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RESEARCH

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New Zealand Beachgoers' Swimming Behaviors, Swimming Abilities, and Perception of Drowning Risk

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and Elizabeth Robinson**

Little is known about the specific water-safety beliefs, swimming skills, and behaviors that might be associated with beachgoers' perception of drowning risk. New Zealand adult beachgoers ($N = 3,371$) were surveyed to assess beach swimming frequency, swimming skill, swimming behaviors, and perception of the risk of drowning in five prevalidated scenarios. Thirty-two percent of beachgoers estimated that they could currently swim less than 25 m, 55% reported that they had swum outside lifeguard-patrolled areas, and 26% had swum after consuming alcohol. Young adults and men were more likely to self-report strong swimming skill, more frequent at-risk swimming behavior, and lower perception of drowning risk. High swimming frequency, better self-reported swimming skill, and previous at-risk swimming behaviors were all associated with a lower perception of risk of the case scenarios. Addressing tendencies to overestimate swimming skill and underestimate drowning risk should be focal points of drowning-prevention interventions, especially among young male adults.

Keywords: beach swimming, water safety, water-safety instruction

In New Zealand, recreational swimming has been identified as the third-most-popular active recreational pursuit, surpassed only by walking and gardening, with a million adult New Zealanders (36% of the population) reporting that they swim regularly (Sport and Recreation New Zealand, 2002). Beaches have long been identified as popular sites for aquatic recreation such as swimming, ranking second behind shopping centers as the most popular leisure facility used by New Zealanders (Russell & Wilson, 1992). Although generally perceived as a pleasurable and healthy activity, swimming is not without risk. Recreational swimming is a significant cause of unintentional death among New Zealanders, with a mortality rate of 0.9 fatalities per 100,000 person-years (Langley, Warner, Smith, & Wright, 2001). Common sites for drowning as a consequence of recreational swimming are inshore, still- and moving-water locations (such as beaches and harbors), which

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accounted for more than one third (38%) of recreational swimming fatalities ($N = 163$) from 1980 to 1994 (Langley et al.). A study of children and young adults under 25 years of age found that, although death by drowning as a consequence of recreational swimming declined from 1980 to 2002, drowning (at guarded and unguarded surf beaches) had not declined (Child and Youth Mortality Review Committee, 2005). Furthermore, national surf-lifesaving statistics illustrate the potential for even greater loss of life, with an average of 1,850 rescues performed annually from 2001 to 2006 (Surf Lifesaving New Zealand, 2007). Several studies have identified specific risk factors that are associated with recreational drowning, such as gender (Langley et al.) and alcohol consumption (Driscoll, Harrison, & Steenkamp, 2004). Much less is known about specifically how people behave or perceive drowning risk when swimming at beaches. A previous New Zealand study described swimming behaviors, perception of swimming survival competency, and the occurrence of potential drowning incidents among young adults (Gulliver & Begg, 2005). That study did not, however, examine the underlying beliefs and perception of drowning risk associated with actions of swimmers at beaches.

The New Zealand Drowning Prevention Strategy has identified water-safety attitudes, beliefs, and behaviors as areas requiring greater research attention in efforts to reduce recreational drowning in New Zealand (Accident Compensation Corporation, 2005). To address gaps in current understanding of factors that contribute to beach drowning, this study investigated sociodemographic differences in frequency of beach swimming, self-assessed swimming-competency risk behaviors, and perception of personal risk of drowning. In addition, the association between frequency of swimming at the beach, swimming behavior, swimming competency, and perception of risk was assessed. To this end, the following hypothesis was proposed: Males and young adults (age 16–29 years) are more likely than others to swim more frequently, perceive greater swimming competency, have more risky swimming behavior, and have lower perceptions of risk than women, children, and older adults. Significant differences between ethnic groups across all independent variables were also anticipated.

Method

A cross-sectional survey of people who use public beaches throughout the greater Auckland region was conducted during summer 2006. In total, eight (guarded) beaches were selected (including surf and flat-water beaches) within close proximity to the large urban and multicultural population of metropolitan Auckland. The beaches were selected because of their relative ease of access and popularity for aquatic recreation. To generate a sample of the Auckland summer beach-going population, all visitors to the beaches age 16 years and older were invited to participate in the study. A team of trained researchers worked in pairs at the selected beaches on weekends between 11 a.m. and 2 p.m. during January and February 2006. The study was granted ethical approval by the University of Auckland human participants ethics committee.

Survey Instrument and Measures

A brief, self-completed, anonymous questionnaire sought information on socio-demographic characteristics of respondents, including gender, age (16–29, 30–49,

or 50+ years), and self-identified ethnicity (New Zealand European, Maori, Pacific Islands people, Asian, or "other" ethnic groups). Swimming behaviors and perception of drowning risk were based on questions previously developed for a national survey on water safety of New Zealand youth (Moran, 2003). The validity and reliability of the survey items regarding the frequency of swimming at the beach, swimming competency, swimming behaviors, and perception of drowning risk had been assessed for content validity via a national peer-review process and pilot studies (Moran, 2006). The questionnaire was pilot-tested 3 weeks before the main survey on a sample of beachgoers to determine the appropriateness of the language and content for an adult population. Minor adjustments to the items were made, and the five risk-scenario items included in the current study showed good internal reliability ($\alpha = .74$).

Frequency of swimming at the beach was assessed by asking respondents to indicate, using a five-point scale from *never* to *daily*, how often they swam at a beach during the summer months. This item was subsequently dichotomized as daily to weekly swimming and monthly or less frequently. Swimming competency was assessed via a question that asked participants to estimate how many lengths of a pool they could currently swim without stopping or touching the bottom, using six response categories ranging from *cannot swim* to *can swim more than 400 m*. The swim-competency categories were then split into three subcategories (less than 25 m, 25–200 m, and 200 m or more). Past swimming behavior of beachgoers in the previous year was assessed on responses to the following two items: "When you went swimming in the past year did you (a) swim between the patrol flags at a patrolled surf beach (reverse coded) and (b) swim after drinking alcohol," using a four-point scale of frequency (*never*, *sometimes*, *often*, and *always*). For the regression analysis, the two items were combined, with safe swim behavior (*never* drink alcohol and *always* swim between flags) and unsafe swim behavior (*sometimes*, *often*, or *always* drink alcohol or *never*, *sometimes*, or *often* swim between flags).

The main outcome variable, perception of risk of drowning, was assessed using a series of five general water-safety scenarios depicting differing levels of danger. Participants were asked "How would you rate the risk to your life in the following situations: tipped upside down in a canoe 100 m from the shore of a lake, caught in a rip current at a surf beach, chased an inflatable toy into deep water at a local swimming pool, fell into deep water fully clothed while walking along a riverbank, swept off isolated rocks by a wave while fishing?" Each of the five scenarios was answered individually. The general perception of risk of drowning was expressed using four response categories ranging from *no risk* to *extreme risk*. Summed scores for the five risk responses were normally distributed and therefore were dichotomized at the mean (range = 1–20, $M = 12.7$, $SD = 2.7$) to establish higher and lower levels of perceived risk.

Data Analysis

Data from the completed questionnaires were entered into EPI Info version 6 for statistical analysis using SPSS version 12.0 in Windows. Frequencies and percentages were used to report on the sociodemographic differences in frequency of swimming at the beach, swimming competencies, risk behavior, and risk perception. Chi-square statistics were used to test these associations. Logistic-regression analysis was conducted to assess the associations between frequency of beach

swimming, high perceived swim competency, previous swimming behavior (as the independent variables), and self-perceived risk of drowning relating to the scenarios (as the dependent variable). The analyses were controlled for sociodemographic variables. Results for the main effects are presented.

Results

Of the 4,237 beachgoers invited to participate in the study, a sample of 3,371 adults completed the survey, representing an 80% response rate. Of these, 56% were women and 44% were men; 47% were 16–29 years of age, 42% were 30–49 years old, and 11% were age 50 years and over; and 57% of the sample self-identified as European, 10% as Maori, 8% as Pacific Islanders, 5% as Asian, and 19% as being from “other” ethnic groups.

Frequency of Beach Swimming

Chi-square analyses were conducted to ascertain differences in self-reported frequency of swimming at the beach during the summer months by sex, age, and ethnicity (Table 1). Fewer than 2% of respondents reported that they never swim at a beach; most (50%) reported swimming weekly. Participants in the youngest age group (16–29 years) were more likely than the older age groups (30–49 and 50+ years) to swim at the beach daily or weekly during summer (63% vs. 54% and 44%, respectively), $\chi^2(2) = 49.1, p < .001$. Asian participants were much less likely than other ethnic groups surveyed to report swimming daily or weekly during summer (28% compared with 43–67%), $\chi^2(4) = 90.7, p < .001$. No significant gender differences related to swimming frequency were observed, $p = .60$.

Swimming Ability

Estimates of swimming competency were aggregated into three skill (or competency) levels and analyzed by sex, age, and ethnic group. One third (32%) of beachgoers estimated that they could currently swim less than 25 m. Table 1 shows that women were more likely than men to estimate that they could swim less than 25 m, whereas men were more likely to estimate that they could swim more than 200 m, $\chi^2(2) = 57.4, p < .001$. A greater proportion of beachgoers in the older (50+ years) age group estimated that they could swim less than 25 m than in the younger 16- to 29-year and 30- to 49-year age groups, $\chi^2(4) = 32.2, p < .001$. New Zealand European and the “other” ethnic groups were more likely than other participants to estimate that they could swim more than 200 m, $\chi^2(8) = 209.1, p < .001$.

Previous Swimming Behaviors

Beachgoers’ self-reported swimming behaviors during the previous year were analyzed by sex, age, and ethnic group. Overall, fewer than half (45%) of beachgoers reported always swimming between the flags; almost three quarters (74%) reported never swimming after consuming alcohol. Table 1 shows that more women than men reported always swimming between the flags (54% vs. 35%), $\chi^2(1) = 31.7, p < .001$. More men than women reported swimming after drinking alcohol (35%

Table 1 Frequency Scores for the Outcome and Independent Variables by Gender, Ethnicity, and Age Group

	Gender		Ethnicity					Age Group (years)			
	Male (n = 1,436)	Female (n = 1,886)	European (n = 1,821)	Maori (n = 350)	Pacific Islands (n = 248)	Asian (n = 155)	Other (n = 652)	16–29 (n = 1,567)	30–49 (n = 1,382)	50+ (n = 367)	
Swimming frequency											
low	606 (42%)	813 (43%)	699 (38%)	149 (43%)	142 (57%)	112 (72%)	1379 (43%)	584 (37%)	633 (46%)	204 (56%)	
high	830 (58%)	1,073 (57%)	1,122 (67%)	201 (57%)	106 (43%)	43 (28%)	1847 (57%)	983 (63%)	749 (54%)	163 (44%)	
Swimming ability											
<25 m	376 (26%)	692 (37%)	500 (28%)	140 (40%)	147 (59%)	93 (60%)	165 (25%)	484 (31%)	417 (30%)	165 (45%)	
25–200 m	573 (40%)	748 (40%)	800 (44%)	143 (41%)	63 (25%)	33 (21%)	239 (37%)	641 (41%)	562 (41%)	117 (32%)	
>200 m	487 (34%)	446 (24%)	521 (29%)	66 (19%)	38 (15%)	29 (19%)	248 (38%)	442 (28%)	403 (29%)	85 (23%)	
Past behavior											
had swum outside patrol flags	927 (65%)	871 (46%)	1342 (75%)	230 (67%)	151 (61%)	111 (72%)	465 (73%)	1,066 (68%)	602 (44%)	119 (32%)	
had swum after drinking alcohol	496 (35%)	367 (20%)	456 (25%)	115 (33%)	65 (26%)	33 (21%)	170 (26%)	599 (38%)	219 (16%)	47 (13%)	
combined unsafe swimming behavior	413 (29%)	409 (22%)	628 (35%)	105 (31%)	89 (36%)	59 (38%)	234 (37%)	485 (31%)	274 (20%)	61 (25%)	
Risk perception											
high	713 (51%)	1,265 (69%)	1,064 (59%)	184 (54%)	159 (69%)	115 (78%)	411 (65%)	892 (59%)	822 (61%)	259 (72%)	
low	677 (49%)	575 (31%)	731 (41%)	154 (46%)	72 (32%)	32 (22%)	224 (35%)	629 (40%)	519 (39%)	102 (28%)	

vs. 20%), $\chi^2(1) = 93.1, p < .001$. By age, more beachgoers age 16–29 years than 30–49 years and 50+ years reported swimming outside the patrolled areas (68% vs. 44% and 32%, respectively), $\chi^2(2) = 102.7, p < .001$, and swimming after consuming alcohol (38% vs. 16% and 13%, respectively), $\chi^2(2) = 96.5, p < .001$. One third of Maori respondents (33%); one quarter of European (25%), Pacific Islands peoples (26%), and “other” ethnicities (26%); and one fifth of Asian New Zealanders (21%) reported swimming after consuming alcohol, $\chi^2(4) = 40.3, p < .001$. Most participants across all ethnic groups reported that they had swum outside the patrol flags: New Zealand European 75%, Maori 67%, Pacific 61%, Asian 72%, and “other” ethnic groups 73%, $\chi^2(4) = 25.4, p < .001$.

Perception of Drowning Risk

Perceptions of the risk of drowning associated with five water-based scenarios varied considerably among beachgoers. As shown in Table 1, women were more likely than men to perceive the scenarios to be high risk (69% vs. 51%), $\chi^2(1) = 101.6, p < .001$, and the oldest age group was more likely than the two younger age groups to report the situations as high risk (72% vs. 61% and 59%, respectively), $\chi^2(6) = 25.2, p < .001$. Pacific Islands people and Asian New Zealanders also reported themselves to be at higher risk in the five water-safety scenarios than European, Maori, and those of “other” ethnicities, $\chi^2(4) = 36.2, p < .001$.

In the logistic-regression analyses, after sociodemographic characteristics were controlled for, greater beach swimming frequency, higher self-reported swimming competency, and previous at-risk swimming behaviors all were associated with participants attributing a lower perception of risk in the case scenarios (Table 2).

Discussion

This study examined factors associated with beachgoers’ perception of the risk of drowning in the context of recreational swimming at beaches. Independent variables included frequency of swimming at the beach in past year, perceived swimming competency, and past swimming behavior (as assessed by swimming between the

Table 2 Logistic-Regression Model for Variables Predicting Adult Beachgoers’ Low Perception of Drowning Risk (Underestimation of Risk)

	<i>p</i>	Odds ratio	95% confidence interval
Frequency (high)	.001	1.3	1.1–1.5
Swimming competency			
25–200 m	.001	2.3	1.8–2.8
>200 m	.001	4.2	3.4–5.2
Behavior (safe)	.001	1.2	1.0–1.4

Note. Gender, age, and ethnic group have been included as potential confounders. Reference groups: frequency = low; swimming competency = <25 m; behavior = unsafe swimming behavior.

flags and not swimming after drinking alcohol). Significant sociodemographic differences were observed in the relationships between the dependent and each of the predictor variables. Logistic-regression analyses revealed that after controlling for the effects of gender, age, and ethnicity, higher frequency of beach swimming, higher level of perceived competency in swimming, and unsafe swimming behavior in the past were associated with lower perception of risk attributed to specific water-safety-related scenarios included in the survey. The findings in relation to the sociodemographic characteristics also offer support for previous research that argues that, in addition to overestimating their ability to cope with the risks associated with aquatic recreation, men and youth might underestimate the potential dangers inherent in aquatic activities (Baker, O'Neil, Ginsburg, & Li, 1992; Brenner, Saluja, & Smith, 2003; Howland, Hingson, Mangione, Bell, & Bak, 1996; Moran, 2006). Collectively, these studies provide useful insights into why young males feature so prominently in international drowning statistics.

The findings identified considerable variability in self-estimated swimming competency among beachgoers. Because it is often assumed that swimming competency serves a protective function in a drowning situation (Brenner et al., 2003), it is of concern that one third (32%) of beachgoers in this study estimated that they could only swim 25 m or less. Similar low levels of swimming competence have been found in other studies among adults (Gilchrist, Sacks, & Branche, 2000), young adults (Gulliver & Begg, 2005), youth (Moran, 2006), and ethnic minorities (Mael, 1995; Smith & Brenner, 1995). Perhaps it is not surprising that higher perceived swimming competency was associated with lower perception of risk, which raises the possibility that some individuals (especially young males) might be overly confident about their ability to manage risky situations through overestimation of their swimming skill. When associated with lower estimations of risk as indicated in this study, this combination of factors might prove to be potentially fatal. Further research on the relationship between perceived and real swimming skill might provide valuable insight into the possibility that overconfidence in one's swimming skill might exacerbate risk of drowning during recreational swimming.

The finding that despite extensive local and national public-safety promotion more than half (54%) the beachgoers in this study reported swimming outside patrolled areas and over one quarter (26%) reported swimming after consuming alcohol is a cause for concern. Indeed, past risky behavior was associated with lower risk perceptions, raising the possibility that a perceived invulnerability factor might override protective swimming skills and behaviors. The lower overall perception of risk of drowning among males and their greater self-reported frequency of risky behavior is an issue worthy of further investigation.

Results from this study should be interpreted with some caution in light of several methodological limitations. The sample did not include people who only go to the beach on weekdays or outside of peak hours on the weekend. In addition, self-estimation of swimming competence, though often used in studies on water safety (e.g., Moran, 2003), might not accurately express true competence (Howland et al., 1996; Robertson, 1992). Nevertheless, this measure is considered a relevant and accessible proxy measure of an indicator similar to distance swum in a swimming pool (Brenner, Moran, Stallman, Gilchrist, & McVan, 2006). In addition, the main outcome variable, perception of risk, measured the respondents' perceived threat to life in scenarios in which the risk of drowning was implied rather than

explicitly stated. It is possible that self-perceived risks in hypothetical scenarios as used in this study differ from perceptions in real situations. Further research is required to confirm the apparent relationships between the levels of swimming proficiency and lower perception of drowning risk reported by males and youth in this study. Finally, given our cross-sectional design of the sample, the associations observed in this study cannot be assumed to be either causal or predictive of safe or unsafe swimming behavior but only relational.

Conclusion

The descriptive findings reported in this study suggest the need for further in-depth analyses of the role of risk perception and the specific dimensions within the construct of risk perception that are associated with swimming behavior at the beach. Theoretically driven research on how individuals conceptualize and respond to various risk dimensions are crucial to the development of salient health-promotion messages aimed at increasing safe swimming behavior.

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