than 100 worldwide die of drowning every day (CDC, 2012, 2014b; WHO, 2014). The public health problem of drowning is regrettable as it is highly preventable. Knowing how to swim increases the chances of avoiding death from drowning (Yang et al., 2007; Brenner et al., 2009). Members of certain populations do not learn how to swim as they are hindered by obstacles that are often intangible and difficult to distinguish.

Results from our study showed that children/adolescents with substantial fear of drowning reported much lower levels of swimming participation. This finding supports previous research that found fear of drowning to be the most significant variable to impact no or low swimming competence (Irwin et al., 2008; Irwin et al., 2010; Irwin et al., 2009a). It is important to note that the youth with HF still indicated that they swam approximately 2 days per week during the summer. This result should be a warning to all swimming facility managers and parents/caregivers of these children. Swimmers who have high fear will have low confidence in the water and could be considered high risk for drowning. These individuals are the most likely to panic if they find themselves in a dangerous situation, which is a key determinant of fatal and nonfatal drowning events (Grenfell, 2003).

When asked if they would like to improve their swimming competence, the HF group agreed at a significantly higher percentage when compared with the LF group. When exploring this result at a deeper level, the finding illustrates that even the HF group seems to be open to enhancing their swimming competence with approximately 62% of this group strongly agreeing that they wanted to improve

Table 2 Odds Ratios (OR)—Personal Factors and Fear of Drowning in Children and Adolescents

	B	SE	Wald	Sig.	OR	95% CI for OR	
						Lower	Upper
Most members of my (my child's) family know how to swim. ^{††}	-.29	.114	6.62	.010	.75	.60	.93
My (My child's) best friend likes to swim. [‡]	-.26	.116	4.96	.026	.77	.62	.97
My (My child's) best friends are good swimmers. ^{††}	-.27	.108	5.99	.014	.77	.62	.95
My parents/caregivers (I) encourage(s) me (my child) to swim. ^{††}	-.25	.107	5.41	.020	.78	.63	.96
My parents/caregivers know how to swim. ^{* ††}	-.30	.131	5.23	.022	.74	.57	.96
I swim with members of my family. ^{** ††}	-.53	.129	17.18	.000	.59	.46	.76
I encourage my child to swim. ^{** ††}	-.62	.218	7.92	.005	.54	.35	.83
I am/My child is not physically fit which affects my (his or her) ability to swim. [†]	1.11	.116	92.31	.000	3.05	2.43	3.82
I (My child) don't (doesn't) like how I (he or she) look(s) in a swimsuit [†]	.83	.110	56.80	.000	2.3	1.85	2.85
I am nervous when I swim. ^{* †}	1.87	.138	183.5	.000	6.51	4.96	8.53
I (My child) don't (doesn't) like how swimming ruins my (his/her) appearance.	1.36	.118	132.13	.000	3.89	3.09	4.90
I (My child) do not like to get my hair wet when I swim.	1.11	.112	98.30	.000	3.04	2.44	3.79
I (parent) am afraid that my child will drown when he or she is swimming. ^{** †}	2.02	.213	89.75	.000	7.55	4.97	11.47
I (parent) don't swim because I am afraid of drowning. ^{** †}	1.25	.202	38.20	.000	3.49	2.35	5.19
I would swim by myself if my friends decided to do something else. [*]	-.12	.126	.97	.324	.88	.69	1.13
Sex	-.04	.106	.169	.681	.957	.777	1.179

Note. ^{*}Adolescent only survey. ^{**}Parents/caregivers only survey. [†] Significantly higher OR for fear of drowning, $p \leq 0.05$. ^{††} Significantly lower OR for fear of drowning, $p \leq 0.05$.

Table 3 Odds Ratios (OR)—Behavioral Factors and Fear of Drowning in Children and Adolescents

	B	SE	Wald	Sig.	OR	95% CI for OR	
						Lower	Upper
I (My child) know(s) how to be safe around water. ^{††}	-.39	.122	10.298	.001	.676	.533	.859
Swimming is an activity that I (my child) enjoy(s) doing. ^{††}	-1.07	.132	65.878	.000	.343	.265	.444
I (My child) would like to swim more than I (he or she) do(es) now. ^{††}	-.38	.115	10.597	.001	.687	.548	.861
I (My child) could be a successful swimming athlete if I (he or she) were on a team. ^{††}	-.40	.106	14.598	.000	.667	.542	.821
I can swim in deep water using regular strokes without stopping. ^{*††}	-1.2	.132	82.650	.000	.301	.232	.390
I follow water safety rules when I swim. ^{*††}	-.36	.145	6.304	.012	.695	.524	.923
Non- or low-skilled swimmer. [†]	1.16	.129	80.280	.000	3.179	2.468	4.094
I would rather participate in other sports than swimming. ^{*†}	.62	.134	21.696	.000	1.867	1.436	2.428

Note. ^{*} Adolescent only survey. ^{**} Parents/caregivers only survey. [†] Significantly higher OR for fear of drowning, $p \leq 0.05$. ^{††} Significantly lower OR for fear of drowning, $p \leq 0.05$

Table 4 Odds Ratios (OR)—Environmental Factors and Fear of Drowning in Children and Adolescents

	B	SE	Wald	Sig.	OR	95% CI for OR	
						Lower	Upper
I (My child) feel(s) welcome at swimming pools. ^{††}	-.50	.126	15.638	.000	.607	0.474	0.778
The nearest pool/swimming site is in good condition. ^{††}	-.73	.168	19.011	.000	.481	0.347	0.669
I feel safe at the pool/swimming site. ^{*††}	-.86	.149	33.195	.000	.423	0.316	0.567
Our family budget does not include money for swim lessons. [†]	.83	.108	58.853	.000	2.289	1.853	2.829
Free or reduced lunch. [†]	.51	.136	14.305	.000	1.670	1.280	2.179
It cost a lot of money to swim. ^{*†}	.98	.142	47.611	.000	2.671	2.020	3.530
There is a pool close to where I live.	-.19	.112	2.722	.099	.831	0.667	1.035
I am able to get to a nearby pool (It is easy for my child to get to a nearby pool).	-.18	.117	2.277	.131	.838	0.667	1.054
The nearest pool/swimming site is open all year.	-.16	.139	1.338	.247	.851	0.648	1.119

Note. ^{*}Adolescent only survey. ^{**}Parents/caregivers only survey. [†] Significantly higher OR for fear of drowning, $p \leq 0.05$. ^{††} Significantly lower OR for fear of drowning, $p \leq 0.05$

their swimming competence as compared with only 44% of the LF group. Further, this result reflected that a large proportion of all children/adolescents would like to be better swimmers.

Another compelling barrier emerged between groups when examining the method of swimming instruction. The LF group responded at a significantly higher rate that they had learned how to swim from a swim instructor/lifeguard (24%) as compared with the HF group (9%). This finding emphasized that the mode (and presumably the quality) of aquatic instruction might increase the confidence of LF child in the water and his/her swimming competence. Injury prevention authorities consistently recommend formal swimming lessons from a teacher who is qualified and certified by a recognized aquatic organization to prevent drowning (CDC, 2014b).

Further analysis of these data were organized around personal, behavioral, and environmental factors to more logically determine impactful variables that may influence fear of drowning and, thus, the lack of swimming competence. The positive personal factors of “family and friends who swim” and “encouragement to swim” were robustly linked to low fear of drowning. These findings seem logical as early exposure to any pursuit has been shown to support future involvement in that specific activity (Morrissey, Wenthe, Letuchy, Levy, & Janz, 2012). Personal factors that had the highest ORs for fear of drowning were tied to a child’s comfort in the water and the parent’s fear that their child would drown. Both of these factors can be ameliorated through swim instruction by certified swim instructors who are sensitive to the fear that some parents have of their children drowning.

Results focusing on behavioral factors revealed an unmistakable connection to fear of drowning. Children who reported that they enjoyed swimming, had strong swimming skills, and had knowledge about how to be safe around water had significantly lower ORs for fear of drowning. This finding again points to the need for instruction by certified swimming instructors to insure that children have strong swimming skills and water safety knowledge to help reduce fear of drowning.

Last, environmental factors also indicated significant associations among income levels, local facilities, and fear of drowning. Sufficiently high family income was essential to become involved with sport or physical activity. Researchers have found that children and adolescents from higher income families are more likely to participate in sports/physical activities than children and adolescents for lower income families (Chen, Matthews, & Boyce, 2002; White & McTeer, 2012). Because the sport of swimming has a privileged essence about it, this may result in disenfranchised groups believing they cannot afford swimming. The findings concerning the respondents’ ability to get to a nearby pool and the availability of that facility supported a finding from the earlier Irwin et al. study (2011) which indicated that these were not factors that significantly impacted participation in swimming.

Limitations

A few key limitations associated with this research involved ones that are typical to larger population studies. Most importantly, these findings were derived from a convenience sample. Despite this issue, the number of survey respondents was large, which has been shown to enhance the reliability of the data (Brener, Billy, & Grady, 2003; Brener et al., 2004).

Using YMCAs in impoverished areas of large urban cities as the point of contact for survey respondents was also a quandary as swimming is a central mission for all YMCAs. To counter this bias, researchers visited each site to train staff on how to obtain consent, instructed them how to coach research participants to complete the survey in an honest manner, and when recruiting survey respondents to focus their efforts on individuals coming from nonswimming activities.

Last, the research instrument was a modified version of a previously designed survey which could have meant that it was necessarily valid for the current research questions. This revised survey was carefully scrutinized to establish content validity by soliciting feedback from connected experts and was piloted using a population that was similar in demographics to the intended study population.

Despite these potential limitations, we believe this study offers important insights into factors associated with fear of drowning among children and adolescents that could prove to be beneficial in the development of drowning prevention interventions.

Conclusions

The findings strongly point to family support variables of parental encouragement and family participation to decrease the fear of drowning. Educating parents/caregivers is necessary to overcome these obstacles, which ought to include instructing aquatic experts to target this group. Numerous strategies that include the important role played by parents and caregivers in fear of drowning and swimming competence should be strongly considered in future research and curricular development efforts. These include engaging a trusted messenger who is popular and well respected within the local neighborhood. This messenger could be another parent/caregiver who recently had overcome his/her fear of drowning, a revered physical education teacher, or an admired swimming coach. In addition, getting these parents/caregivers into the pool alongside their children has been recommended previously (Irwin et al., 2010). At the very least, swimming instructors should talk to the parents/caregivers before lessons begin. During prelesson meetings, the instructor ought to discuss with the adults how the lessons will progress, that the instructor is cognizant of their fears, and offer methods for managing this fear during the lessons, such as breathing slowly, giving their child a smile and reassuring hand gestures (e.g., a thumbs up) when that child looks scared, and possibly leaving the pool deck if these strategies do not assuage the fear. Making instructors more aware that these parents/caregivers may need some extra attention is a very easy step toward enhancing swimming competence and participation with affected populations.

Also, this current analysis showed that the greater the degree of fear, the more participation rates for swimming dropped as did self-reported swimming competence, which reinforced earlier findings (Irwin et al., 2011; Irwin et al., 2010). This result clearly is connected with how the parent/caregiver exposes or does not expose their child to swimming. On the flip side, findings confirmed that most children in this study reported that they wanted to improve their swimming skills.

Last, financial considerations were associated with a higher fear of drowning. Minority swimming programs that include free or low cost swimming lessons and then connect to developmental swimming teams are logical and potentially effective solutions toward decreasing fatal and nonfatal drowning incidents.

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