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Parental Choices of Flotation Devices for Children and Teen Swimmers and Waders: A Survey at Beaches in Washington State

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Cover Page Footnote

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Abstract

Drowning at open-water areas is the second leading cause of unintentional death among Washington State children. Providing written and visual safety instructions and loaned life jackets at swim sites (“loaner boards”) may reduce the risk of drowning. This study sought to understand parental perceptions regarding loaner boards and behaviors related to bringing flotation devices for children to use while swimming. Of the 102 surveys administered to parents on the beach at 10 different open-water sites, 29 were collected from sites with loaner boards. Parents provided information about ages of family members present, flotation devices brought and perceptions surrounding loaner boards. The majority (85%) of families with young children (under six years old), brought some type of flotation device and 59% of them brought life jackets compared to 57% and 8% of families with only children six or older, respectively. Results provide evidence that parents of children younger than 6 years old more often plan for children to use life jackets while swimming; this may partially explain low rates of life jacket use among older children. Findings can guide efforts to increase the efficacy of loaner board programs and develop strategies to promote parental encouragement of life jacket use for older children.

Keywords: flotation; loaner boards; life jackets; swim safety; child drowning prevention

Introduction

Drowning is the second leading cause of unintentional injury death among American children under 15 years old and the fifth leading cause of unintentional injury death among Americans of all ages, with an average of 3,536 drownings annually (CDCP, 2016b, 2016c). The risk of fatal drowning is highest among children one to four years old and accounts for almost 32% of all unintentional fatal injuries within that age group (CDC WISQARS, 2015). From 2010 to 2016, the annual crude rate of fatal drowning among children less than five years old was 2.2 per 100,000 (CDC WISQARS, 2017). This risk decreases for children ages 5-9 and 10-14 years (0.6 and 0.5 per 100,000, respectively) and rises again for those aged 15-19 (1.2 per 100,000). Non-fatal drowning injuries among children follow similar patterns across age groups and occur at a rate five times as often as fatal drowning. This can result in significant neurological damage and a range of other physical and psychological morbidities (Peden, 2008).

Out of the 9,624 child accidental drowning deaths among children and adolescents less than 20 years old between 2007 and 2016, 37.9% occurred in natural water settings such as lakes, ponds, oceans, and rivers (CDC Wonder). While children 4 years and younger were more likely to drown in pools or at home, older children were more likely to drown in natural water settings (Safe Kids

Worldwide, 2016). Between 2007 and 2016, the proportion of unintentional drowning fatalities that occurred in natural water settings compared to other settings steadily increased with age; 17.3% occurred among children less than 5 years, 37.3% among children ages 5-9 years, 55.2% among children ages 10-14 years, and 67.5% among children ages 15-19 years (CDC Wonder). Furthermore, between 2007 and 2016, the rate of natural water drownings out of all unintentional drowning fatalities among children has remained relatively stable, with the lowest rate at 34.3% in 2007, highest 41.3% in 2013, and most recently 38.2% in 2016 (CDC Wonder). Thus, there is a need for drowning prevention strategies specifically aimed at addressing open, natural water settings.

In Washington State, drowning rates at open-water areas are higher than the national average (Seattle Children's Hospital & Washington State Department of Health, 2016). Among all drowning deaths in open waters reported in Washington State from January to September 2012, a total of 41% occurred in rivers or streams, 36% in lakes or ponds, and 19% in marine waters (Seattle Children's Hospital & Washington State Department of Health, 2015). Among children aged 1-17 years in Washington State, drowning is the second leading cause of unintentional death (Seattle Children's Hospital, 2016).

To reduce the risk of child and adolescent drownings, the Centers for Disease Control and Prevention (CDC) and American Red Cross (ARC) recommend close adult supervision and the use of U.S. Coast Guard (USCG)-approved personal flotation devices (life jackets) by children while in or near natural bodies of water, regardless of swimming ability (CDC 2016a; ARC, n.d.). The use of other "substandard" flotation devices that do not meet USCG standards, such as inner tubes, pool toys, non-USCG-approved water wings, or other floating objects, are not recommended as substitutes for life jackets (Seattle Children's Hospital, 2016; CDC, 2016b). Based on a Washington State Child Death Review, 85% of all unintentional youth drownings in open waters between 1999 and 2003 could have been prevented through safety interventions such as lifeguard supervision or the use of life jackets (Seattle Children's & Washington State Department of Health, 2016).

Even with these nationally recognized and publicly promoted recommendations, recreational swimmers and their parents frequently do not follow these guidelines. An exploratory observational study monitoring the quality of parental supervision at 18 popular beach settings in New Zealand determined that nearly one quarter of all children in the water were not "adequately" supervised (Moran, 2010). Even with adult supervision, many people are unfamiliar with the signs of drowning and are thus unable to recognize or respond quickly enough when a drowning is occurring (Vittone, & Pia, 2006). An observational study conducted

in 2014 by Seattle Children's Hospital and JSI Research and Training Institute, Inc. of Boston (JSI), reported relatively low rates of life jacket use among recreational swimmers in natural water settings in Washington particularly among older children (Quan, Mangione, Bennett & Chow, 2018). About 51% of children younger than 5 years wore life jackets while swimming in open water, compared to 21% of children aged 6-12 and only 3% of teenagers aged 13-17.

In 1992, the Seattle Children's Hospital implemented a state-wide "Stay on Top of It" drowning prevention outreach campaign to promote life jacket use through multiple intervention strategies, such as promoting educational and safety messages related to life jacket use and recreating near open water and increasing access to life jackets for swimmers and boaters (Bennett, Cummings, Quan & Lewis 1999). More specifically, publicly-loaned life jackets were placed near signs providing written and visual safety instructions at designated recreational open-water sites (hereafter referred to as "*loaner boards*").

Life jacket loaner board programs have been instituted in numerous locations throughout the United States and Canada to increase life jacket use by providing life jackets to borrow while swimming or boating. These locations are generally at boating launch points, boat rental areas, and high-visibility facilities ("*Life Jacket Loaner Programs*" Californian Parks, n.d.; "*PFD and Life Jacket Loan Program*" Canadian Red Cross, 2018). Although there is no standard format for loaner boards, signs usually include information on how to select an appropriately-sized jacket and how to wear and adjust the jacket to fit properly. In a 2014 observational study of adult life jacket use in Washington State, life jacket wear rates were significantly higher among adult boaters at sites with loaner boards compared sites without loaner boards (Mangione, Chow, Heitz, & Lisinski 2015). Most studies related to flotation devices have focused on life jacket use among adults and boaters, thus there is a need to better understand parental perceptions and use of different flotation devices among their children and adolescents while swimming. This study sought to determine the types of flotation devices parents brought for child and teen use; elicit parental suggestions for strategies to increase the use of life jackets among children while swimming; and assess the ease of understanding standard loaner board design in use in Washington State. Findings may assist policymakers and health safety officials with the development of more effective campaigns and loaner board programs to promote life jacket wear for swimming and recreating near open-water sites.

Method

Participants

In this study, parents at designated swim areas were surveyed to better understand perceptions related to life jackets and the loaner board program, as well as behaviors related to bringing life jackets and other flotation devices. Data collection teams invited parents sitting on the beach to complete the survey while their families were taking a break from swimming and wading – this was a convenience sample. One adult per family unit participated in the survey. Among parents at sites with active loaner boards, additional survey questions regarding utilization of the loaner boards were administered. This survey research was conducted concurrently with an observational study assessing life jacket use among swimmers at open-water areas, funded by the Seattle Children’s Hospital Foundation and also conducted by JSI (Quan, submitted 2016). This study was reviewed and approved by the Seattle Children’s Institutional Review Board.

Table 1. Characteristics of survey sites and families surveyed (N=102) *

<i>Active Loaner Board present</i>	All families (N=102)	(%)	<i>Family Type (by child age in years)</i>	All families (N=102)	(%)
No	73	71.6	Only children under 6	12	11.8
Yes	29	28.4	Only children 6-12	24	23.5
			Only children 13-17	22	21.6
<i>Open Water Site Name</i>	All families (N=102)	(%)	Children under 6 and 6-12	19	18.6
Battle Ground Lake State Park	18	17.6	Children under 6 and 13-17	2	2.0
Mayfield Lake Park	16	15.7	Children 6-12 and 13-17	17	16.7
Millersylvania State Park	12	11.8	Children under 6, 6-12, and 13-17	6	5.9
Lake Chelan State Park	5	4.9	<i>Family type combinations (by child age in years)†</i>	All families (N=102)	(%)
Orondo River Park	3	2.9	Any children under 6	39	38.2
Sun Lakes Dry Falls State Park	6	5.9	Any children 6-12	66	64.7
Bear Lake Regional Park	13	12.7	Any children 13-17	47	46.1
Tibbets Beach (LB)	8	7.8			
Allan York City Park (LB)	10	9.8			
Howard Amon Park (LB)	11	10.8			
*7 surveys are excluded because adults surveyed reported no children present					
†Percentages add to more than 100% because of multiple age groups in family party					

A total of 109 surveys were administered. Seven respondents reported no children present and were excluded from analysis, resulting in a sample size of 102 parent respondents. Seventy-three surveys (72%) were administered to families at sites without loaner boards and 29 (28%) from sites with active loaner boards. Table 1 shows the distribution of the number of surveys collected by loaner board presence, open-water location, and family type (determined by the age groups of children present). Thirty-nine families (38%) had some children under 6 years old; 66 families (65%) had some children 6-12 years old; and 47 families (46%) had some children 13-17 years old.

Procedures

Site Selection. Surveys were administered during daytime hours on Saturdays and Sundays in July and August 2014. In consultation with Seattle Children's Hospital's research staff, a total of 10 swim sites with reported high volumes of swimmers were identified in both Western and Eastern Washington State. All sites were located within established parks in designated swim areas not supervised by lifeguards, in order to control for factors that might influence patron life jacket or loaner board use. Five sites were selected due to their reported presence of loaner boards, but upon observation only three sites were found to have operational boards stocked with life jackets.

Survey Administration. Seven teams of two observers conducted the surveys. For each site, observers spent approximately four hours collecting observational data on swimming activity and the use of flotation devices. Teams were instructed to take multiple short breaks to administer this survey to parents sitting on the beach while their families were taking a break from swimming and wading. One adult per family unit was invited to participate and complete the self-administered paper survey immediately on site.

Research Instrument. The 9-question survey asked about the number and age of all family members present, the types of flotation devices brought to the beach by the family, the ease of interpretation of the standard loaner board design, and suggestions for improving life jacket wear rates among child swimmers (see *Appendix 1* for survey form). At sites with active loaner boards, additional survey questions asked about parental awareness of the on-site loaner board and its influence on their life jacket use. Face validity for all survey items was judged to be adequate, as all questions addressed relatively simple concepts and used simple language; thus, no formal reliability checks were implemented. Further, data collectors administered the survey in person and on site, allowing participants to ask clarifying questions if needed. All study procedures were reviewed and approved by Seattle Children's Hospital's IRB.

Data Analysis

Survey responses were coded and analysed using SAS version 9.4. Common themes to the responses of the open-ended question that asked respondents to list suggestions to persuade parents to encourage the use of life jackets were generated through qualitative sorting. Responses were categorized by suggestions related to improving the loaner board program or other general safety suggestions. Proportions of families aware of and/or utilizing loaner boards were calculated for the three sites that had functional loaner boards present.

Frequency distributions of family types surveyed (determined by age groups of children) and types of flotation devices brought were calculated and compared across sub-groups. Differences in proportion of family type by type of flotation device brought were detected using chi-square and Fisher's exact tests (using alpha-level <0.05). Exploratory chi-square and Fisher's exact tests were conducted to detect differences in proportion of flotation devices brought (by family type) and type of flotation devices brought by loaner board presence and assessed for significance at $p < 0.05$.

Results

The most common themes of respondent suggestions for the loaner board campaign to help convince parents to encourage the use of life jackets while their children are swimming or playing near open water are summarized in Table 2. Overall, 92 suggestions covering a wide range of promotional strategies were provided by 47 respondents who chose to answer this open-ended question. Of the 47 respondents who offered one or more suggestion, 28 (60%) indicated support for the loaner board program by offering recommendations on improving loaner board design or efficacy. Nine respondents (19%) believed that it is a parent's responsibility to ensure child safety (rather than relying solely on life jackets).

Parents frequently commented that loaner boards should be used at more open-water sites (32%), designed to present persuasive, engaging and visually-appealing information (15%), and placed in more prominent locations (26%). Several parents indicated support for standard procedures that would ensure that the loaner board is continuously well-stocked with life jackets of various sizes (particularly for younger children) and kept clean and dry. Other suggestions to promote general swimming safety were related to life jacket design and the need for greater public education. These included: developing easier to use and less bulky life jackets for smaller children; implementing regulations and fines for failure to provide adult supervision or use life jackets while swimming; and providing more signs and educational messages about the benefits of life jacket use (such as warning signs or media campaigns outlining swimming and drowning risks and safety recommendations).

Table 2. Summary of the 47 open-ended suggestions to promote life jacket use while swimming*†

	Number of persons responding (N=47)	(%)
Response indicated support of the loaner board program	28	59.6
General belief that parents are responsible for child safety (teaching children how to swim and/or providing close supervision is higher priority than life jacket use)	9	19.1
Common suggestions to promote life jacket use while swimming:		
Increase the number of loaner boards / signs for loaner boards	15	31.9
Make loaner board or signs for loaner boards more prominent (better locations)	12	25.5
Improve the information / graphics provided on loaner boards	7	14.9
Promote general knowledge with educational campaigns/TV commercials/advertisements	6	12.8
Provide more life jackets on loaner board	4	8.5
Develop a process to ensure cleanliness of loaner life jackets	4	8.5
Design easier to use / more affordable / less bulky life jackets	4	8.5
Regulate life jacket use among swimmers	3	6.4
* Answers were coded and organized into general themes		
† Percentages add to more than 100% because several respondents provided multiple suggestions		

For the three sites with an active loaner board present, a total of 29 surveys were administered. Results should therefore be viewed with caution. Responses to questions regarding loaner board awareness, influence, encouragement to use life jackets, and actual use of loaned life jackets are summarized in Table 3. Only 13 (45%) of all families knew that their site had a loaner board before arriving and less than half of those indicated that the loaner board influenced their decision to visit that specific site where they were swimming. Seventeen (59%) of all families surveyed failed to notice the board upon arrival. Among those who noticed the board, 7 (58%) reported that the board encouraged someone in their family to use a life jacket. Only 4 (15%) of all loaner board site respondents actually borrowed a life jacket. Across all 10 sites, almost 90% of respondents thought that the loaner board signage was “very easy” or “somewhat easy” to understand when shown a picture of the standard loaner board design (see *Appendix 2, Figure 1* for image).

Table 3. Awareness and utilization of loaner boards among parents at loaner board sites (N=29)

<i>Family knew that there was a loaner board on site before arriving*</i>	(N=29)	(%)
No	16	55.2
Yes	13	44.8
<i>Presence of loaner board influenced which site family chose to visit*†</i>	(N=13)	(%)
No	7	53.8
Yes	6	46.2
<i>Family noticed the loaner board upon arrival to their site*</i>	(N=29)	(%)
No	17	58.6
Yes	12	41.4
<i>Loaner board encouraged someone in family to wear a life jacket while swimming**</i>	(N=12)	(%)
No	5	41.7
Yes	7	58.3
<i>Someone in family used a loaner board life jacket*</i>	(N=26)	(%)
Yes	4	15.4
Someone wanted to but no life jacket was available	2	7.7
Loaner life jacket was not needed	20	76.9
<i>Ease with which respondent understood standard loaner board design ††</i>	(N=88)	(%)
Very easy	58	65.9
Somewhat easy	20	22.7
Somewhat hard	10	11.4
Very hard	0	0.0
* Among respondents at loaner board sites only		
† Among respondents aware of loaner board presence		
** Among respondents who noticed the loaner board		
†† Among respondents at loaner board AND non-loaner board sites		

Table 4 shows the type of flotation devices brought by families. Of the 102 families surveyed, 69 (68%) brought some type of flotation device intended for children's use. Although many respondents brought more than one kind of flotation device, it is notable that only 28 (41%) brought U.S. Coast Guard-approved life jackets while the majority, 41 (59%), brought only "substandard" flotation devices.

Table 4. Types of flotation brought by families (N=102)

<i>Family brought a flotation device for children</i>	All families (N=102)	(%)		
No	33	32.4		
Yes	69	67.6		
<i>Flotation device type combination</i>	All families (N=102)	(%)	Only families bringing some type of flotation device (N=69)	(%)
Only USCG-approved life jackets	10	9.8	10	14.5
Only "substandard" flotation devices	41	40.2	41	59.4
"Substandard" flotation devices and USCG-approved life jackets	18	17.6	18	26.1
No flotation devices	33	32.4		
<i>Specific type of flotation device brought*</i>	All families (N=102)	(%)	Only families bringing some type of flotation device* (N=69)	(%)
USCG-approved life jackets	28	27.5	28	40.6
Water Wings	10	9.8	10	14.5
Plastic Rings	17	16.7	17	24.6
Inner Tubes	8	7.8	8	11.6
Other Pool Toys	42	41.2	42	60.9
No flotation devices	33	32.4		
<i>*Percentages add to more than 100% because of multiple flotation device types brought by family</i>				

Table 5 summarizes the specific types of flotation devices brought by families with at least one child under 6 years old compared to families with all children 6 or older. Of the 39 families with any children under 6 years old, 23 (59%) brought life jackets and 6 (15%) brought no flotation devices at all. In contrast, only 5 (8%) of the 63 families with all children 6 years or older brought life jackets and 27 (43%) brought no flotation devices at all.

Table 6 compares the types of flotation devices brought for children by ages of children in the family. Two family type comparisons are presented: (1) families that had any children under 6 years old compared to families that had all children 6 and older; and (2) families that had any children under 13 years old compared to families where all children were 13 or older. Due to small sample sizes, results of these statistical tests should be considered exploratory and interpreted with caution.

Table 5. Distribution of type of flotation devices brought by family type

ALL FAMILIES				
	Families with any children under 6 years old†		Families with all children over 6 years old††	
Type of flotation device brought*	(N=39)	(%)	(N=63)	(%)
USCG-approved life jackets	23	59.0	5	7.9
Water Wings	7	17.9	3	4.8
Plastic Rings	11	28.2	6	9.5
Inner Tubes	1	2.6	7	11.1
Other Pool Toys	17	43.6	25	39.7
No Flotation Devices	6	15.4	27	42.9
ONLY FAMILIES BRINGING SOME TYPE OF FLOTATION DEVICE				
	Families with any children under 6 years old†		Families with all children over 6 years old††	
Type of flotation device brought*	(N=33)	(%)	(N=37)	(%)
USCG-approved life jackets	23	69.7	5	13.5
Water Wings	7	9.7	3	8.1
Plastic Rings	11	15.3	6	16.2
Inner Tubes	1	1.4	7	18.9
Other Pool Toys	17	23.6	25	67.6
*Percentages add to more than 100% because of multiple flotation device types brought by family				
† Includes ALL families with any child under 6, regardless of ages of other children				
†† Excludes all families with any children under 6				

Compared to families with only children 6 or older, families with any children younger than 6 were significantly more likely to have brought some form of flotation device for their children (85% compared to 57%; $p < 0.01$); more likely to have brought a life jacket for their children (59% compared to 8%; $p < 0.0001$); and less likely to have brought only “substandard” flotation devices (30% compared to 86%; $p < 0.0001$). Compared to families with all children 13 or older, families with any children younger than 13 were significantly more likely to have brought some form of flotation device for their children (73% compared to 50%; $p < 0.05$); more likely to have brought a life jacket for their children (35% compared to 0%; $p < 0.001$); and less likely to have brought only “substandard” flotation devices (52% compared to 100%; $p < 0.01$). These results were likely driven by the families with children under 6 years of age. Additional exploratory tests for equality of proportion were assessed comparing family type or flotation device type by loaner board presence; however due to small sample sizes among swim sites with loaner boards, testing power was limited. There was statistically significant evidence suggesting a

difference in the proportion of families with any children under 13 years old by presence of loaner board, where more families with any children under 13 years old were surveyed at sites with loaner boards (93%) compared to sites without (72.6%) ($p < 0.05$).

Table 6. Cross tabulations and analysis of difference in proportion of family type by flotation devices brought

	Brought flotation devices for children			Brought life jackets for children			Brought only substandard flotation devices for children †		
	No	Yes	<i>p</i>	No	Yes	<i>p</i>	No	Yes	<i>p</i>
Any children under 6 years old			**			****			****
At least one child <6	6 (15.4)	33 (84.6)		16 (41.0)	23 (59.0)		23 (69.7)	10 (30.3)	
All children 6+	27 (42.9)	36 (57.1)		58 (92.1)	5 (7.9)		5 (13.9)	31 (86.1)	
Any children under 13 years old			*			***			**
At least one child <13	22 (27.5)	58 (72.5)		52 (65.0)	28 (35.0)		28 (48.3)	30 (51.7)	
All children 13+	11 (50.0)	11 (50.0)		22 (100.0)	0 (0.0)		0 (0.0)	11 (100.0)	
<i>Cells are N (%)</i> <i>p-values based on Pearson Chi-Square Test for Equal Proportions or Fisher's Exact Test for Equal Proportions in cases where expected cell count < 5</i> † Among the 80 respondents who brought flotation devices for children; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$									

Discussion

Perceptions regarding loaner boards

While the majority of respondents thought that the standard loaner board design was easy to understand, they also provided several suggestions that policymakers, campaign strategists, and safety officials should consider in order to further increase the efficacy and acceptance of loaner boards. The most common suggestions for promoting life jacket use while swimming were related to improving access to loaner boards, with the most frequent of these to increase the number of loaner board programs (32%) and make the location of the boards more prominent (26%). Ensuring that loaner boards are adequately stocked and that life jackets are clean and in serviceable condition was also an important component of availability.

Comments related to the loaner board itself were to both simplify and improve readability and the images on the standard loaner board used in Washington State.

Less than half of all respondents knew before arriving that their open-water site had a loaner board or noticed the loaner board upon arrival. Thus, efforts to raise awareness of loaner board presence, both before and after arrival, could increase the use of loaner life jackets, remind parents to use their own life jackets, or remind parents of the risks associated with children recreating near open water and in turn influence parents to adjust their supervisory behaviors accordingly.

Flotation devices brought for children

This survey showed that while most parents (68%) brought some kind of flotation device for their children to use while swimming, the majority of these devices were toys and not USCG-approved. Furthermore, the type of flotation brought by parents was significantly related to the age of the children present. Almost 60% of families with at least one child younger than 6 years old brought a life jacket compared to only 8% of families with all children 6 years or older. Similarly, over 80% of families with at least one child younger than 6 years old brought some type of flotation device compared to less than 60% of families with only older children (6 years or older). No families with all teenage children brought life jackets. This suggests that families with younger children prioritize bringing flotation devices for safety, while families with older children bring flotation devices designed for play.

Thus, parents seemed to be aware of the risks associated with bringing young children near open water and generally follow public safety recommendations to use USCG-approved flotation devices. However, parents of children 6 years or older, and especially parents with teenagers, did not follow these recommendations as they relate to the kinds of flotation devices they bring to use while swimming, which may indicate a lack of perception of drowning risks associated with swimming in open water. This finding is significant, since teenagers have a higher risk for fatal drownings compared to younger children 5 years or older (CDC WISQARS, 2017). Thus, effective messages and campaigns should *reinforce* life jacket wear among young children and inexperienced swimmers and *encourage* wear among older children.

The common parental responses concerning child swim safety may provide insight into the family type differences in the possession of flotation devices at open-water swim sites. A prevailing belief among respondents was that parents should be responsible for teaching their children how to swim and/or provide vigilant supervision rather than relying on life jackets for safety. Parents may believe that wearing life jackets sends an undesirable message to others that they do not want to take the effort to provide attentive supervision or that their children

cannot swim. These negative perceptions support similar findings from a 2008 focus group study funded by the CDC, which found that most adult boaters held negative views of life jackets and largely associated life jacket use for children and the elderly or those with poor boating or swimming ability (Quistberg, Bennett, Quan & Ebel, 2014). Similarly, studies showed that as their child's swimming skills improve, parents adjust their perception of their child's supervision needs and believe that their child is less at risk of drowning, which likely influences whether parents encourage the use of life jackets among their older or more experienced children (Morongiello, Sandomierski & Spence, 2013). Thus, the current life jacket designs and social perceptions discourage adults and older children from wearing life jackets while boating *or* swimming and represent a barrier to decreasing the high risk of drowning while swimming among older children.

Practical Applications

Findings from this study can guide safety officials in efforts to increase the efficacy of loaner board programs and develop strategies to promote parental encouragement of life jacket use for older children. The attitudes towards loaner boards expressed by parents and the observed behavior regarding which flotation devices were brought suggest a number of targets for improved education. Participants provided many suggestions for loaner board improvements that should be considered for current and future loaner board installations, such as increasing the number and prominence of the boards or improving the quality of information of boards and loaned life jackets. Following this study, the Washington State standard loaner board design was revised to incorporate participant suggestions and improvements (see *Appendix 2, Figure 2*). Other programs can employ similar processes to elicit and incorporate feedback when developing and improving their own loaner board designs. This study also provides evidence that parents of younger children more often plan for their children to use life jackets while swimming, but the need exists to develop strategies that promote parental encouragement of life jacket use among older children, especially in open-water swim areas where there may be no lifeguards on duty. Educational campaigns and messages presented on loaner boards and other safety tools should address the importance of life jacket use for all swimmers, regardless of age or swimming experience. Other USCG-approved flotation devices that combat the negative perceptions surrounding the current life jacket design should be developed (such as designs that reduce the extent to which life jackets inhibit swimming). Investigating the safety and utility of "substandard" flotation devices and how families and teens perceive swimming risk could contribute to the development of appropriate intervention strategies that educate parents and teens about the benefits associated with wearing life jackets past the age that children learn to swim, rather than relying on other types of flotation devices. Use of Social Marketing Theory is

recommended to help guide strategies based on age of child and messages based on attitudes related to use of life jackets, ability to swim and social norms (Bennett et al., 1999).

Limitations and suggestions for further research

This study focused on the assessment of families' behaviors pertaining to bringing flotation devices for swimming as well as their perception and utilization of life jacket loaner boards. While the number and type of flotation devices brought may be an indication of families' intent to use, the survey did not ask about or observe the actual life jacket use of these specific families and thus can only draw conclusions based on indicated intention to use while swimming. Future studies examining the effect of loaner board presence on flotation devices brought should include a larger study among parents who know before arriving if a swim site has a loaner board. In order to assess the effect of noticing loaner boards on actual life jacket use of borrowed life jackets, future studies should measure actual flotation and life jacket *use* rather than devices *brought*. A more in-depth survey should ask parents about perceived utility and safety of flotation devices during swimming, life jacket safety knowledge, swimming skill of family members present, opinions associated with life jacket use (e.g., fashion, mobility, and other social perceptions), and reasons why parents and their children do not use life jackets or loaner boards.

Expanding survey observations to other times of day, week, or year of observation would increase generalizability of results, as would increasing the sample size. Furthermore, all surveys were administered at designated swim sites with clear swim boundaries, limiting our results to similar swimming situations. Thus, results are not generalizable to natural water or recreational swimming conducted outside of designated swim boundaries. Because more drownings occur outside of designated swimming areas (such as when swimming near an anchored boat, wading or swimming to a buoy or sand bar), future studies should expand observations to include less defined swimming areas.

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