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## Knowledge, Attitudes, and Behaviours of New Zealand Youth in Surf Beach Environments

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### Cover Page Footnote

The authors wish to acknowledge and thank Surf Life Saving New Zealand for allowing the use of incident report data and statistics for the purpose of this research.

## Abstract

New Zealand youth are over-represented in drowning statistics yet little is known about their understanding of water safety, especially in surf beach context. This study aimed to ascertain current youth surf safety knowledge, specifically rip current awareness, explore self-reported competencies and confidence when surf swimming, and examine youth behaviour when at the beach. A cross-sectional survey was conducted among senior high school students ( $n = 599$ ) in Auckland, New Zealand. Over half (58%) reported they were unable to swim  $> 100$  m in a pool. Males and students of European-New Zealand and Maori (New Zealand's indigenous population) heritage were most likely to report risky behaviors such as swimming alone, outside of the patrol flags, or at a beach without lifeguards. Females reported lower swimming competency and confidence. Students of non-European-New Zealand heritage consistently reported lower surf safety knowledge. The results suggest that, in spite of frequent surf beach use and confidence in their ability to cope with risk, the surf safety knowledge, attitudes, and behaviors of most New Zealand youth leaves them at higher risk of drowning.

*Keywords:* water safety knowledge, water safety attitudes, youth, drowning prevention

New Zealand is an island nation with over 11,000 km of coastline, and extensive rivers and lakes, many of which are easily accessible, resulting in high participation water-based sport and recreation rates among residents and visitors alike. New Zealand has a higher drowning rate (1.7 per 100,000 people) than other similar high income countries such as Australia (1.3 per 100,000) and the United States (U.S) (1.1 per 100,000) (Lin, Wang, Lu, & Kawach, 2014). Every year on average, 110 people fatally drown, a further 160 are hospitalised (Water Safety New Zealand [WSNZ], 2014), and approximately 1,300 beachgoers are rescued at surf beaches (Surf Life Saving New Zealand [SLSNZ], 2013). Recent statistics suggest that youth and young adults are especially at risk, with up to 30% of surf beach drowning fatalities (WSNZ, 2014) and 41% of surf rescues occurring among those aged 16 - 30 years (SLSNZ, 2013). The drowning rate among young New Zealanders (12-24 years) is almost double the rate of Australian youth (1.9 per 100,000 people cf. 1.0 per 100,000) and almost four times the rate of American youth (0.5 per 100,000) (Lin et al., 2014). In 2014, the 15-24 year age group accounted for 21% of national drowning deaths ( $n = 16$ ), with an additional 25 youth hospitalised as a result of drowning-related incidents (WSNZ, 2014).

The 2014 New Zealand National Physical Activity Survey found that swimming was the second most popular activity among 16-24 year olds (38%) across all socio-economic levels (Sport New Zealand, 2014), with beaches a popular environment for young people to recreate and socialise. A national youth water safety survey conducted in 2003, reported that up to 75% of 15-16 year olds surveyed had swum at a patrolled beach, and around half had swum at an unpatrolled beach during the previous year (Moran, 2009).

Water safety and surf education programs (and campaigns) are common in high income countries, notably in New Zealand, Australia, and the United Kingdom (UK) where the majority of programs primarily targeting young, pre-school and primary school aged children (Moran, 2016). However, few evidence-based water safety initiatives target high school students and young adults, and little is known about what surf safety education informs youth practice of safety at surf beaches (Moran, 1996; Willcox, 2013). Some evidence suggests that youth are not well prepared to handle the challenges that high energy surf beaches pose to those wishing to take part in surf-based recreational activities (Moran,

2008). In addition, males in particular may be at greater risk than their female counterparts because of their tendency to underestimate risk and overestimate their ability to cope with that risk (Moran, 2011). The evidence also suggests that knowledge and understanding of specific surf hazards (such as rip currents) is also lacking with one fifth (19%) of students unable to identify any hazards in a photo of a dangerous surf conditions at a well-publicised popular surf beach (Moran, 2008).

Therefore, the purpose of this study is to: 1) ascertain current youth surf safety knowledge, specifically rip current awareness; 2) measure current self-reported competencies and confidence in open water and; 3) examine youth behaviour especially when at a surf beach.

## Method

### Participants

A cross-sectional survey of a convenience sample of high school students aged 16 -18 years in West Auckland ( $n = 599$ ) was conducted between February and April 2014. West Auckland was chosen as the setting for this research because of its proximity to popular surf beaches regarded as high risk due to large surf conditions and strong rips; these beaches are consistently ranked within the top 10 beaches for the highest number of surf rescues in New Zealand (SLSNZ, 2013). All high schools in this area were invited to take part in the study, with a total of five state (public) schools agreeing to take part: three co-educational, one all-male and one all-female school. All five schools had similar socio-economic profiles and multi-cultural student populations.

Schools were provided with information sheets for teachers, parents, and students. Permission for the school to take part in the research was sought from each school principal. Completion of the survey implied participant consent, and participants had the right to withdraw until the questionnaire had been submitted. Ethical approval for the study was granted by the University of Auckland Human Participants Committee (Reference 010470).

### Survey instruments and measures

A self-complete, anonymous paper-based questionnaire was developed to ascertain level of surf safety knowledge and risk perception of drowning within a surf beach environment with an emphasis on rip current awareness, surf conditions and water safety principles. The survey was pre-tested in November 2013 with students from a school with similar demographics but not associated with the study. The final survey consisted of 17 questions and consisted mostly of closed questions, using a combination of multiple-choice, true-false, and a five-point Likert scale (*strongly agree, agree, unsure, disagree, strongly disagree*). Where possible, pre-validated questions and scales were used to strengthen external validity, drawing from a range of existing water safety surveys (Brander et al., 2013; McCool et al, 2009; Moran, 1996, 2003, 2009, 2013; Moran & Willcox, 2013). The survey was structured to allow completion within 20 minutes and was completed during class time.

Swimming competency was self-estimated based on student's perception of how many lengths of a 25 m swimming pool they could swim without stopping, using six categories ranging from *None, I cannot swim* to *More than 16 lengths (400 m or more)*. Students were asked about their confidence when swimming the same distance at the beach in three different situations: deep water, calm conditions; deep water, small surf conditions; deep water, big surf conditions using four response categories (*very anxious, anxious,*

*confident, and very confident*). These responses were dichotomized into two categories *anxious and confident* for analysis purposes.

Surf knowledge questions were designed to ascertain youth understanding of rip currents and surf conditions by replicating questions previously used in the New Zealand Youth Water Safety Survey (Moran, 2003). Four multiple-choice questions focussed on rip current knowledge including what is a rip current, how to identify a rip, and what advice the respondent would give someone if caught in a rip current. Three pictorial questions were adapted from the Australian Rip Safe Project (with permission from lead researcher Rob Brander) (Brander et al., 2013) to visually test rip knowledge, with photos of three different beaches with a rip current present. The final question used an illustration of a dangerous local surf beach and was designed to measure cognitive understanding of hazard identification and personal decision making skills when at the beach (Moran 2003, 2009). To allow direct comparison of responses from the 2003 New Zealand Youth Water Safety Survey to the present, the question used the same assessment procedures (Moran, 2009, 2003). The scenario described a day with a group of friends at a surf beach, with an aerial photo of a New Zealand surf beach featuring a rip current at one end of the beach and the patrolled area positioned at the opposite end of the beach. Respondents were asked to list possible dangers that they would consider in this situation and personal decisions about going into the water, and to indicate on the picture where they would set up for the day and choose to swim. These responses were coded from *extreme risk*, to *no risk*, in relation to the patrol area and the rip current pictured.

### Data analysis

Descriptive data analysis included: frequency tables, chi-square testing for association and Mann-Whitney *U* testing for non-parametric data. Frequency tables were generated for all questions and, unless otherwise stated percentages are expressed as the number of respondents to each survey question within groups. Data on dependent variables (such as surf safety knowledge) were analysed by independent variables (such as sex, ethnicity). Ethnic groups were broadly based on Statistics New Zealand's classification and included European, Maori, Pacific Island (hereafter called Pasifika), Asian, and an 'other' category for those who did not identify with the above categories. Data analysis was carried out using SPSS Version 22 and the level of significance was set at  $p = .05$ .

### Results

Of the 870 surveys distributed to the five participating schools, 599 were completed (69% response rate). The average number of enrolled students for the year level surveyed (available from the Ministry of Education) were used to calculate the response rate by school. This ranged from 39% in School 5, to 75% in school 1, the overall average response rate for the schools was 65%. The mean age of respondents was 16 years, and 51% were female (Table 1). Nearly half (48%) self-identified as being of New Zealand European ethnicity, 20% Pasifika, 9% Maori and 9% Asian (4% Chinese, 4% Indian and 2% Korean). Fourteen percent identified as 'Other', including Australian, English/British, South African, Middle Eastern and African.

Two thirds (66%) of respondents reported having swum at surf beaches in the previous year, almost half (48%) of these reported doing so on a monthly basis. A small proportion (10%) had not swum at a surf beach in the previous year. When analysed by ethnicity, New Zealand European and Maori students reported the highest frequency of swimming at surf beaches in the previous year, Asian students were the least likely to have

swum at a surf beach. No significant differences were reported in frequency of swimming at surf beaches when analysed by sex. One half reported always or often swimming between the beach flags (males 48%, females 54%), and one fifth (21%) reported never swimming at an unpatrolled surf beach (males 18%, females 24%). More New Zealand European students reported that they swam at unpatrolled beaches than non-New Zealand European students (61% compared to 37%) ( $\chi^2(16) = 65.2221, p < .001$ ).

**Table 1** Characteristics and self-reported swimming competency of survey respondents, Surf Safety Survey 2014 (n=599)

Characteristics	<i>n</i>	%
Sex		
Male	294	49.1
Female	305	50.9
Total	599	100
Ethnicity		
NZE*	288	48.1
Maori	53	8.8
Pasifika	120	20.0
Asian	56	9.3
Other	82	13.7
Total	599	100
Age		
15 years	72	12.0
16 years	321	53.6
17 years	132	22.0
>18 years	25	4.2
Unknown	49	8.8
Total	599	100
Self-estimated swimming competency		
None I cannot swim	73	12.2
<25m	108	18.0
26-100m	166	27.7
101-200m	104	17.4
201-400m	60	10.0
>400m	80	13.4
Nil response	8	1.3
Total	599	100.0

\*NZE = New Zealand European

### Swimming Competency

Almost one third (30%) of students reported that they could not swim 25 m, and a further 28% were unable to swim further than 100 m (Table 1). When analysed by sex, significant differences in self-reported swimming competency were found. More females (37%) than males (23%) estimated that they were unable to swim further than 25 m ( $\chi^2(3) = 15.037, p = .022$ ). Significant differences were also found between ethnicity and swimming competency, ( $\chi^2(12) = 67.222, p = .011$ ) with Asian students reporting a lesser swimming ability than New Zealand European and Maori students. More than half (55%) of Asian students reported that they could not swim. For distances greater than 100 m, one half (52%) of New Zealand

European students reported being able to swim the distance, compared with 34% of Pasifika students, 23% of Maori, and only 21% Asian students.

### Confidence in the surf

Students were most confident (73%) about swimming in deep water with calm conditions and least confident (32%) about swimming in deep water with big surf conditions with 65% reporting that they would feel anxious in these conditions (Table 3). Significant differences were found when analysed by sex. Males expressed higher confidence than females swimming in both big surf conditions ( $\chi^2(4) = 26.194, p < 0.001$ ) and small surf conditions ( $\chi^2(4) = 25.063, p < 0.001$ ). Significant differences were also found when analysed by ethnicity. More New Zealand European than non-European students reported being confident in calm conditions ( $\chi^2(4) = 33.926, p < .001$ ), in small surf conditions ( $\chi^2(4) = 46.191, p < .001$ ), and in big surf conditions ( $\chi^2(4) = 19.722, p < .001$ ). Asian students were the most likely to report being anxious swimming in calm conditions ( $\chi^2(4) = 20.506, p < .001$ ), and in small surf conditions ( $\chi^2(4) = 20.621, p < .001$ ), compared to non-Asian students, however non-significant differences were found in anxiety levels when swimming in big surf conditions.

**Table 2** Confidence in swimming at the beach in different water conditions, Surf Safety Survey 2014 (n=599)

Water conditions	Anxious		Confident		Nil response		Totals
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>
Deep water, calm conditions	152	25.4	436	72.7	11	1.8	599
Deep water, small surf conditions	221	36.9	360	60.1	18	3.0	599
Deep water, big surf conditions	391	65.3	189	31.5	19	3.2	599

### Water Safety Education and Surf Experience

Most respondents (77%) reported having been taught to swim previously, and almost half (48%) had received some form of surf education. Almost one quarter (23%) reported experiencing a life threatening situation in the surf. Of these respondents, 49% reported being able to get out of difficulty unassisted, 32% were rescued by family or friends and 10% were rescued by lifeguards. Over half (55%) reported that this experience did not have any negative impact on future surf activity participation, whereas 32% reported that whilst they still take part in surf activity, they are now very cautious.

### Swimming Behaviour

The most frequently reported 'at risk' activity undertaken at surf beaches was swimming alone (50%), followed by swimming at an unpatrolled surf beach (21%). Up to 15% reported that they had swum after drinking alcohol. Half (50%) reported always or often swimming between the patrol flags and 21% had never swum at an unpatrolled beach. No significant differences in self-reported behaviour were found when analysed by sex. Significant differences in self-reported behaviour were found when analysed by ethnicity across all

scenarios. More New Zealand European than non-European students reported that they swam at unpatrolled beaches (61% compared to 37%) ( $\chi^2(16) = 65.2221, p < 0.001$ ), swam on their own (54% compared to 47%) ( $\chi^2(16) = 50.708, p < 0.001$ ), swam after drinking alcohol (17% compared to 14%) ( $\chi^2(16) = 42.996, p < 0.001$ ) and had swum outside of the flags (60% compared to 42%) ( $\chi^2(16) = 58.624, p < 0.001$ ) compared to other students.

### Rip Current Knowledge

Two thirds (66%) of students were able to accurately define a rip current (males 69%  $n = 201$ , females 66%), more than half (54%) could recall the correct advice to tell someone if caught in a rip current (males 56%, females 51%), 40% could correctly identify characteristics of a rip current (males 41%, females 38%) and 30% thought that they could identify the safe location to swim at an unpatrolled beach (males 33%, females 28%) (Table 3).

**Table 3** Students rip current knowledge by sex and ethnicity, Surf Safety Survey 2014 (n=599)

Surf safety question	Correctly identified		Male		Female		NZE*		Maori		Pasifika		Asian		Other	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Definition of a rip current	403	66.0	201	68.3	202	66.2	242	84.0	37	69.8	43	35.8	32	57.1	49	59.6
Description of a rip current	237	39.6	122	41.5	115	37.7	135	46.9	18	34.0	35	29.2	22	39.3	27	32.9
Safe location to swim at an unpatrolled beach	182	30.0	97	33.0	85	27.9	121	42.0	15	28.3	17	14.2	11	19.6	18	22.0
Advice if caught in a rip current	321	54	164	55.8	157	51.5	174	60.4	33	62.3	55	45.8	27	48.2	32	39.0

\*NZE = New Zealand European

No significant differences in surf knowledge were found when analysed by sex; however, New Zealand European students demonstrated a higher knowledge of rip current safety than other students across all questions; *Definition of a rip current* ( $\chi^2(4) = 73.617, p < .001$ ), *Description of a rip current* ( $\chi^2(4) = 43.392, p < .001$ ), *Safe location to swim at an unpatrolled beach* ( $\chi^2(5) = 50.491, p < .001$ ), and *Advice if caught in a rip current* ( $\chi^2(4) = 54.542, p < .001$ ). When asked to visually identify a rip current in the three beach photos provided, less than half of the students were able to correctly identify a rip current (picture 1 = 45%, picture 2 = 39%, picture 3 = 36%), with more males than females correctly identifying the rip currents (43% males vs. 36% females). When analysed by ethnicity, New Zealand European and Maori students were most likely to correctly identify a rip current and Pasifika students were the least likely to be able to identify a rip current in the photos provided, however there was no statistical differences noted when analysed by ethnicity.

### Personal Decision Making and Hazard Identification

Students were presented with the scenario of going to the beach for the day and shown an aerial photo of a local West Auckland beach (adapted from Moran, 2003). Students were asked to identify dangers about the beach, list personal safety decisions about going into the water, and to indicate on the picture where they would a) locate themselves for the day and b) where they would go in the water. One quarter (26%) did not identify any dangers on the



beach, 43% could identify one or two dangers (one = 18%, two = 25%) and one third (31%) could identify three or more dangers at the beach. When asked about going into the water, 30% noted at least one safety decision, 21% considered two safety decisions and 39% did not name any safety considerations. Over half (54%) identified that the least risky place to set up for a day at the beach was at the patrolled area, 6% chose the highest risk area (rip current present). No significant differences were found by sex with regard to hazard identification, safety actions and safe locations. Significant differences were found when analysed by ethnicity for all three questions respectively. More non-New Zealand European than European students were unable to identify any dangers (24% compared to 14%) ( $\chi^2(16) = 37.089, p = .002$ ). Fewer non-New Zealand European students could name three or more safety considerations about going into the water (14% compared to 17%) ( $\chi^2(16) = 35.287, p = .004$ ). In regards to safety of location chosen, more New Zealand European students identified that the least risky location was the patrolled area (33% compared to 20%) and more non-New Zealand European students chose the higher risk areas (8% compared to 3.8%) ( $\chi^2(16) = 70.897, p < .001$ ).

### Discussion

The findings of this study suggest a lack of surf safety knowledge among West Auckland youth. This is concerning given that half of the students had swum at a surf beach in the past year, one fifth had swum at an unpatrolled beach, and only half reported having been taught surf safety at school previously. Additionally, all schools were located within close proximity of popular surf beaches regarded as high risk due to large surf conditions and strong rips.

When analysed by sex, males estimated a higher swimming competency than females. Differences in swimming skill between youth and young adult males and females have been previously reported in New Zealand (Gulliver & Begg, 2005; Moran, 2009) and in the U.S (Brenner, Saluja, & Smith, 2003). This study found significant differences in self-reported swimming competency when analysed by ethnicity. New Zealand European students reported the highest swimming competence and Asian students the least. The New Zealand Youth Water Safety Survey reported similar findings with over half of the participants reporting that they could not swim more than 100 m, and Pasifika and Asian students reporting poor competency (Moran, 2009). Similar differences in swimming skill among young people of different ethnicities have also been previously reported in Canada (Golob, Giles & Rich, 2013) and in the United States (Irwin et al., 2011).

A high level of confidence among males and those of New Zealand European and Maori students was reported when swimming in open water in all conditions. However, confidence levels in being able to swim the same distance progressively lessened from deep calm water to big surf conditions for all students. More males reported higher confidence than females when swimming in both small and big surf conditions, with more females and Asian students reporting being anxious in this situation. Similar results were reported in another New Zealand study of young adults where 58% of participants reported feeling confident swimming in a deep lake with choppy conditions with females reporting higher anxiety than males in this situation (females 53% vs. males 32%) (Gulliver & Begg, 2005).

The most risky behaviours commonly undertaken by students in this study were swimming on their own (50%) and swimming at an unpatrolled surf beach (21%). In comparison to other New Zealand youth studies, these results report a lower incidence of risky behaviour among youth. Gulliver and Begg (2005) in their study of 1,000 21 year olds, reported almost half (46%) of participants had swum at an unpatrolled beach. The New Zealand Youth Water Safety Survey found that 42% of year 11 students had swum at

patrolled surf beaches and 68% had swum at non-patrolled surf beaches in the past year (Moran, 2003, 2009). Fifteen percent of students in the present study reported having swum after consuming alcohol, compared to 24% of respondents in the New Zealand Youth Water Safety Survey (Moran 2003, 2009). Although a slight reduction of youth partaking in at-risk behaviours has been reported here, it is still of concern that youth continue to persist with risky behaviours around water. It is recommended that water safety agencies consider developing campaigns or programs encouraging young people to make informed decisions around the water. The desired result would be less young people putting themselves in potentially risky situations and therefore reducing the incidence of surf rescues and fatal drowning among youth and young adults.

The present study found that rip current knowledge varied considerably among the students. Two thirds (67%) could describe a rip current, yet less than one third (30%) could identify the safe place to swim at the beach if there were no patrol flags present, and less than half could identify a rip current from a still photo. These findings are consistent with other studies investigating public knowledge of rip currents that suggest a lack of surf safety knowledge and an understanding of rip currents (Lapinski & Viken, 2014; Moran 2007, 2006; Williamson et al., 2012). Males and New Zealand European students reported higher rip current knowledge than females and other ethnic groups. Minority groups including Pasifika (Moran, 2007) and Asian youth (Moran, 2006) have consistently been reported as having a poor understanding of surf safety knowledge. A study of Australian beachgoers, rural residents and tourists found that less than half of those surveyed were able to identify a rip current from a still photograph although over half knew what to do if caught in a rip current (Williamson et al., 2012). Similarly, a study of young males in Lake Michigan, U.S, reported that most participants were unable to accurately describe a rip current, yet they could recall a range of strategies to escape a rip current (Lapinski & Viken, 2014).

Comparison of results on the same pictorial question on personal decision making and hazard identification between the present study and the original New Zealand Youth Water Safety Survey of 2003 reveals some interesting findings. A higher proportion of students could not identify any hazards (26% in 2014 vs. 19% in 2003) and make any safety decisions about going into the water (39% in 2014 vs. 30% in 2003). Significantly fewer chose the most risky place to swim in 2014 compared to 2003 (6% in 2014 vs. 32% in 2003). Whereas a higher proportion of females were found to be able to identify hazards and make safety decisions in the national study, the present study found no significant differences between males and females. However, consistent differences in surf safety knowledge when analysed by ethnicity warrants further investigation.

### **Limitations**

The results of this study need to be considered in light of several limitations. The study was restricted to students from the geographical location of West Auckland, this may mean the findings may not be generalizable to all youth. The survey study was confined to quantitative data gathering techniques, and did not allow for in-depth analysis. Further investigation using qualitative methods such as focus groups or interviews may give a greater insight of knowledge, behaviours and attitudes among youth. The use of still photos to identify a rip current rather than a video of moving water is a limitation; these photos were selected for comparative purposes with the Australian Rip Current Survey. It is unknown if a video of moving water could have had any effect on the results. The survey was written in English only and therefore excluded students with English language limitations for whom this research may be particularly relevant given their lack of familiarity with the New Zealand

surf environment. Further investigation using multilingual research tools is advised. Swimming competency was reported by self-estimation and may not accurately portray actual swimming competency. As has been reported in other health behaviour studies, this may have introduced bias that may not reflect actual competencies (Robertson, 1992; Mickalide, 1997; Watson, Kendrick & Coupland, 2003). Further studies using real rather than perceived swimming competencies are recommended. Finally, this was a cross-sectional study and therefore no casual assumptions can be drawn from the findings. Notwithstanding these limitations, the results provide novel insight into the knowledge, attitudes and behaviour of youth towards drowning when in a surf beach environment.

### **Implications for policy and practice**

This study has highlighted the lack of knowledge, awareness and confidence among youth with regards to the open water surf environment. The self-estimated low levels of swimming ability found in this study are cause for concern since most students reported that they had been taught to swim and many frequently swam at surf beaches. A strategy that builds on traditional swimming and water safety lessons in the early years and then progressing to open water during high school years would be beneficial to better prepare young people for realistic situations. Research suggests that skill acquisition and drowning prevention strategies should highlight open water practices, to realistically reflect the locations in which youth may find themselves in difficulty and, that swimming instruction should be taught according to the causes of drowning (Gulliver & Begg, 2005; Stallman, Junge, & Blixt, 2008). Addressing emerging high risk groups such as males and young adults should be a priority for drowning prevention agencies.

The limited understanding of drowning risk at surf beaches highlighted in this study suggests that the surf education work being done in primary schools requires further consolidation and development at high school level. Since youth and young adults are likely to continue frequenting easily accessible and highly popular surf beaches, greater emphasis on risk awareness, risk assessment, and risk management so that youth can make informed decisions about their safety and that of others seems imperative. This is especially important given New Zealand surf beaches do not have lifeguards present year around and many do not have patrols at all therefore knowledge of rip currents and knowing where it is safe to swim is essential. Teaching youth about the nature of rips currents and rough water initially within the safe confines of the swimming pool in simulated surf conditions as has been previously taught in the high school curriculum (Moran, 1996) is recommended. Given the findings from this present study, it may be timely to focus drowning prevention efforts on a surf safety awareness campaign that addresses rip current knowledge at high schools as well as primary schools in New Zealand.

### **Conclusion**

In spite of recent efforts of drowning prevention researchers and practitioners, effective drowning prevention strategies targeted at youth and young adults remains a challenge in New Zealand. The results of this study suggest that in the years since the 2003 New Zealand Youth Water Safety Survey (Moran, 2003) was conducted, youth surf safety knowledge has not improved. This signals a need for a new agenda, a new surf safety campaign with a special emphasis on rip current knowledge. Practical solutions are required to provide a wider water safety knowledge base among youth and the general population, with the ultimate aim to reduce surf related drowning.

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