Re-thinking Drowning Risk: The Role of Water Safety Knowledge, Attitudes and Behaviours in the Aquatic Recreation of New Zealand Youth

A thesis presented in fulfilment of the requirements for the degree of

Doctor of Philosophy

at Massey University, Palmerston North, New Zealand.

Kevin Moran

2006

Abstract

This study evolved from concerns about the number of young people drowning in New Zealand (544 deaths between 1980-1994), the author's long experience with surf life saving and the suspicion that participation statistics on aquatic recreation do not adequately explain why so many young people drown. It was postulated that the risk of drowning associated with aquatic recreation also was the consequence of many underlying water safety influences that operate at intrapersonal, interpersonal and community levels. Thus the purpose of the study was to obtain comprehensive data on what young people know, think and do about their safety during aquatic recreation.

A 25-item questionnaire was designed to survey a randomised sample of New Zealand youth (2202, year 11, 15 – 19 year olds) to assess their participation in, knowledge about and behaviour during aquatic recreation. To develop the questionnaire, a conceptual framework was devised that constructed the risk of drowning as a complex phenomenon dependent on how often young people participate in various forms of water-based activities, but largely influenced by their water safety knowledge, attitudes and behaviour, all of which are shaped by social, cultural and demographic variables.

Almost all New Zealand youth had taken part in some swimming (98%) or other aquatic activity (94%) in the previous year. Risk of drowning was exacerbated among many students because they had poor water safety skills and knowledge, held unsound water safety attitudes, and often practiced at-risk behaviours. For example, many students estimated that they could not swim more than 100 m (54%), thought that swimming was acceptable at a surf beach after patrol hours (61%), and had swum outside patrol flags (61%) or never worn lifejacket (19%) during aquatic recreation. Taken separately, any one of these dispositions is capable of heightening drowning risk; taken collectively they offer strong explanation as to why youth are at greater risk of drowning than others. When analysed by gender, the lack of water safety knowledge, the prevalence of unsafe attitudes and at-risk behaviours among males was consistent and pronounced. The effect of socio-economic status and ethnicity on these risk-enhancing dispositions was less pronounced, although the data did suggest that the knowledge base of youth from low-decile schools and of Pasifika and Asian ethnicity provided least protective potential in the event of unintentional submersion.

Preface and acknowledgements

This thesis is the consequence of a lifelong interest in the promotion of water safety and the prevention of drowning. Specifically, it is the written manifestation of many years of experience of rescuing young people while lifeguarding at one of New Zealand's most dangerous surf beaches, as well as the product of many years of advocacy for the necessity of water safety education for young people.

In affording the writer the opportunity to indulge in an in-depth study of an activity that has long held a professional and personal interest, this study has been a labour of love as much as a labour of material end. As in all such work, many people have facilitated its completion at both a personal and professional level. On the personal level, I am appreciative of the tolerance and patience shown by my wife, Sian, and family, who have had to endure unremitting doubts, frustration and elation, often in the same day. On a professional level, I am deeply indebted to my supervisors, Pat Nolan and Bruce Ross, for their unfailing support and wisdom. Above all, I am indebted to both for their friendship. In addition, a special thanks is proffered to Chris Tennet for her ever-enthusiastic assistance in proof reading and unfailing ability to detect errors in writing with hawk-like precision.

The project could not have proceeded without the assistance of the principals, staff and students of the 41 schools that took part in the nationwide survey, or without the generous financial support and advice of Water Safety New Zealand that made the survey possible. I am also grateful for the professional advice and support of other water safety organizations including Surf Life Saving Northern, Surf Lifesaving New Zealand, and WaterSafe Auckland Incorporated.

Finally, I acknowledge the assistance of the Auckland College of Education Research Grants Committee and the Massey University Post Graduate Research Committee by making funds available to assist with the completion of the study.

Lucent in tenebris

Table of Contents

List of Tables

List of Figures **Page no.**

Part 1

Introduction

1 Chapter Introduction

1.1 Background

Drowning as a consequence of aquatic activity is a significant cause of unintentional death among young New Zealanders. Between 1980 and 1994, a total of 544 New Zealand youth and young adults in the 15-24 year age group died in unintentional drowning incidents (Langley, Warner, Smith, & Wright, 2000). Young males in the 15-19 year age groups had one of the highest age-specific rates of drowning-related deaths (7.9 per 100,000 person years) between 1989-1998 (Injury Prevention Research Unit, University of Otago, 2003). The drowning incidence for males dramatically rises in 15-22 year olds, whereas female deaths by drowning peak in the pre-school years (Child and Youth Mortality Review Committee [CYMR], 2005). In the decade from 1992-2001, approximately one half of the New Zealand youth drowning fatalities occurred during recreational activity (Water Safety New Zealand Drownbase™, 2004). Surf lifesaving rescue statistics illustrate the potential for even greater loss of young lives. In the five years between 1995-2000, young people between 10-19 years of age comprised the largest group of victims with a total of 2,363 youngsters rescued from the surf (Surf Lifesaving New Zealand, 2000). High rates of youth drowning and rescue however, are not confined to New Zealand. Young people between the ages of 15-19 years are consistently over-represented in the drowning statistics of most developed countries and, globally, drowning is the second leading cause of injury-related death among children and youth, exceeded only by deaths from motor vehicle incidents (Brenner, 2002).

The writer's many years of association with drowning prevention, both as a lifeguard at one of New Zealand's busiest and most dangerous west coast beaches and as a water safety educator and teacher, reinforce the urgent need to address the problem of youth drowning. Conversations with fellow lifeguards about rescue activity, informed by years of collective observation of public behaviour in the face of dangers associated with surf-related recreational activity, provided the genesis for this research. Many of these conversations focused on why youth were often the centre of rescue attention. It appeared that while many young people were able to

safely take on the challenges presented by the surf environment without endangering their lives, others were not. The latter often appeared to be ignorant of, or chose to ignore, water safety principles and practice, and consequently placed their lives and the lives of others (including lifeguards) at risk of drowning. When young rescue victims were questioned about the reasons why they had got into difficulty, some seemed to lack surf safety knowledge, others appeared to lack swimming competency, while still others claimed to have the necessary skills but had just underestimated the conditions. Of the latter, some even insisted that they had not been at risk of drowning and could have extricated themselves from the situations without the intervention of lifeguards. Observations such as these have led some lifeguards to the conclusion that many youth simply do not have the pre-requisite water safety skills and knowledge to cope with surf. Others preferred to believe that youth know about water safety principles and practice but choose to ignore them. Similar discussions about youth drowning risk with water safety educators generally indicated that lack of knowledge resulting in poor water safety attitudes and behaviours, was the primary cause of increased risk.

Some studies have suggested that a recent reduction in the incidence of youth drowning is the consequence of reduced exposure to risk brought about by decreased active recreation and the prevalence of passive forms of recreation such as video games, computer use and television watching, greater use of supervised aquatic sites, and reduced alcohol use (Smith & Howland, 1999; Langley et al., 2000). Others, especially rescue organisations such as Surf Life Saving Australia (2003) and Surf Life Saving New Zealand (2003) cite increased lifeguard vigilance, more effective rescue techniques and an increased incidence of rescue as a prime reason for the reduction in drowning fatalities. Brenner (2002) notes however, that studies supporting such hypotheses are lacking and other explanations such as decreased risk taking or improvements in swimming ability and water safety knowledge should also be considered. While such explanations seem entirely plausible, evidence to support such theory remains elusive. Comprehensive research on the formative role of water safety knowledge, attitudes and behaviours in the shaping of drowning risk associated with youth aquatic recreation remains to be done.

Even though youth have been identified as one of the most at-risk age groups for drowning in New Zealand (Langley et al., 2000; CYMR, 2005) and most other developed countries (Brenner, Trumble, Smith, Kessler & Overpeck, 2001, in the United States; Mackie, 1999, in Australia; Royal Society for the Prevention of Accidents [RoSPA], 2002, in Great Britain), the underlying reasons why youth appear to be at greater risk of drowning than other groups are poorly understood. This lack of understanding of the drowning phenomenon has led to frequent demands for more research on risk factors that contribute to youth drowning from within the field of injury prevention (Centre for Disease Control [CDC], 2002c; Harborview Injury and Prevention Research Centre, 2000; World Congress of Drowning Taskforce, 2002b). Two large-scale studies, the *Youth Risk Behaviour Surveillance System [YRBSS]* (CDC, 2002a) in the United States and *Youth 2000: A profile of their health and wellbeing* (University of Auckland, 2001) in New Zealand, have demonstrated that youth are an at-risk group in many health contexts such as sexual relations and drug abuse, but neither study currently includes drowning risk among the risk items surveyed. What was evident from both personal experience and research studies was that, while the circumstances surrounding youth drowning are quite well known and reported, many of the conclusions as to why so many youth get into difficulty in water remain speculative.

In New Zealand, the recently released National Drowning Prevention Strategy (2005-2015) provided a succinct statement of the problem confronting New Zealand. The report recognised the critical contribution that water safety attitudes, beliefs, and behaviours play in reducing drowning risk (Accident Compensation Corporation [ACC], 2005). It suggests that if the aim of the Strategy is to enable people to safely enjoy water-related activities and environments, water safety knowledge, attitudes and behaviours must become an important part of all aspects of water-related activity. Yet without valid and comprehensive information on what constitutes the water safety knowledge, attitudes and behaviours of young and old, drowning prevention initiatives such as the Strategy may prove to be of little worth. The Strategy acknowledges that setting realistic and meaningful targets to reduce drowning is not possible without information on the factors that increase a person's risk of drowning or detailed information on how many New Zealanders participate in diverse water-related recreation. Furthermore, the Strategy also acknowledges a lack

of New Zealand-specific research on water safety and drowning prevention that may inform national policy and practice. Accordingly, the Strategy identified the improvement of water safety knowledge through research and development as one of its four immediate objectives (ACC, 2005). Specifically, the document identifies areas for action that include "prioritising gaps in water safety knowledge and seeking ways to undertake research to increase our understanding and knowledge" and "improving our knowledge of risk factors such as . . . alcohol use and/or skill levels" (pp. 26-27).

In order to reduce the risk of drowning, many resources have been allocated to water safety education for children and youth (WSNZ, 1999; 2002a). A consensus exists among the water safety education community that the value of such education is axiomatic. Water Safety New Zealand, a collective of more than 40 water safety organisations, has as its mission statement, "Through water safety education, to prevent death by drowning" (WSNZ, 2005, p. 1). That the teaching of water safety knowledge and skills will shape positive water safety attitudes and perceptions, and lead to safe behaviour in, on and around water is central to such beliefs. Yet while investment in water safety education appears sound, the research-knowledge base that informs this practice is limited and knowledge of the factors and forces that place youth at greater risk of drowning than other groups is not founded on systematic, empirical evidence and knowledge.

1.2 Purpose of the Study

The thrust of the proposed study was to address gaps in our underlying knowledge of drowning risk and water safety with regard to youth participation in aquatic recreation in New Zealand. From the vantage point of being involved in water safety education at the top of the cliff and as a lifeguard at the bottom of the cliff, it seemed to the writer that to address these gaps in our understanding of youth drowning risk required a shift away from orthodox views of drowning risk. Consequently, this research stands in contrast to other studies on drowning prevention that address risk of drowning based on retrospective evidence of drowning incidence and the circumstances surrounding it. Such studies fail to take into account how people's understanding and practice of water safety critically shapes drowning risk. Therefore the purpose of this thesis was to gain a comprehensive understanding of the nature of youth aquatic activity and the knowledge, beliefs, attitudes and values of young people that may mediate the risk of drowning associated with that activity. In addition, this research would seek knowledge of the socio-cultural influences that might underpin youth water safety and thus help explain why some youth may be at greater risk of drowning than others.

The consequences of adopting a broader socio-cultural perspective of drowning risk is research that focuses not only on the explicit nature of youth aquatic recreation, but also on: (i) the practical and theoretical water safety knowledge base that informs the actions and thinking of youth; (ii) the attitudes of young people towards water safety and their perceptions of drowning risk and, (iii) their behaviour when taking part in aquatic recreation. Such a shift of emphasis also facilitates exploration as to what socio-cultural forces influence youth water safety knowledge, attitudes and behaviour. Currently, little is known about how socio-cultural factors such as schooling, family and peers help shape young people's understanding of drowning risk and practice of water safety.

To achieve this purpose, the research reported in this thesis had two aims. The first was to develop and apply a conceptual framework to explain drowning risk, based on personal experience and theoretical analysis, that incorporated the many contributory

factors believed to shape its construction, especially those attributes associated with water safety knowledge, attitudes and behaviours. Each of these attributes — water safety knowledge, attitudes and behaviours — taken separately appear important, but together it seems they provide for a very substantial part of the explanation as to why individuals drown during aquatic recreation and why some, particularly youth who are the subjects of this research, are at greater risk of drowning than others.

The second aim was to carry out empirical survey research that would provide baseline evidence of the many factors and forces in the lives of young people that influence the risk of drowning associated with participation in aquatic recreation. Such knowledge may be particularly valuable to those engaged in water safety education by indicating how and where water safety educational interventions might best be directed. In addition, a baseline study such as the one proposed might also provide a reference point for, and stimulus to engage in, further confirmatory studies to enhance our understanding of the vexed issue of youth drowning.

1.3 Theoretical Perspective on Drowning Risk

Previous discussion has indicated that the drowning risk associated with youth aquatic activity appears to be a complex and multifaceted phenomenon that is more than a reflection of exposure to risk as traditionally perceived (Michalsen, 2003). Central to this thesis is the notion that drowning risk is inextricably linked with what young people know, think and do, in relation to their safety, and the safety of others, around water. To justify that notion and demonstrate the necessity for the study, the following discussion reviews the literature that informs current understanding of drowning risk with regard to (i) youth aquatic recreation (ii) youth water safety knowledge, attitudes and behaviours (iii) socio-cultural influences on youth water safety and (iv) socio-demographic determinants of youth drowning risk and water safety.

1.3.1 The nature of youth aquatic recreation

Exposure to the danger of submersion in water that is inherent in any human activity in the aquatic environment is a pre-requisite condition for drowning to occur. Any increase in exposure to those dangers as a consequence of aquatic recreation has the potential to increase the likelihood of drowning. A first step to understanding drowning risk therefore requires a comprehensive knowledge of the nature and extent of youth aquatic recreation. Langley and Smeijers (1997) suggest that more young New Zealanders drown than their American counterparts mainly because of their greater exposure to water and higher levels of participation in aquatic recreation. While the popularity of aquatic recreation among New Zealand youth is well reported in general terms (Hillary Commission 1997a, 1997b, 1998, 1999; Reeder, Stanton, Langley & Chalmers, 1991; Sport and Recreation New Zealand [SPARC], 2002), little specific information is available on what youth do during that aquatic recreation.

Evidence from retrospective studies on drowning provides some clues about the circumstances surrounding youth drowning. Swimming has been identified in many studies as the activity most frequently engaged in prior to drowning (CYMR, 2005;

Langley et al., 2000; Quan & Cummings, 2003; Smith & Brenner, 1995). These studies also show that drowning as a consequence of swimming also takes place in a variety of settings. In the United States, Smith and Brenner (1995) reported that youth drowning most commonly occurs in natural bodies of fresh water, whereas the most common sites in New Zealand for the 15-19 year age group between 1980-2002 were rivers, offshore, surf beaches and lakes, in descending order of frequency (CYMR, 2005). Some studies have also found that much youth swimming activity is done at remote, unsupervised sites (CDC, 1992; Smith & Brenner, 1995).

While valuable, knowledge gained from drowning statistics does not fully describe the true extent of drowning risk. Using the analogy of an iceberg, Schuman, Rowe, Glazer and Redding (1977) suggest that drowning figures are but the tip of an iceberg underpinned by a much greater base of near-drowning and unreported life-threatening incidences. In order to more comprehensively understand the nature and extent of drowning risk therefore, knowledge of what youth currently do in their aquatic recreation is also required. In the case of swimming activity, knowledge is needed of where, how often, and with whom youth swim, whether they swim in supervised or unsupervised locations, or whether some youth are more likely than others to swim in safe or dangerous places. In addition, knowledge of the nature and extent of young people's participation in other popular New Zealand aquatic pastimes such as boating and surfing activities is also lacking. While recreational boating has been identified as a leading cause of death by drowning among youth (Langley et al., 2000), little is known about the frequency and extent of youth involvement in boating activity. Similarly, even though the surfing has long been identified as a popular youth sub-culture (Pearson, 1979), understanding of the circumstances surrounding its practice remains speculative.

Given these gaps in our knowledge, ascertaining the nature of youth participation in aquatic recreation appears to be the logical, and long overdue, first step towards increased understanding of the youth drowning phenomenon. Furthermore, providing a comprehensive account of young people's aquatic recreation also provides a relevant context for subsequent exploration of the influence of their water safety knowledge, attitudes, and behaviours on the risk of drowning associated with that activity.

1.3.2 Water safety knowledge, attitudes and behaviours (K-A-B)

In recent years, theoretical models of public health have emerged that view contemporary problems such as drowning from an ecological perspective (Sleet & Gielen, 2004). Such a perspective seems especially relevant to a study of drowning risk because it conveys the notion of multiple levels of influence operating at an intrapersonal, interpersonal and community level. Glanz and Rimmer (1995) identified three interrelated levels of influence. They include:

- an intrapersonal level that describes the influence of an individual's knowledge, attitudes and beliefs on behaviour,
- an interpersonal level that describes the influence of significant others such as families and friends, and
- a community level that describes the influence of organisations such as schools and churches.

Adopting such a perspective seemed particularly appropriate to a study of youth drowning because it might help explain the dynamics of the many inter-related factors and forces in young people's lives that influence drowning risk and water safety.

At the intrapersonal level of influence, several models of injury prevention have identified the mediating role of knowledge, attitude and behaviour in shaping the risk of injury (Callmer, Eriksson, Sanderson & Svanström, 1986; Svanström, 1987). Andersson (1999) notes that the K-A-P model (K = knowledge, A = attitude, P = performance) has been widely used in injury prevention based on the supposition that by influencing people's knowledge, their attitudes will change and so will their safety performance. The relationship between safety knowledge, attitudes, and performance (hereafter referred to as behaviour) however, has not been widely investigated, although Anderson (1999) notes that empirical findings indicate the relationship between knowledge, attitudes and behaviours is not straightforward. Svanström (1987) included K-A-B in a framework to evaluate safety interventions because they subsequently modified the risk condition, but noted that many problems arise when trying to find valid ways of identifying and measuring these components.

Not the least of these problems is determining what constitutes safety knowledge in the prevention of injury.

The protective role of knowledge factors such as swimming ability in the prevention of youth drowning is not well understood, even though swimming has long been advocated by swimming organisations as a way of promoting water safety and thereby reducing drowning risk (WSNZ, 1996, Royal Life Saving Society New Zealand, 1985). Some organisations have claimed that the recent reduction in drowning in developed countries is the consequence of targeted risk reduction interventions such as water safety education programmes in schools and in the community (New South Wales Water Safety Taskforce, 2001; RoSPA, 2002). The relationship between swimming competency, swimming lessons and the risk of drowning for young children has been the subject of some enquiry (Brenner, Moran, Stallman, Gilchrist & McVan, 2005), but little is known about this relationship in respect of adolescents. A systematic, large-scale review of childhood and youth drowning noted that even though a number of studies had shown that swimming lessons improved the ability to dive, swim underwater, breathe correctly, and tread water, no study had examined the more important question of whether swimming lessons actually prevented drowning and near-drowning (Harborview Injury Prevention and Research Centre, 2001). All of these capacities have some association with survival in water, but determining the protective capacity of swimming ability remains unclear. Ascertaining swimming ability among New Zealand youth might provide some indication of the protective capacity afforded by their being able to swim. In addition, and perhaps more importantly, analysis of swimming ability by self-estimation might provide some indication of possible expressions of over-estimation of that ability, a factor that has been associated with higher rates of drowning among males (Howland et al., 1996).

Others have suggested that the protective effect of being able to swim might be offset by the increased exposure to aquatic risk inherent in utilising that skill (Baker, O'Neil, Ginsburg & Li, 1992; Barss, 1995; Robertson, 1983; Smith, 1995), yet little documented evidence exists to confirm this relationship. Baker et al. (1992) go further and suggest that the ability to swim "could lead to overconfidence or to swimming in places with hazardous currents or undertow" (p. 183). Similarly,

Brenner, Saluja and Smith (2003) suggest that children and adults who are confident in their swimming abilities might be "more likely to swim in unsafe settings, such as remote natural bodies of water, in stronger currents or rougher surf, or alone" (p. 215). However, the contention by Baker et al. (1992) and Brenner et al. (2003) that swimming proficiency, and thus confidence in water, is a precursor for some individuals to engage in high-risk behaviour has not been demonstrated in previous studies. Evidence of a relationship between swimming ability and at-risk behaviour among youth would help confirm or refute such speculation and provide valuable insight into the nature of youth drowning.

Similarly, little is known about the protective role of other elements of water safety knowledge such as rescue and cardiopulmonary resuscitation (CPR) ability, or a theoretical understanding of water safety principles. The ability to perform a deep-water rescue and CPR skills may be important skills for young people because previous studies suggest that they often swim in unsupervised environments and some drown during rescue attempts (CDC, 1986, 2002a, 2002b, 2001; Smith & Brenner, 1995). On the assumption that New Zealand youth also are likely to engage in unsupervised aquatic activity, knowledge of their rescue and CPR skills may help inform understanding of drowning risk because possession of such skills might provide some immediate revival capacity in drowning emergencies (Brenner, 2002; Smith & Brenner, 1995; Wintemute, Kraus, Teret, & Wright, 1987). Traditionally, rescue and CPR skills have been taught within the swimming and lifesaving component of the Physical Education syllabus (Department of Education, 1980, 1987; Ministry of Education 1999), although recent evidence suggests a paucity of CPR training in schools (Lafferty, Larsen & Galletly, 2003) and the community (Larsen, Pearson, & Galletly, 2004). Further information is required to ascertain the extent of CPR understanding among young people and to ascertain whether failure to teach this life-skill has affected youth's preparedness to safely participate in aquatic activity.

Youth's theoretical understanding of water safety principles is perhaps the area of water safety knowledge that is least researched and understood. What little has been reported suggests that young people may be lacking a sound understanding of water safety principles. A longitudinal study of 162 high schools found that more than half

of the physical education teachers responsible for teaching aquatic education did not consider their Year 11 students adequately prepared (Moran, 1999b). These teachers also believed that the situation had worsened in the intervening 10 years between 1987-1996. Earlier New Zealand studies reported that the knowledge base that informs youth decision-making about their safety in water was, at best, tentative, and many students were poorly informed about water safety (Dukes, 1985, 1987). A lack of boat safety knowledge was also evident in a national survey of Year 4 and Year 8 pupils (Crooks & Flockton, 1999).

Overseas studies have also suggested that lack of knowledge and experience among youth were strongly associated with increased boating fatalities (Molberg, Hopkins, Paulson & Gunn, 1993). Other studies have shown that youth are not aware of the dangers of swimming in rivers or lakes (Bennett, Quan, & Williams, 2002) or of the dangers of mixing alcohol with aquatic activity (Orlowksi, 1987, 1989). Evidence of gaps in the knowledge of young New Zealanders might indicate which youth were at greater risk in the aquatic environment. In addition, knowledge of the strengths and weaknesses of youth understanding of water safety principles and practice might also indicate where educational initiatives may be best targeted. Specifically, ascertaining what youth know about small boat safety and surf safety may be especially relevant since boating and swimming have been identified as leading causes of drowning among youth (Langley et al., 2000), and because the beach and surfing are widely associated with youth culture (Lencek & Bosker, 1999; Pearson, 1979).

In spite of a widely held belief that attitudes influence, and often predict, behaviour (Bohner, 2002), the influence of what youth think about water safety and drowning risk and its subsequent, if any, impact on behaviour in the aquatic environment has not been well investigated. Attitudes are defined as “a relatively enduring organisation of beliefs around an object or situation pre-disposing one to respond in some preferential manner” (Rokeach, 1986, p. 112). Water safety attitudes are considered important to the construction of drowning risk because they serve both motivational and cognitive functions by providing a frame of reference for organising information (Aiken, 2002). They are thus likely to be closely associated with knowledge. However, the belief systems underlying youth water safety are likely to be less enduring and well informed than those of the adult population.

Unsafe attitudes might thus be more prevalent among youth than adults and consequently increase drowning risk. In addition, because attitudes are considered to be tendencies to act with some degree of favour or rejection towards an intended outcome (McGuire, 1985), water safety attitudes might also have a strong association with water safety performance or behaviour. Unfortunately, the nature or extent of negative water safety attitudes among New Zealand youth, and the association between negative attitudes and subsequent at-risk behaviours have not been the subject of investigation.

Youth perception of drowning risk is poorly researched and understood even though risk perception is often viewed as playing a central role in motivating adolescents' behaviour (Millstein & Halpern-Felsher, 2002). Identifying differences in drowning risk perception among youth, along with differences in knowledge and attitudes, might offer strong explanatory evidence as to why some youth are at greater drowning risk than others. This might be especially true of young people since it is a commonly held belief among adults that many adolescents are unable to judge risks accurately (*ibid*). Even though judgment of risk is considered to be an essential element of decision-making competence (Gittler, Quigley-Rick & Saks, 1990; Hodne, 1995), the role of risk judgment in relation to youth drowning is poorly understood. Although there is little evidence currently available to prove poor risk judgment, some studies have claimed that males are more likely to drown than females as a consequence of overestimating their ability and underestimating risk (Baker et al., 1992; Howland et al., 1996; Schuman et al., 1977).

Adolescents have been widely recognised to be at greater risk than others of adverse health outcomes (such as drowning) as a consequence of their indulgence, intentional or otherwise, in at-risk behaviours (DiClemente, Hansen & Ponton, 1996). Even so, not a great deal is known about the nature and extent of that at-risk behaviour in the aquatic environment. During youth aquatic recreation, at-risk behaviours (such as swimming alone, swimming outside surf patrol areas and the non-wearing of lifejackets) may nullify or override protective safety factors (such as expert supervision, swimming skill and water safety knowledge) and dispose some youth towards greater risk in the aquatic environment. Some evidence from overseas studies has demonstrated the prevalence of at-risk behaviours in relation to

swimming alone (CDC, 1992; Smith & Brenner, 1995), boating (Howland et al., 1996), alcohol consumption during aquatic activity (Orlowski, 1987; Smith et al., 2001), but little is known about the behaviour of New Zealand adolescent youth. One recent study of 21-year-old young adults from Dunedin did find that one fifth of males had consumed alcohol prior to aquatic activity or never worn a lifejacket when boating (Gulliver & Begg, 2005). The extent of such at-risk behaviours among the younger 15-19 year age group in boating or other areas of aquatic activity however, remains unknown. Anecdotal evidence based on the writer's frequent observations of dangerous play in the surf suggests such risky behaviour among youth in other aquatic settings is likely to be equally commonplace, but further empirical evidence of the nature and extent of such behaviour is required.

In addition to not knowing about the nature and extent of youth at-risk behaviour, the role of water safety knowledge and water safety attitudes in mediating at-risk-behaviours is also poorly understood. Comparisons between at-risk behaviours during youth aquatic recreation and their associated knowledge, skills and attitudes might provide indication of the strength, or otherwise, of the complex relationship between safety knowledge, safety attitudes and safe behaviours alluded to by Andersson (1999) in previous discussion. Such is the lack of clarity about the relationship between safety knowledge and its contingent effects on attitudes and behaviours that some studies have questioned the value of safety education programmes aimed at modifying risky behaviour (Baker & Dietz, 1979; Coleman, Munro, Nicholl, Harper, Kent & Wild, 1996; Roberts, Smith & Bryce, 1993; Wright, Rivara & Ferse, 1995). Baker and Dietz (1979) even challenge the value of safety knowledge itself as a form of prevention by claiming that many injuries result less from the lack of knowledge or skill than from the failure to apply what is known. Whether this is the case with New Zealand youth remains unclear because so little is known about their knowledge of water safety or any subsequent failure to apply that knowledge during aquatic activity.

1.3.3 Formative socio-cultural factors influencing youth water safety

The formative role of socio-cultural factors on youth understanding of water safety is another area that may shed light on the future likelihood and current high incidence

of drowning. Among many possible significant others that operate at an interpersonal and community level in young people's lives, the influence of peers on the water safety knowledge, attitudes and behaviours was considered particularly important. Previous studies have shown that youth spend half as much time with their parents as they spend with their peers (Brown, 1990; Savin-Williams & Berndt, 1990). It might be that the formative influence of peers and peer norms is greater than that of parents, schooling, or past experience in the shaping of water safety and drowning risk, but evidence is needed to substantiate such claims. Current evidence of the role of peers from studies of other youth health risk behaviours is equivocal. While peers are often blamed for the onset of risk behaviours such as cigarette smoking (Evans, Dratt, Raines, & Rosenburg, 1988) and illegal drug use (Jenkins (1996), other studies have found that friends may protect adolescents from risk (Ennett & Bauman, 1994; Maxwell, 2002). Little is known however, about the influence of peers on the youth drowning risk, especially the extent to which youth understanding of water safety is informed by peers, the extent to which peers encourage risk practices, and the extent to which at-risk behaviours are the social norm among peer groups during aquatic activity.

Equally so, little is known about family input into youth water safety, the extent to which families inform youth understanding of water safety, and the extent to which they supervise, regulate, or encourage safe participation in aquatic activity of their children. Some evidence from pediatric exercise science suggests that parents exert considerable influence on their child's physical activity behaviour (Brustad, 1993, 1996; Taylor, Baranowski & Sallis, 1994; Welk, Wood & Morss, 2003). Whether such influence extends to safety considerations associated with specific forms of activity such as swimming and other aquatic recreational activities is less well understood.

Personal experience of a life-threatening incident and its subsequent effect on youth understanding and practice of water safety has not been the subject of study. Some studies have considered the aversive impact of previous experience of a life-threatening submersion incident on water phobia (Graham & Gaffan, 1997; Poulton, Menzies, Craske, Langley & Silva, 1999), but little is known about how such experience might shape the subsequent practice of water safety. Other studies have

investigated unreported submersion incidents as an indication of the true extent of the drowning phenomenon (Schuman et al., 1977; Smith & Brenner, 1995), although no previous studies have investigated the extent of unreported submersion incidents among New Zealand youth. Gulliver and Begg (2005) provided some evidence of the roles of risk exposure, protective factors and at risk behaviours in self-reported submersion incidents, but their subjects were 21-year-old young adults and they were not questioned about any subsequent effect of the experience on their current participation. While it might appear self-evident that youth understanding of water safety would be affected by their experience of a life-threatening experience, little is known about (i) the frequency and extent of such incidences, (ii) the impact of such experiences on continued participation in water-based activity and (iii) whether such experience helps shape positive or negative water safety attitudes and behaviours.

At a community level of influence, education and schooling may be important contributors to youth water safety and drowning risk because of a long history of swimming and lifesaving teaching in the New Zealand school curriculum (Moran, 1999a) and the extensive current teaching of aquatics education in New Zealand schools (WSNZ, 1996; Royal Life Saving Society New Zealand, 1985; Moran & Stanley, 1991a, 1991b; Moran, 1996, 1999). In spite of the widespread promotion of aquatics education however, little is known about youth perceptions of education and schooling to their understanding of water safety. Some evidence exists about school water safety education from a provider perspective (Moran, 1999b, 2002; WSNZ, 2002c), but little is known about how youth perceive the relevance of school programmes in informing their understanding or practice of water safety. In addition to identifying gaps in the provision of water safety education that may account for differences in drowning risk among youth, further research on how youth view the role of schools and other community organisations might also provide some insight into ways of best addressing youth drowning prevention through education.

1.3.4. Social demographic variables

Three key demographic variables — gender, socio-economic status and ethnicity — have been identified by the Task Force of the World Congress on Drowning established in 2001 as having an important influence on the youth drowning

phenomenon. Gender has been identified as one of the prime determinants of drowning incidence both globally (World Health Organisation (WHO), 2003; Task Force of the World Congress on Drowning, 2001, 2002a, 2002b) and nationally (Langley et al., 2000; Water Safety New Zealand, 1999, 2002a). Some studies (notably Langley & Smeijers, 1997) have suggested a higher incidence of drowning among males as a consequence of greater participation in aquatic recreation, while others (notably Howland et al., 1996) have identified a propensity among males to overestimate ability and underestimate risk. While the impact of gender on drowning incidence has been well reported, differences in the water safety knowledge, attitudes and behaviour on drowning risk have not. Such evidence may help explain why males appear to be at greater risk than females in the aquatic environment.

Ethnicity has also been identified as a prime variable with regard to risk exposure and drowning incidence (Task Force of the World Congress on Drowning, 2002a, 2002b). Brenner, Saluja and Smith (2003) have argued that increased swimming ability is almost certain to be protective in a drowning situation and, if this is the case, then differences in swimming ability among ethnic groups may help explain why some youth are at greater risk of drowning. In New Zealand, the influence of ethnicity on drowning risk is not well understood. Langley et al. (2000) have suggested that the indigenous Maori may be at greater risk of drowning because they are more likely to participate in cultural activities such as shellfish gathering. The same might be said of other Polynesian minority groups (hereafter referred to as Pasifika) who also share similar cultural affinities to the sea and *kaimoana (*seafood). In addition, the high frequency of incidence of Asian peoples (notably those from Korea) in fishing fatalities (SLSNZ, 1996) suggests their predisposition to greater risk of drowning. How ethnicity influences drowning risk in an ethnically diverse youth population such as New Zealand's has not been well investigated, and study of its possible impact on water safety knowledge, attitudes and behaviours may provide important clues as to why some youth are at greater risk of drowning than others.

Little is known about the role of socio-economic status on drowning or rescue incidence in New Zealand partly because such data is not recorded in drowning or rescue statistics. Ascertaining what influence differences in socio-economic status might play in the drowning phenomenon is also problematic because it is an ill-

defined term that often includes such variables as education, occupation, income and socio-cultural milieu (World Congress on Drowning Taskforce on the Epidemiology of Drowning, 2002a, 2002b). Even though socio-economic status may present difficulties in definition and measurement, it may be an important influence on drowning risk. Higher drowning rates among youth in low per capita income areas have been reported in one US study, with greater exposure to unsupervised sites and less access to protected sites cited as possible reasons for the disparity (Baker, O'Neil, Ginsburg & Li, 1992). Even though New Zealand may be a less socio-economically diverse society than the US, differences in socio-economic status may be reflected in differing levels of recreational aquatic activity, the use of supervised sites, the availability of safety equipment, or the opportunity to receive paid swimming and safety instruction, but no evidence is available to substantiate or refute such claims.

In summary, a review of literature on youth drowning has highlighted gaps in current knowledge of youth drowning risk. Retrospective evidence from studies on drowning incidence provided some indication of the exposure to risk and the circumstances surrounding youth drowning. Detailed knowledge of the current nature and extent of aquatic recreation among New Zealand youth in particular, remains elusive. Equally elusive is research evidence at the intrapersonal level on the role of water safety knowledge, attitudes and behaviours in shaping the risk of drowning associated with that recreational activity. Furthermore, knowledge of socio-cultural factors that might influence youth understanding of water safety at an interpersonal and community level is also lacking. In addition to identifying gaps in knowledge of youth drowning, the literature review also provided some indication that drowning is indeed a complex and multifaceted phenomenon (Quan, 1999). Viewing risk of drowning from an ecological perspective, as posited by Glanz and Rimmer (1995) however, provides an appropriate theoretical view of the complex interaction of factors and forces operating at an intrapersonal, interpersonal and community level, as they seem to influence youth risk of drowning. The following section describes how a multilevel framework was developed to conceptualise the multifaceted nature of drowning risk in order to address the gaps in knowledge identified in the review above and enhance understanding of youth drowning.

1.4 Conceptual Framework

As a consequence of the previous theoretical discussion on youth drowning, a multilevel framework was developed to conceptualise the multifaceted nature of drowning risk and demonstrate the complexity of factors and forces that needs to be taken into account when attempting to understand the phenomena of youth drowning associated with aquatic recreation in New Zealand society. Figure 1 is a diagrammatic representation of drowning risk, viewed floating in an aqueous environment and underpinned by a host of factors that dispose youth to danger or safety during their recreational activity in that aquatic environment. Overall, Figure 1 shows that drowning is linked systemically with layers of variables such that any change in one layer may influence what happens in another. The lines between the first three tiers are broken to indicate that the links between variables and between layers are tentative and claims for association within the construct are modest, further reflecting the complexity of drowning risk (adapted from Adams, 1995).

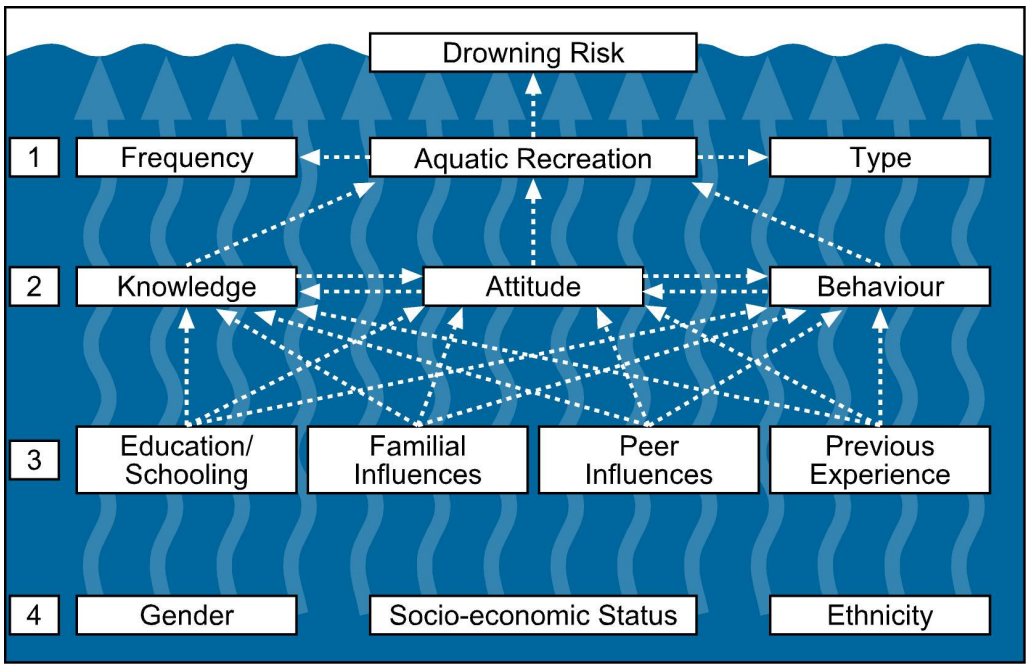

Figure 1. Factors influencing the risk of drowning among youth as a consequence of their participation in aquatic recreation.

Figure 1 illustrates the writer's conceptualization of the many inter-related water safety factors that the literature and his experience indicated contribute to the high probability of some young people drowning as a consequence of aquatic recreation. Drowning risk, the probability of an untoward and potentially fatal event in the aquatic environment, is located at the top of the framework. The factors that influence drowning risk are arranged in four underlying levels. They include:

1. A first level that identifies the nature and extent of youth aquatic recreation, described in terms of type of activity engaged in and the frequency of participation;
2. A second level that collates those intrapersonal influences that relate to youth understanding, perceptions and practice of water safety. Water safety knowledge includes swimming, rescue and CPR skills, and a theoretical understanding of surf and boat safety. Water safety attitudes includes perceptions of drowning risk and opinions on water safety, while behaviour includes performance of safe and unsafe behaviours during swimming and other aquatic activities;
3. A third level that collates the socio-cultural factors that other studies and the writer's experience suggest underpin the safety knowledge, attitudes and behaviours identified in the second level. They include familial influences, peer influences, education and schooling influences, and previous experience; and
4. A fourth and final level of the framework that groups the demographic variables that may influence all the three previous levels. These include the independent variables — gender, socio-economic status and ethnicity — that were thought to be important determinants of drowning risk. This fourth aspect is linked to the levels above by a series of wavy lines in Figure 1 to indicate that these demographic variables in fact permeate the whole conceptual framework.

1.5 Research Design

The purpose of the study was to examine the complex relationship between drowning risk and water safety in the context of young people's participation in aquatic recreation in New Zealand. In order to achieve this purpose, a conceptual framework (as discussed in the previous section) was used to identify a range of intervening and independent variables that may influence youth drowning risk and water safety. Based on the variables identified in the conceptual framework, questions for a survey of New Zealand youth were devised (see section 2.2, Chapter 2 for details). The intent of the survey was to provide baseline data on the aquatic knowledge, attitudes, and behaviour of New Zealand youth as well as aspects of their socio-cultural background.

Survey design was chosen because it was capable of providing a quantitative or numeric description of relevant information from a representative sample of the population. This was done through a data collection process of asking youth questions about their aquatic activity, their water safety knowledge, attitudes and behaviours, and factors that influenced their understanding and practice of water safety. The data collected in this baseline survey enabled the researcher to generalise the findings from the sample of responses to the youth population in order to enhance understanding of youth drowning risk and water safety.

The survey study was cross-sectional in nature for three reasons. Firstly, a cross-sectional study provided the temporal location for a foundational study that attempted to establish a relationship between drowning risk and water safety as posited in the conceptual framework. Secondly, a cross-sectional survey served as an initial reference point for further confirmatory longitudinal or in-depth qualitative studies about youth drowning risk and water safety. Thirdly, a cross-sectional survey generated a large amount of information from a representative sample in a relatively short space of time and within the limited budget available. This economy of design was particularly relevant because, as a baseline study, it was important that the data were sufficiently rich to provide a comprehensive snapshot of what youth knew, thought and did in relation to aquatic recreation.

The size and composition of the sample required careful methodological consideration to ensure that the survey sample yielded evidence that was robust and applicable to the New Zealand youth population as a whole. A multistage sampling design that used schools as the first point of access was the preferred design because of its capacity to provide a representative sample of young people. The second stage in the procedure required systematic random sampling of students within selected schools. The population studied was confined to Year 11 school students because it corresponded with a time when this cohort were entering one of the most at-risk age groups for drowning, the 15-19 year age group. In addition, Year 11 was chosen as the most representative year of this group because it was least likely to be affected by school leavers. Year 12 and 13 students were not considered for inclusion because of anticipated reluctance of schools to engage senior students in the survey. The consequence of confining the study to Year 11 was that the sample comprised mainly of students in the middle phase of adolescence (14-16 years) and included only some late adolescents (17-21 years). It thus may not be wholly representative of the 15-19 year age group that is the focus of many youth drowning studies (World Health Organisation [WHO], 2003; Harborview, 2000, 2001a, 2001b; Centre for Disease Control [CDC], 2001, 2002b, 2002c).

A stratified random sampling frame was the preferred method of sampling because of its ability to reduce normal sampling variation (Fowler, 1988; Babbie, 1990). The sampling frame was based on schools by type – coeducational, single sex male, single sex female – and by geographical location – Greater Auckland, Other North Island, South Island. This framework was similar to one used by Crooks and Flockton (1999) for a large-scale, cross-sectional study of the Health and Physical Education curriculum of New Zealand schools. The Ministry of Education schools rolls, obtained from the Data Management Unit (DMU), provided the database from which to select possible schools to participate in the study. This database also contained information on school decile ratings that could be used as a proxy measure of socio-economic status for data analysis purposes.

A number of logistical considerations guided thinking on the most appropriate size of the sample. These included: the large number of variables under study; the large amount of data that would be generated; the cost of extensive data entry and the need

for rapid turnaround in data collection. Given these constraints, a sample size of approximately 2,000 students, or 4% of the Year 11 school population, was considered appropriate because the database generated from such a sample size would confidently allow inferences to be made at a population level about youth drowning risk and water safety.

A new survey instrument needed to be constructed because the study was foundational and many of the variables identified in the conceptual framework previously had not been studied. Creating a new survey instrument resulted in considerable preliminary testing of the instrument in order to establish its validity and reliability. The survey instrument also required extensive cognitive testing during its development phase in order to ensure the appropriateness of its content. The consequence of these demands was the necessity for an extended series of pilot studies prior to the commencement of the main study.

A self-completed, supervised, written questionnaire that could be completed in a normal class period was chosen as the most appropriate form of survey instrument. The advantages of using a questionnaire of this design were: completion of a large number of surveys in a relatively short space of time with no delay in returns; relatively low cost supervision and administration; minimal disruption to the normal school timetable; a standardised environment in which to complete the survey; reduced respondent error and minimal influence of peers or school staff on student responses as a consequence of employing trained and independent supervisors to conduct the survey.

In choosing to use a self-completion questionnaire as the survey instrument, several important methodological implications had to be addressed. The survey study, in using a self-completion questionnaire for its data gathering, was subject to respondent reactivity. Measurement error may have been produced by respondents' inability to recall accurately, a lack of truthfulness, the instability of their opinions and attitudes, and by ambiguity of question interpretation. To counter the possible impact of memory decay, students were asked to report on aquatic activity and behaviour in the past year only, a strategy recommended as a way to reduce inaccuracy in respondent recall (Fink, 1995a). In addition, questions were structured

so that respondents could select from lists of possible responses to make recall easier. The use of closed questions with forced responses may have limited some student responses regarding their drowning risk and water safety. To overcome this potential shortcoming, many questions included an open category so that students could respond outside the prescribed response categories. Reliance on student honesty to accurately report water safety behaviours was a major concern, given the level of maturity of the respondents and the degree of social undesirability associated with at-risk water safety behaviour. This was addressed in two ways. Firstly, participation in the survey was voluntary and anonymous, thereby reducing any sense of threat or compulsion in honestly reporting at-risk behaviour. Secondly, questions related to behaviour were carefully structured so as to minimise any suggestion that students might be judged on their reporting of any at-risk behaviour.

The use of a self-completion questionnaire raised another methodological consideration, that of the value of the self-report information in injury prevention research (Robertson, 1992). The use of a self-completion questionnaire did not allow direct measurement of behaviour although, as Babbie (1990) points out, survey research is frequently used to indirectly report on behaviour through questions that relate to self-reported practice. Self-reported data also were used to assess students' water safety abilities and perceptions of risk. As was the case with behaviour, use of survey research precluded any field measurement of pupil practical skills (such as swimming ability) to substantiate students' self-reported estimation of their practical and theoretical water safety knowledge. While acknowledging the potential inaccuracy of self-report information (Howland et al., 1996; Robertson, 1992), reliance on such data in this study is justified on the basis that this initial examination of youth drowning risk and water safety is primarily an exploration of subjective constructs such as student perceptions of drowning risk, water safety knowledge, attitudes and behaviours.

The survey questionnaire had to be sensitive to the variable levels of maturity that typify the adolescent age group who were the subjects of the study. Because of this, the questionnaire needed to be simply and clearly written so as to make sense to a representative sample of Year 11 students, whose levels of understanding and background of water safety and drowning risk might vary considerably. In addition,

because the selected age group was adolescent, the survey needed to minimise any sense of threat or authority that might result in hostile or inappropriate responses, especially with regard to questions about at-risk behaviour.

The questionnaire also needed to accommodate variable levels of literacy because participation in the survey required written rather than verbal responses. It was anticipated that the sampling process used to select participants would present all levels of intellectual ability and would also include many new arrivals in New Zealand for whom English was not their first language. This placed further emphasis on the need for questions to be simply and clearly written, but also supported the use of closed questions that used forced responses. This strategy was more likely to provide all students (but especially those students with limited understanding of the written word) with clear direction on how to answer the questions.

Conditions under which students completed the survey also required careful consideration. To ensure that students completed the questionnaire independently, without assistance and in survey conditions that were consistent, it was decided to administer the survey to classroom size groups during school time and under supervision. It was anticipated that the use of trained supervisors to guide students through the relatively long questionnaire would reduce student error by assisting students to complete all questions and help answer student queries about specific questions. In addition to providing more meaningful data by reducing respondent error, it was also expected that this process would speed up the data-gathering phase of the study by reducing the need for time-consuming follow-up procedures to collect completed questionnaires. The use of external supervisors also reduced the possibility of students being unduly influenced by peers or school staff. One consequence of providing a supervised environment for the completion of the survey was the need to ensure that supervisors were professionally capable of administering the survey in classroom conditions to a group of adolescents. To facilitate strict and standardised supervision of the survey, supervisors therefore required training to develop their understanding of the survey contents and procedures prior to visiting the participating schools.

Another important methodological consideration was that the survey data would need to be amenable to standard descriptive statistical analysis in order to reveal both commonality and variability of the many variables that were posited in the multifaceted conceptual framework used to explain youth drowning risk and water safety (see Figure 1). Systems were required that allowed for the efficient handling of large quantities of data because it was a large-scale, empirical study intent upon establishing extensive quantitative baseline information about youth drowning risk and water safety. Specifically, data coding systems were needed that would minimise the chance of error in data entry when producing a database that would eventually consist of 240,000 entries from approximately two thousand cases and more than 120 data fields. These requirements were met by developing structured responses to questions that allowed the use of: standardised numerical coding for questions related to student aquatic activity and behaviours; scaled Likert-type responses for questions on water safety attitudes; open-ended questions on water safety knowledge that required minimal need for expert interpretation; and analysis of data using standardised statistical procedures. To ensure that responses were interpreted correctly and that data were entered accurately on to a database, personnel with data entry abilities were trained in the use of a data coding system and supported by a data entry manual designed for the data entry phase of the study.

Careful consideration also was given to the amount of time and expertise required to interpret responses prior to data entry. This meant that the inclusion of questions that were complex, open-ended and needed expert interpretation would be limited by constraints of time, available expertise and costs. It was anticipated that questions related to youth understanding of water safety knowledge might prove particularly problematic in this regard. Consequently, open-ended questions requiring expert interpretation were limited to analysis of water safety knowledge. Furthermore, in the interest of consistency, it was decided that only the main researcher would evaluate these questions.

1.6 Summary

In summary, youth drowning was identified as a significant cause of unintentional death among young New Zealanders (section 1.1). It was the purpose of this study to help explain why this might be, and probably is, the case (section 1.2). The risk of drowning, when viewed from an ecological perspective, was conceptualised as a complex and multifaceted construct that was the product of many contributory influences operating at intrapersonal, interpersonal and community levels. A review of literature on youth drowning, reinforced by the writer's personal experience of drowning prevention, identified gaps in current knowledge of water safety factors that might contribute to an understanding of the high risk of drowning associated with youth aquatic recreation (section 1.3). A conceptual framework that identified and located possible contributory factors to youth drowning risk as a consequence of aquatic recreation was devised (section 1.4). A foundational empirical study that utilized a cross-sectional survey research design was conceived to address shortcomings in current knowledge of the complex nature of youth drowning (section 1.5). A self-completed, supervised, written questionnaire was the chosen survey method because it was capable of providing the quantities of data expected to be generated for a large-scale, empirical study. Because many of the factors identified in the conceptual framework had not been previously studied, a new survey instrument was developed and piloted.

As a consequence of the theoretical and methodological deliberations described in this chapter, a research method was devised to investigate the phenomenon of youth drowning and the role of water safety knowledge, attitudes and behaviours in shaping drowning risk among New Zealand youth during aquatic recreation. The research method is discussed in detail in Chapter 2.

2 Chapter Method

2.1 Introduction

Chapter 1 provided a theoretical perspective on the problem of youth drowning and a conceptual framework within which to conceive and design the research of the thesis as systematic survey research. As the chapter explained, a survey research design was the preferred form of design for two main reasons:

1. It was consistent with conceptualizing the research as multifaceted and in multiple layers characterised in the framework as inter-related levels of variables and factors associated with youth drowning risk, and
2. It enabled the collection of data and information, associated with each layer, in a way that is efficient, affordable and able to encompass the diversity of demographics considered likely to be relevant to understanding drowning and drowning risk among youth.

The following key steps comprise the methodological processes employed in the study and make explicit how the survey methods were derived from, and correspond with, the purpose of the study and the contents of the conceptual framework. The steps were to:

1. Design the survey research instrument, a survey questionnaire, to comprehensively capture the range and depth of data and information required to encompass all the factors and variables in each level of the conceptual framework;

2. Pilot test the questionnaire to (i) establish its fitness for purpose, encompassing validity and reliability, (ii) demonstrate its capacity, using a standardised format, to generate answers in a form that can be analysed yet does not limit student responsiveness, and (iii) show that it accommodates, and is responsive to, differing levels of literacy and maturity likely to exist among the respondents;

3. Devise and implement a system and strategy to administer the questionnaire including determination of sample, selection of schools, and meet the (Massey

University) ethical requirements associated with doing research with human subjects, notably with minors in socially sensitive areas such as alcohol use;

4. Implement the system and strategy nationwide to collect the data and store it electronically ready for analysis; and

5. Construct the data processing and analysis methods and processes, the strategy for using them and for evaluating their use, and the strategy required to report results.

To accomplish its purpose of reporting and explaining the research methods used in the study, chapter 2 is organised in 5 sections, which correspond with the five processes identified above. A summary section at the end comments on the scope of the data and information collected and analysed.

2.2 Development of the Survey Questionnaire

The process of questionnaire development and validation are described in the following two sections that discuss the following steps:

- Development of draft questions on youth exposure to drowning risk as a consequence of aquatic recreation, youth water safety knowledge, attitudes and behaviour and socio-cultural influences on water safety and drowning risk;
- Cognitive testing of draft questions in an initial pilot study of Year 11 students to assess appropriateness of questions and questionnaire design;
- Redevelopment of the questionnaire and testing in a second pilot study to ascertain student responses to the modified questions;
- Final testing of the questionnaire in third and fourth pilot studies to establish questionnaire reliability and test data processing procedures, and
- Review of the questionnaire by an expert panel to establish content validity.

The survey questionnaire was based on a review of large-scale studies of youth risk including the *2001 Youth Risk Behaviour Surveillance Survey* [YRBSS] (CDC, 2002a), *Measuring Violence-related Attitudes, Beliefs and Behaviours among Youths* (Dahlberg, Toal & Behrens, 1998) and the *Young Males and Risk Taking Project* (Norton & Lam, Injury Prevention Policy Unit, NSW Health, 1999). Questionnaire development was informed by discussion with peers in the field of drowning prevention from national organisations (Water Safety New Zealand, Surf Life Saving New Zealand) and regional organisations (Injury Prevention Research Centre, University of Auckland; Watersafe Auckland).

The conceptual framework discussed in chapter 1 (see Figure 1), and reproduced as a thumbprint in Figure 2, initially identified youth drowning risk in terms of exposure to risk as a consequence of aquatic recreation. Figure 2 shows that aquatic recreation was divided into two categories: swimming activity and aquatic recreation activity that did not have swimming as a primary objective. Four forced response questions on frequency and type of activity, and with whom they had participated, were designed to generate descriptive data on the nature of youth aquatic recreation.

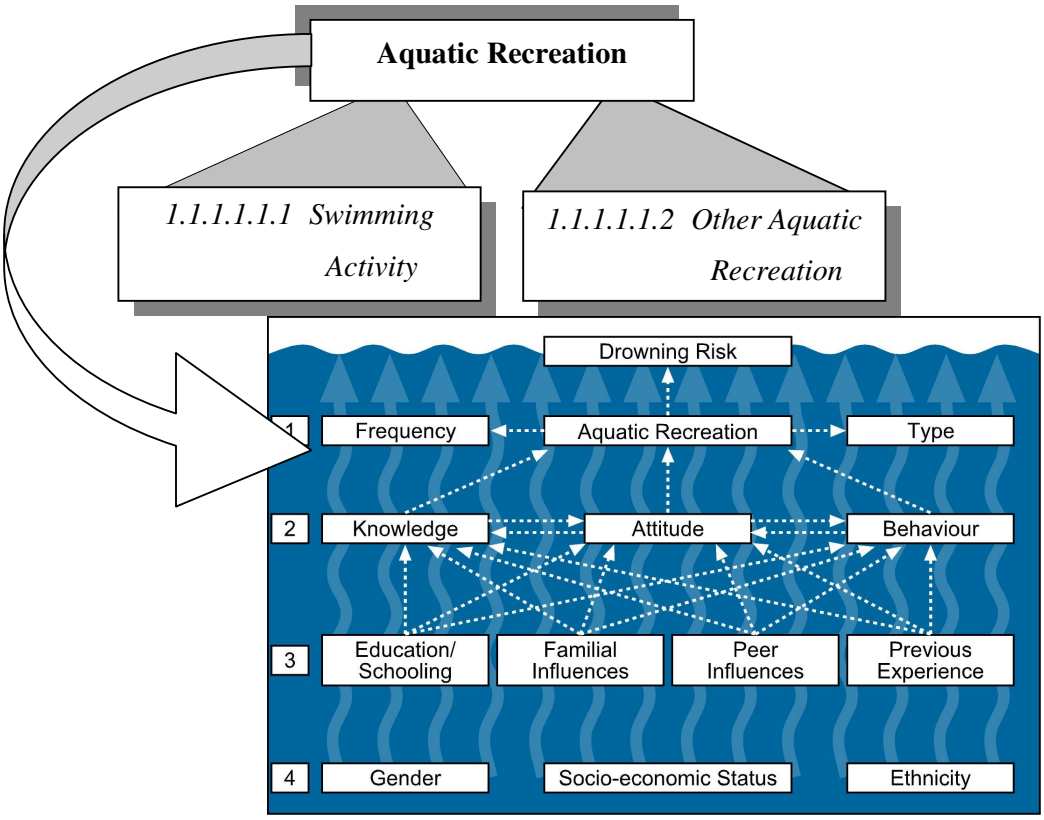

Figure 2. Survey questions on exposure to drowning risk by frequency and type of activity and their relationship to the conceptual framework reproduced from Figure 1.

Two questions on how frequently and where swimming activity took place, and with whom they swam, were included in the questionnaire (see survey questions 9-10, Appendix 1). The questions were similar to those included in the 1992 YRBSS survey of American youth that also used a 12-month recall period, varying swim locations and an ordinal scale of frequency response (Waxweiler, Harel & O'Carroll, 1993). Two questions on other forms of aquatic recreation were designed in a similar way to elicit information on frequency and type of aquatic activity, and who accompanied them during the activity (see survey questions 12-13, Appendix 1). Questions on swimming and aquatic recreation participation and behaviour, water safety abilities, attitudes and risk perceptions were structured to elicit ordinal rather than scalar data. For swimming and other aquatic activities, four response categories with numerical descriptors of frequency that ranged from *never*, *not often (1-9 times)*, *quite often (10-19 times)* and *very often (20 times+)* were included to describe student participation in aquatic activity. The reason for this was that in initial testing, students had difficulty recalling precisely how many times they had

participated in activity in the previous year. The consequence of employing this response structure was to limit the interpretation of data to non-parametric methods of statistical analysis.

Questions on youth water safety knowledge, attitudes and behaviours as identified in the second tier of the framework are illustrated in Figure 3. Figure 3 shows that five questions on water safety knowledge were developed in relation to swimming, rescue and CPR ability, and cognitive understanding of boat and surf safety. Figure 3 also shows that two questions related to drowning risk perception and water safety opinions were developed to test attitudes; and two questions related to recall of swimming and other aquatic recreation at-risk activities were developed to test behaviours.

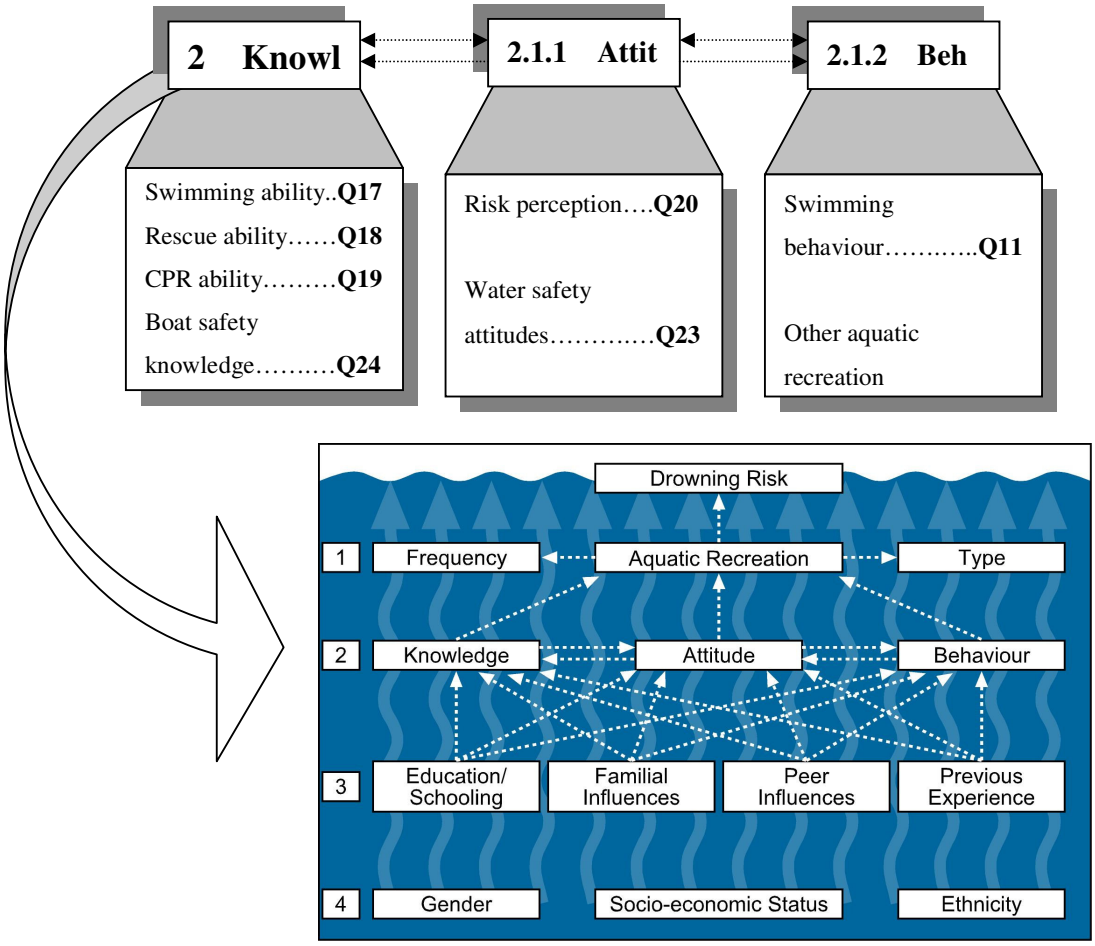

Figure 3. Survey questions on water safety knowledge, attitudes and behaviours (K-A-B) and their relationship to the conceptual framework reproduced from Figure 1.

Water safety knowledge of respondents was investigated in terms of practical aquatic skills and theoretical understanding of water safety principles. Practical competencies included swimming, rescue and CPR ability (see survey questions 17-19, Appendix 1). The forced response question on swimming ability was structured to elicit self-estimates of distance swum from seven categories that ranged from non-swimmer to being able to swim more than 400 m nonstop in a 25 m pool. The questions on rescue ability and CPR ability also sought self-estimates of student ability to perform the skills using four categories that ranged from no ability to expert ability.

Cognitive understanding of water safety relating to small boat safety and surf safety knowledge was included because of the popularity of boat- and surf-related activities among youth (see survey questions 24-25, Appendix 1). Each question consisted of three parts that focused on identification of hazards, risk management and safety practices. They included photographs of aquatic scenes and were designed to stimulate student response to two imaginary scenarios that required them to demonstrate their understanding of boat and surf safety. They were modeled on questions on water safety used in a national monitoring review of the Health and Physical Education curriculum (Crooks & Flockton, 1999).

What students thought about drowning risk and water safety was evaluated in two separate questions. A question on student perceptions of drowning risk (see survey question 20, Appendix 1) was designed to elicit perceptions of personal risk in five water-based scenarios that portrayed various degrees of potential danger using a four point scale that included *no risk*, *slight risk*, *high risk* or *extreme risk*. These scenarios ranged in potential danger from immersion in the deep end of a pool, considered by the review panel of experts (see section 2.3.4) to be a low-risk environment, to unintentional immersion at an isolated surf coastline considered to be an extreme risk environment. A question that sought student attitudes towards a series of water safety-related statements (see survey question 23, Appendix 1) was included to test the assumption that water safety knowledge positively influenced safety attitude and behaviour. Students were asked the extent to which they agreed or disagreed with a series of statements on water safety using a 4-point Likert-type scale that included *strongly agree*, *agree*, *disagree* or *strongly disagree*. Figure 3 also shows that student behaviour in an aquatic environment, the third component of water safety identified in the second level of the framework, was the focus of two questions that related to their participation in swimming and other aquatic recreational

activities. Ten at-risk behaviours associated with swimming activities and six at-risk behaviours associated with other forms of aquatic recreation were included (see survey questions 11 and 14, Appendix 1). The forced response questions asked students how many times in the previous year they had engaged in at-risk behaviours using four frequency categories that included *never*, *sometimes, mostly* and *always.*

Figure 4 identifies questions that focused on the socio-cultural influences that underpinned student water safety knowledge, attitude and behaviours as previously described in the third tier of the conceptual framework. A general question on important sources of water safety knowledge required students to rank the three most important sources from a range of possible options that included friends, family, school, group/club/organisation, media or other sources (see survey question 7, Appendix 1).

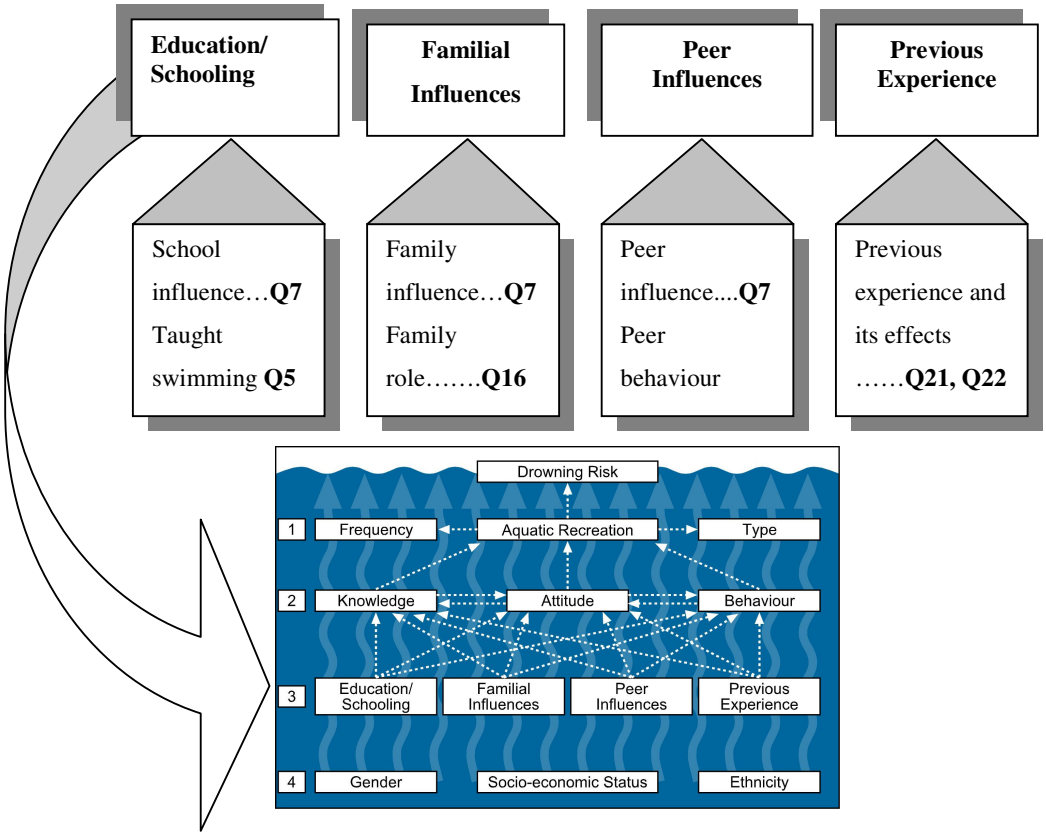

Figure 4. Survey questions on socio-cultural influences on water safety K-A-B and their relationship to the conceptual framework reproduced from Figure 1.

The questionnaire then included a series of follow-up questions that specifically related to the influence of education and schooling, family, peers, and previous experience on water

safety. To ascertain the influence of education and schooling, questions were included in relation to student swimming and water safety education (see survey questions 5-6, Appendix 1). The question on swimming education was designed to elicit information on what students considered to be the most important source of their swimming instruction from a range of options that included primary and secondary school, parents and family, paid lessons, club or group, friends or self-taught. The question on water safety education sought information on specific aspects of water safety that included pool, surf, boat, river and underwater safety.

Respondents were also asked a follow-up question on the influence of friends and peer groups on water safety via a question on student observation of their friends' at-risk aquatic-related behaviours (see survey question 15, Appendix 1). The question was structured so as to elicit yes/no categorical responses with a third option to provide for those students who had never been with friends in the situation described. The eight at-risk behaviours included common unsafe practices such as swimming outside patrol flags, not wearing a lifejacket in a boat and mixing alcohol/drugs with aquatic activity.

A question on family/whanau involvement in water safety was included to ascertain the possible contribution of family to the promotion and practice of youth water safety (see survey question 16, Appendix 1). The question was structured to also provide yes/no categorical responses to eight aspects of family water safety. These included practices that either directly influenced their youth's water safety (such as the giving of water safety advice or prohibiting water activity because of safety) or indirectly influenced their water safety (such as encouraging improvement in swimming ability/fitness or having undergone first aid training).

Figure 4 shows that two questions were included to elicit information on experience of any life-threatening aquatic situation, the fourth possible influence on youth water safety identified in the third tier of the conceptual framework (see survey questions 21-22, Appendix 1). Question 21 focused firstly on whether the respondents had experienced such an incident and secondly, how they had got out of difficulty. Students who had recalled any life-threatening aquatic experience were then asked in question 22 to describe how the experience had affected their current aquatic recreation.

The questionnaire included questions on gender and ethnicity as identified in the fourth tier of the conceptual framework (see survey questions 1-2, Appendix 1). Socio-economic status, the other social demographic variable identified in this tier, did not require a specific question because the decile rating of the school attended was to be used as a proxy measure. Ethnicity was described via five aggregated categories where students self-identified the ethnic grouping that they considered most representative of their ethnicity. The questionnaire was also designed to elicit information on age and length of residency (see survey questions 3-4, Appendix 1).

2.3 Preliminary Testing

Prior to the commencement of the main study, a series of preliminary investigations were conducted in order to test the questionnaire, establish the appropriateness of the content, its validity and reliability. These pilot tests also provided opportunity to test and refine the data collection and data processing procedures.

2.3.1 Pilot study 1

The first pilot study involved cognitive testing of the questionnaire with a class of Year 11 students at an Auckland secondary school. The purpose of the first pilot was to identify ambiguities in the instructions, clarify the wording of the questions and identify any omissions or unanticipated answers. The class consisted of a co-educational group of 28 Year 11 students who were completing a Year 11 Art module. The survey took place in the fourth term of the school year prior to their participation in end-of-year national assessment processes. Because the group was studying an optional subject, it contained students from several Year 11 classes representing a range of academic abilities. The group consisted of 20 females and 8 males whose ages ranged from 15-17 years. Ethnically, the group was multicultural and consisted of 17 European/Pakeha (61%), 9 Asian (32%), 1 Maori (4%) and 1 Pasifika (4%) student.

Students first were asked to read the introduction and were then guided by the writer through the completion of the questionnaire. The process was timed in order to ascertain how long it took students to answer and to determine which questions needed clarification and precise direction. Students were asked to note any difficulties they had in answering questions by making brief comments on the questionnaire. Students were not permitted to engage in discussion with their peers until after the questionnaire had been completed. The questionnaire took approximately 45 minutes of an hour-long timetable period to complete, slightly less time than was anticipated.

Upon completion of the survey, students were asked to comment on the questionnaire and the comments recorded on tape for further analysis. The students reported that questionnaire completion had not been an onerous task and they thought that other Year

11 students would probably respond as they had. Students also thought that honesty in responding to questions about at-risk behaviour would not be a problem because the survey was anonymous and would not be conducted by staff associated with the school. They had difficulty answering the questions relating to participation in aquatic recreation because the draft questions required precise numerical recall of the number of times that they had engaged in the activity. As a consequence of this, the questions were modified to give ordinal responses of frequency ranging from *never* to *very often* (see survey questions 9, 10, 12, 13, Appendix 1) as previously reported.

The draft question on water safety attitudes had consisted of 11 statements and used a Likert-type scale response. Analysis of responses produced an alpha reliability coefficient of .409, which was considered to provide a not sufficiently high level of internal consistency. Consequently, it was decided, after consultation with the peer review group (see sub-section 2.3.4, Peer review) to re-construct the question on water safety attitudes using traditional Likert procedures (as described by Aiken, 2002) that involved re-designing the statements and testing them on a group of 100+ subjects. Reliability and factor analysis would then be used on test-retest data to establish an alpha coefficient correlation around .800. This level generally is considered indicative of an acceptable level of internal consistency in attitude testing (Aiken, 2002).

2.3.2 Pilot study 2

A second pilot study was conducted in order to test a revised bank of statements on water safety attitudes and revised questions on the nature and extent of swimming and aquatic recreation. The participants consisted of three co-educational classes of Year 10 students that comprised of 52 females and 51 males whose ages ranged from 14-16 years. In terms of ethnicity, the group consisted of 70 European/Pakeha (68%), 25 Asian (24%), 2 Maori (2%) and 6 students of other ethnicity (6%). The group was given an abbreviated form of the initial questionnaire containing the same social demographic questions and the revised questions on water safety attitudes and recreational activity.

The bank of 20 statements on water safety attitudes produced an alpha reliability coefficient of .804. In order to reduce the total number of statements, items were eliminated that detracted from the reliability score or were deemed to be repetitive. This

item analysis resulted in a final bank of 14 statements that had an alpha reliability coefficient of .786. A final version of the question was subsequently developed that included these 14 statements (see survey question 23, Appendix 1). Three of the statements were reverse coded in order to ensure that students considered each statement carefully before responding.

2.3.3 Pilot studies 3 and 4

A test-retest procedure to determine the reliability of the final survey instrument was conducted three months prior to the main data collection. This process involved a group of Year 11 students who completed the questionnaire on two separate occasions with a one-month interval in order to determine how stable the responses to the questionnaire were. Survey conditions were replicated by using the identical study period in the same room with the same supervisor. Students who did not attend both test and re-test sessions were excluded from the study, a process that resulted in 19 respondents being included in the reliability analysis.

The results of questions on swimming frequency and location, water activity type and frequency, perceived risk of drowning, and water safety attitudes were analysed to test the reliability of the questionnaire. They were chosen because they typified the range of questions in the survey that sought different types of student response, including recall (of activity), perception (of risk) and attitude (towards water safety). Upon completion of the fourth pilot study, test-retest data were compared using Spearman's Rank correlation test procedures for non-parametric data.

Survey question 9 (see Appendix 1) sought information on student swimming activity. Table 1 shows the comparisons of student responses on where swimming activity took place between the first and second pilot studies. Spearman rank correlation coefficients ranged from .758-.959, which indicated that student responses to the question on where and how frequently they swam at various locations were consistent between the pilot studies 3 and 4.

Table 1. *Inter-correlations between Swimming Activity Reported in Pilot Studies 3 and 4*

Swimming Location	r_s
Home pool	.959*
Public pool	.762*
Patrolled surf beach	.758*
Non-patrolled surf beach	.956*
Flat water beach	.894*
Lake, pond, waterhole	.887*
River, creek, drain	.839*
Total swimming activity	.883*

*p <.01.

Survey question 12 (see Appendix 1) sought information on participation in aquatic recreation. Table 2 shows that comparisons of responses on student recreational activity in pilot studies 3 and 4 produced correlations that ranged from .730–1.00. These results suggest that student responses to the question relating to recall of aquatic activity during the previous year were consistent between test and retest.

Table 2. *Inter-correlations between Other Aquatic Activities in Pilot Studies 3 and 4*

Other Aquatic activity	r_s
Boating	.901*
Yachting	.745*
Paddling	.760*
Fishing from a boat	.950*
Fishing from land	.730*
Netting/shellfishing	1.00*
Surfing	.918*
Windsurfing/skiing	.947*
Underwater	.751*
Total Activity	.939*

* p <.01.

Survey question 20 (see Appendix 1) asked students to rate the risk that five different aquatic situations posed to their personal safety. Table 3 shows that student estimates of drowning risk were consistent between test and retest, with the exception of retrieving a toy in the deep end of a swimming pool. It was decided to retain the latter item because it helped to provide a range of risk settings and because the alpha correlation coefficient for overall risk perception was high (r_s = .791). In addition, it was thought likely that students had become less cautious in their response as a consequence of familiarity with the

questions in the retest study. This familiarity was also reflected in a lower sum of risk responses in the retest (244 as compared with 250 in the first test), which suggested some regression between tests, a characteristic of test-retest data (Liebert & Liebert, 1995).

Table 3. *Inter-correlations between Drowning Risk Perceptions in Pilot Studies 3 and 4*

Drowning risk perceptions	*rs*
Capsized canoe 100 metres offshore	.839*
Caught in rip current at surf beach	.822*
Retrieved a toy in the deep end of swimming pool	.438
Fell into deep river when fully clothed	.747*
Swept off isolated rocks into surf while fishing	.789*
Total risk perception	.791*

*p <.01.

Survey question 22 (see Appendix 1) sought information on student attitudes towards water safety. Table 4 shows that analysis of the fourteen attitude statements produced coefficients ranging from .393-.904. When the individual attitude scores were summated and compared, an alpha correlation coefficient of .860 was found between the total attitude scores for test-retest data.

Table 4. *Inter-correlations between Water Safety Attitudes in Pilot Studies 3 and 4*

Water safety attitudes	*rs*
Safety rules in public swimming pools spoil fun	.551*
Swimming outside patrol flags on surf beach is okay if surf looks safe	.805*
Wearing lifejacket unnecessary in small boat 100 m offshore	.814*
Drinking alcohol on a boat okay provided skipper's sober	.608*
You should avoid crossing a river on your own	.524*
Homeowners shouldn't have to fence their swimming pools	.421
Swimming alone is risky even for good swimmers	.625*
Lifeguards shouldn't be able to tell you where to swim	.393
Swimming in ordinary clothes is okay if you don't have swimsuit	.495*
Wearing a lifejacket is unnecessary for good swimmers	.547*
Having a beer whilst fishing in a boat is okay on a calm day	.590*
Swimming after surf patrol is finished is ok if people in water	.568*
Diving headfirst into shallow water is ok if you can dive	.432
Swimming in clothes is alright if you don't go out too deep	.904*
Total attitude score	.860*

*p <.01.

Three statements relating to the fencing of pools, the role of lifeguards in telling swimmers where to swim and diving headfirst into shallow water did not produce significantly consistent responses. It was decided to retain the three statements in the final questionnaire because item analysis of responses from a larger group of 103 students in a previous pilot study (see sub-section 2.3.2, Pilot study 2) had not found any inconsistency in student response to these statements. As was the case with the risk perception question previously reported, the sum of attitude responses was lower in the retest (751 as compared with 772 in the first test), suggesting some regression between the test and retest results.

Given the levels of similarity between responses to the selected questions in the test and retest situation, it was decided that the survey had sufficient reliability to retain all questions without further amendment for the main survey.

2.3.4 Peer review

A peer group of colleagues with expertise in the fields of water safety, injury prevention and education reviewed the draft questionnaire in order to establish the validity of the survey instrument. This form of validity, content validity, is a subjective measure of how appropriate the items selected seem to a set of expert reviewers. The peer review process was used because, as Litwin (1995) suggests, it provided "a good foundation on which to build a methodologically vigorous assessment of a survey instrument's validity" (p. 35). Representatives of water safety, injury prevention and educational organizations were invited to become part of an expert panel whose function was to critique the purpose of the study and the survey instrument to be used to elicit data. Members of the panel included representatives of: Water Safety New Zealand; Swimming New Zealand; Surf Life Saving Northern; Injury Prevention Research Centre, University of Auckland; Watersafe Auckland Incorporated and the Auckland College of Education. The panel was convened after the first pilot study when students had completed the draft questionnaire.

A synopsis of the study and copy of the draft survey were circulated prior to the meeting. Members of the panel unable to attend the meeting were invited to submit comments that were then reported to the meeting during discussion. After a brief introduction on the purpose of the study, the panel was asked to comment on the accuracy of the content, the

appropriateness of the questions and possible amendments. The results of the first pilot study were discussed with particular reference to student response to questions on: measures of swimming capacity; water safety attitudes and measurement of risk exposure to swimming and aquatic recreational activity. As a consequence of the panel discussion, the draft questionnaire was amended with modifications to questions relating to participation in swimming and aquatic recreation, water safety attitudes and drowning risk perception. Members of the panel were sent a copy of the revised questionnaire for final comment, prior to its use in the second pilot study that tested the revised version of the questionnaire with school students.

The revised version was also reviewed by Statistics New Zealand (September 26, 2002) prior to further testing in the second pilot study. Comment was sought on general design, order of questions, clarity of questions and possible data coding and analysis implications. Statistics New Zealand provided a comprehensive technical review that included comment on the general layout, the purpose and objectives of the survey and expected outputs. Statistics New Zealand commented on the difficulty of measuring student socio-economic status and recommended that the decile rating of the school attended might be a readily available indicator of student socio-economic status. Specific comments on the content and structure of the questions raised a number of issues including: the lengthy time frame (originally 3 years) of questions seeking recall of behaviour; possible difficulty in accurately recalling frequency and type of aquatic activity; and the need to separate out some questions in order to prevent misinterpretation. In light of this advice, the questionnaire was modified and then subjected to three further pilot studies as previously discussed (see sub-sections 2.3.2-2.3.3, Pilot study 2, Pilot studies 3 and 4).

2.3.5 Final questionnaire

The final version of the questionnaire contained 24 questions that addressed youth drowning risk and water safety (see Appendix 1). The questionnaire consisted of a front cover that included the title and an introductory section that briefly explained the purpose of the questionnaire and respondents' rights regarding voluntary completion and anonymity. The first eight questions were concerned with socio-demographic characteristics, including age, gender, ethnicity, length of residency in New Zealand, history of swimming and water safety education, influences on water safety and

ownership/access to aquatic recreation equipment (see survey questions 1-8, Appendix 1). These questions on background information were included in the introductory phase of the questionnaire because it provided a non-threatening start to the survey and settled the students into the survey process.

Student participation in swimming and other aquatic recreational activity was tested in a series of closed questions that focused on location and frequency of the activity, with whom the activity was done and student behaviour when doing the aquatic activity (see survey questions 9-14, Appendix 1). These were followed by a series of questions on peer and familial influences on student water safety, student perceptions of their swimming, rescue and resuscitation ability, perceptions of drowning risk and experience of a life-threatening aquatic incident (see survey questions 15-22, Appendix 1).

Three final questions sought information on student attitudes towards water safety and on cognitive understanding of small boat and surf safety knowledge. Attitudes towards water safety were tested using 14 statements and used a 4-point Likert-type scale that included *strongly agree*, *agree, disagree, strongly disagree* response options (see survey question 23, Appendix 1). Knowledge of small boat safety and surf safety were tested using illustrated, open-ended questions (see survey questions 24-25, Appendix 1). These questions were designed to elicit information on student knowledge of safety equipment, recognition of hazards, and risk management practices.

Following this process of questionnaire development and validation, the questionnaire was administered to and completed by a stratified random sample of students. The population from which the sample was drawn and the processes used in obtaining a random sample are described in the following section entitled 2.4 Development of the Survey Process.

2.4 Development of the Survey Process

The first phase of the survey research required the development of a sampling procedure that would elicit a representative sample from the survey population. The second phase of development required the establishment of administrative systems that met the ethical requirements associated with doing research with human subjects some of whom were minors (Massey University Human Ethics Committee, 2002). The survey population and the sampling techniques devised to create the survey sample are described in the following two subsections; the ethical considerations are discussed in a third subsection.

2.4.1 Survey population

The population studied was Year 11 adolescent students enrolled in full-time study at New Zealand state and private schools. Because of difficulties associated with access and cost of data collection, it did not include schools with a Year 11 roll of less than 20 students, Correspondence School, or home-schooled students. Since the study was confined to students from Year 11, the expected age range was likely to be small, but those below 15 or older than 19 years of age were excluded from participating in order that comparisons could be made with other large-scale analyses that used the 15-19 year age bracket to describe young adult populations.

The population base consisted of students enrolled in secondary and composite schools included on the Ministry of Education database for July 2002, the most recent database available at the time of constructing the survey sample. The exclusion of schools with a Year 11 roll of 20 or less and the Correspondence School from the Ministry of Education database reduced the number of available schools from 476 schools with a Year 11 population of 53,749 to 389 schools with a Year 11 population of 50,950. From this population, a sample of 2,233 students, approximately 4 percent of the Year 11 school population, constituted the database for the study. Table 5 shows the breakdown of the Year 11 population, expressed in numbers and percentages, by school type and geographical location.

Table 5. *Year 11 Student Population by School Type and Location, July 2002*

School type	Co-educational	Single sex male	Single sex female
No. of schools = 389	No. (%) of schools = 281 (72.2%)	No. (%) of schools = 46 (11.8%)	No. (%) of schools = 62 (15.9%)
No. of students = 50,950	No. (%) of students = 35,371 (69.4%)	No. (%) of students = 7,319 (14.4%)	No. (%) of students = 8,260 (16.2%)
School location	Greater Auckland	Other North Island	South Island
	No. (%) of schools = 109 (28.0%)	No. (%) of schools = 174 (44.7%)	No. (%) of schools = 106 (27.2%)
	No. (%) of students = 17,878 (35.1%)	No. (%) of students = 21,100 (41.4%)	No. (%) of students = 11,972 (23.5%)

(Source: Ministry of Education school rolls, July 2002)

Schools were instructed to screen out students who were less than 15 years of age and adult students who fell outside of the 15-19 year age bracket. Foreign fee-paying students enrolled in Year 11 programmes were included in the sample on the basis that they constituted a part of the resident population and were thus exposed to similar aquatic risk as others of their age group while studying in New Zealand.

2.4.2 Sampling technique

The first stage of the multistage sampling design used schools with a Year 11 cohort to access survey participants. In order to ensure that the schools selected provided access to a representative cross-section of the population, the process of stratified random sampling employed the following sampling frame:

- Schools by type – co-educational, single sex male, single sex female
- Schools by geographical location – Greater Auckland, Other North Island, South Island (Crooks & Flockton, 1999).

Table 6 shows that the application of this stratification procedure produced a sampling frame of nine strata. The number of schools included in each cell of the stratified sample was rounded to the most representative whole number. The effect of this rounding was to

slightly inflate the number of schools in the Greater Auckland and South Island regions. However, as can be seen in Table 5, this distribution accurately reflected the Year 11 student population of those regions, with the Greater Auckland region accounting for 35.1% and the South Island accounting for 23.5% of the population respectively.

Table 6. *Stratified Sampling Frame by School Type and Location, July 2002*

School type by region	Number (%) of Schools	Number (%) of Pupils
Co-educational (Greater Auckland)	83 (21.3)	13,235 (26.0)
Co-educational (Other North Island)	122 (30.8)	14,317 (28.1)
Co-educational (South Island)	76 (19.5)	7,751 (15.2)
Single sex male (Greater Auckland)	12 (3.1)	2,178 (4.3)
Single sex male (Other North Island)	21 (5.4)	3,130 (6.1)
Single sex male (South Island)	13 (3.3)	2,011 (4.0)
Single sex female (Greater Auckland)	14 (3.6)	2,397 (4.7)
Single sex female (Other North Island)	31 (8.0)	3,653 (7.2)
Single sex female (South Island)	17 (4.4)	2,210 (4.3)
Total	389 (100)	50,950 (100)

(Source: Ministry of Education school rolls, July 2002)

The sample selection process slightly inflated the number of single sex male schools (11.8% of the national population, 13.2% of the sample) at the expense of co-educational schools (72.2% of the national population, 71.1% of the sample). However, in terms of student numbers, this inflation of single sex male schools accurately matched the proportion of Year 11 students enrolled nationally in single sex male schools (14.4%).

Table 7 shows that, when the population percentages reported in Table 5 and 6 were extrapolated into the sample size using the multistage stratified random sampling process, 41 schools were included in the sample structure. These schools were then selected using a table of random numbers applied to the modified database of each of the stratifications. Random number tables were also used to select replacement schools of similar characteristics where schools had declined to take part in the survey.

Table 7. *Composition of the Stratified Sample by School Type and Location, July 2002*

Schools	Greater Auckland 109 (28.0%)	Other North Island 174 (44.7%)	South Island 106 (27.2%)	Total
Co-educational 281 (72.2%)	10	10	6	26 (63.5%)
Single sex male 46 (11.8%)	2	4	2	8 (19.5%)
Single sex female 62 (15.9%)	2	3	2	7 (17.1%)
Total	14 (34.2%)	17 (41.5%)	10 (24.3%)	41 (100%)

(Source: Ministry of Education school rolls, July 2002)

The second stage of the sampling process consisted of selecting students from those schools that had been chosen in the process previously described. As part of the systematic sampling process, schools were asked to select every fifth student on the alphabetical school roll to participate in the survey. The number of students selected was restricted to approximately one in five students because, on the basis of Year 11 roll sizes, this would provide the sample size of 2,000 + students.

It was anticipated that this process would provide between 20-100 respondents per school, depending on roll size, and that this was an appropriate group size with which to administer the survey during the school timetable using normal school facilities. However, several schools (n = 11) reported that systematic sampling across the Year 11 roll was too disruptive to the normal school timetable and, alternatively, they would randomly select classes of Year 11 pupils to take part in the study. Rather than exclude these schools from the study, they were allowed to continue to take part, but with the proviso that classes selected were not to be part of an options structure (such as a physical education class) or streamed (such as the top or bottom academic achiever classes) because such a selection may have introduced bias into the responses.

2.4.3 Ethical considerations

The Massey University Code of Ethics (Massey University Human Ethics Committee, 2002) guided this study. Of particular ethical concern was any potential harm to students and staff as a consequence of taking part in the study. The survey did not include any invasive or controversial content, other than questions that sought information on alcohol/drug use in and around water. Because of the frequently reported association of alcohol/drug use and drowning in the 15-24 year age group, and given the anonymous nature of the data gathering, it was considered appropriate to include questions on alcohol/drug use. In recognition of the sensitivity of such data, questions related to their drug/alcohol use were structured to provide generalised information that avoided the collection of potentially incriminating evidence.

Another ethical concern was the need for informed consent of the participants at an institutional level, the school, and at the individual level, the pupil and parent. At the institutional level, introductory letters to the school principals and to boards of trustees stressed the importance of the study to the welfare of New Zealand youth but clearly stated that participation, whilst desirable, was voluntary. School principals and boards of trustees were required to complete consent forms before the school could take part in the study. Gaining the informed consent of the individual students posed some difficulty given that the Year 11 age group typically contained students under and over the age of 16 years. Since the study focused on those in the 15-19 year age group, those aged between 15-16 years required parental consent to participate. Meeting this requirement placed additional administrative load on schools and resulted in some wastage of potential candidates through non-compliance by schools, students or parents. To allow for potential wastage, approximately ten percent more students than required were asked to participate. All students were required to complete a consent form two weeks prior to taking part in the survey. These were collected by the survey administrators and stored with the completed surveys in secure premises at the author's place of work.

To address ethical issues of anonymity and confidentiality, schools were informed that all data acquired would be aggregated and analysed using a range of descriptive and analytical statistical tools. In addition, schools were assured that the focus of the study was student knowledge, attitudes, and behaviours and not curriculum-based or school-based

evaluation. Students were provided with an information sheet indicating that participation was anonymous and unconnected to any formal school activity or to any assessment procedure associated with their school study. The information sheet told students that their participation was voluntary and that they had the right to withdraw at any time prior to, or during, the survey. Survey administrators also reminded participants that they had the right not to answer any question at any time. Students were informed on the cover sheet of the survey that no names would ever be reported and that the information would not be used to identify individuals. Schools and students were told that information would be available only to the researcher and would be securely stored for a period of five years before being destroyed.

2.5 Administration of the Survey

In November, 2002, Water Safety New Zealand, a national organisation whose primary role is the promotion of water safety through education in New Zealand, agreed to support the study and make funds available for the nationwide collection of data. The process of gathering data from the sample population began in January 2003, when 41 schools took part in a nationwide survey entitled *New Zealand Youth Water Safety Survey 2003* (Moran, 2003).

2.5.1 Pre-survey administration

Letters of introduction were sent to the principals of the 41 schools initially selected in the sampling process to explain the purpose of the study and to outline what would be required of schools that agreed to take part. Several schools (n = 7) declined to take part in the study and were replaced by schools with similar characteristics, as previously described in the sampling procedure (see sub-section 2.4.2, Sampling technique). Details of the data-gathering procedure were then sent to a designated liaison person in schools that had agreed to take part in the study. The liaison person was contacted one month from the survey date to arrange a suitable time for the survey administrator to visit the school and conduct the survey.

Four trained survey administrators were employed to conduct the survey nationwide in order to standardise responses and minimise response error. A manual of survey protocols and administration was developed and discussed with the administrators prior to the commencement of data collection. The survey was conducted throughout the country during the normal school timetable over a nine-week period during the second school term (Autumn) in May-July 2003.

2.5.2 Survey administration

The survey administrators informed students of the questionnaire requirements in a verbal explanation at the beginning of the survey. Students were instructed not to discuss questions, as individual responses were required. Students were asked to be honest in their

answers and reassured that participation was anonymous with all responses treated as confidential. Because many questions were structured as stem questions with supplementary parts, supervisors emphasised the need for students to carefully read the first part of each question. Students were also encouraged to ask for the assistance of the supervisor if confused by the questions or unsure of their responses. Upon completion, students were asked to review their questionnaire to make sure that they had answered all questions. Supervisors placed special emphasis on questions that required numerical responses such as rankings, age and frequency. Where students wished to change their responses, they were requested to clearly mark their preferred response.

2.6 Data Processing and Analysis

The processes developed to construct a database, manage the entry and storage of data, and the methods employed in analysing and reporting the data are reported in the following two subsections.

2.6.1 Data entry and storage

Data were initially entered on spreadsheets using Microsoft Excel 2002 software by two personnel who had been trained in the data-entry procedures required and provided with a manual of data entry coding. The decile rating of each school, to be used as a proxy measure of socio-economic status, was also entered from the Ministry of Education schools database for July 2002. Because most of the response structures were numerical, Excel numerical filters were used to check the accuracy of the data inputting. Upon completion of data entry, data were analysed using SPSS Version 11 software with the data checked again for aberrant entries using cross tabulation.

Two questions on small boat safety and surf safety required specialist water safety knowledge in order to interpret written responses. Question 24 (see Appendix 1) on small boat safety, asked students to identify essential safety items for a boating trip. The student responses were reviewed and a numerical scale from 0-6 used to score responses that ranged from 0-7 or more safety items. Numeric values were also devised to score responses that gave correct items of boat safety preparation and rules of conduct on board,

as indicated in the tables of results for small boat safety (see Tables 29-32, chapter 4). Data on components of surf safety knowledge included in question 25 (see Appendix 1) were also evaluated and given numerical values according to the number of hazards correctly identified, the number of correct safety decisions made, and the selection of the safest location on the surf beach, as indicated in the tables of results (see Tables 33-36, chapter 4).

Upon completion of the data entry, all questionnaires and consent forms were sealed in boxes according to school number and geographical region. These were then stored in secure premises at the author's place of work in accordance with the requirements of ethics procedures governing the study.

2.6.2 Data analysis and presentation

Data analysis was conducted using a range of conventional statistical techniques appropriate for the task: descriptive statistics for portraying characteristics of the sample population to non-parametric tests for ascertaining the significance of relationships between variables. Initially, data were evaluated descriptively in terms of frequency and percentages. These preliminary findings were presented to Water Safety New Zealand and other organisations in a report entitled *New Zealand Youth Water Safety Survey 2003* (Moran, 2003). In subsequent reporting, those variables which had appeared in the preliminary analysis to be important were analysed using non-parametric tests of significance to ascertain the degree of relationship between dependent variables, such as knowledge, attitude and behaviour, and independent variables such as gender, place and length of residency, socio-economic status (via the decile rating of the school that the students attended) and ethnicity.

Chi-square tests for relatedness or independence were used to compare categorical data of one or more variables. Mann Whitney *U* Tests were used for analysis of significant differences between independent variables on dependent measures. The Kruskall-Wallis *H* Test was used for analysis of ordinal data when the independent variable had more than two levels. In cases where Kruskall-Wallis *H* Tests indicated the need for multiple comparisons, Mann-Whitney *U* Tests were used to determine differences between groups. A Bonferroni correction was applied in these multiple comparisons by dividing the .05

level of significance by the number of comparisons made in order to reduce the likelihood of Type 1 error (Ntoumanis, 2001). To test the degree of relationship between two variables, ordinal data were initially tested for linearity using scatter plots to give a preliminary indication of relationship and, where appropriate, then analysed using Spearman Rank Correlation Tests to determine the strength of that relationship.

The presentation of results required careful consideration given the complexity of the conceptual framework that guided the study (see Figure 1, chapter 1) and the extensive number of dependent and independent variables contained within it. A strategy was devised to manage the reporting of results that involved the subdivision of results into four separate chapters that broadly followed the tiers described in the conceptual framework. Data are presented in tables of results in these chapters that provide initial description of the distributions of responses in terms of numbers and percentages. Data are then analysed according to gender, socio-economic status and ethnicity, the social demographic factors thought to influence drowning risk, located in the fourth tier of variables at the base of the framework. Statistically significant relationships between variables are referred to in the text of the results chapters, but, in order to avoid overuse of tabled results in the main text, full details of the extensive significance testing undertaken of the many variables under investigation are included separately in the appendices (See Tables of Significance Tests, Appendix 2).

Analysis by socio-economic status was based on the decile rating of the school attended, expressed in three aggregated groups for ease of reference. Schools of low socio-economic status were grouped as low-decile (deciles 1-3), mid-range socio-economic status as mid-decile (deciles 4-7) and high socio-economic status as high-decile (deciles 8-10). Students who reported being of ethnic origin other than the European/Pakeha, Maori, Pasifika or Asian were relatively few in number (n = 46, 2.1%) and many did not specify their ethnic origin as requested in the survey. Consequently, this small group was omitted from any analyses by ethnicity. As previously reported, preliminary analysis indicated no systematic difference in patterns of aquatic recreation, water safety knowledge, attitudes and behaviour based on where students lived. Consequently, analysis by region was excluded from further study. Analysis by length of residency was also excluded because it largely duplicated results obtained from analysis by ethnicity.

2.7 Summary

This chapter reported on the methods employed to carry out survey research, designed to address the multifaceted and complex nature of youth drowning risk and water safety as posited in the conceptual framework (see sections 1.3-1.4). A survey questionnaire was created following a rigorous process of development and validation (see sections 2.2-2.3). An implementation strategy, and its associated administrative systems, was devised to conduct the survey on a national basis to a large, representative group of Year 11 students. Approximately 2,000 students between 15-19 years of age, selected by stratified random sampling from the New Zealand high school population took part in the survey (see sections 2.4-2.5 that describe the procedures used). Data processing systems were developed to manage the large amount of data generated by the survey study and analytical procedures were established that would reveal the extent and richness of the findings in the subsequent presentation and discussion of results (see section 2.6).

Part 2

Results

Overview

The results of the survey are presented in four related chapters: Chapters 3-5 report on what students do in and around water, what they know about water safety and what they think with regard to drowning risk and water safety. Chapter 3 reports on the nature of student aquatic recreation and also includes analysis of the self-reported behaviours of students when engaged in swimming and other aquatic recreational activity. Chapter 4 reports on the knowledge base that students possess which may mediate drowning risk during aquatic recreation, and includes findings on the practical abilities and theoretical understanding of water safety. Chapter 5 reports on perceptions of drowning risk and water safety attitudes that indicate what youth think about drowning risk and water safety. Chapter 6 reports on the socio-cultural influences that shape drowning risk and water safety. Particular reference is made to four formative influences that shape student water safety knowledge, attitudes and behaviour, namely (i) education and schooling, (ii) peers, (iii) family, and (iv) previous experiences. Finally, a summary of key results is presented so as to set the scene for the discussion of findings and presentation of recommendations in Chapters 7 and 8.

A total of 2,233 questionnaires were returned and, of these, 31 (l.4 %) were considered invalid because of illegibility and were excluded from the data analysis. Thus, the final database for this study included 2,202 Year 11 students (mean age = 15 years 8 months, range 15-19 years) enrolled in full time study in 41 high schools throughout New Zealand. Preliminary analysis of respondents' age, gender, region and length of residency, socio-economic status and ethnicity indicated that the demographic structure of the sample was consistent with that of the national population from which it was drawn. As Table 8 shows, the sample consisted of slightly more males than females, and a greater proportion of students from low-decile (1-3) schools and high-decile (8-10) schools, but slightly fewer mid-decile (4-7) schools than the national population. In terms of ethnicity, proportionally more European/Pakeha and Pasifika students were included in the study than Maori and Asian students. No comparative figures were available on length of residency.

Table 8. *Characteristics of the Sample by Gender, Region and Length of Residency, Socio-economic Status via School Decile Rating, and Ethnicity, April 2000*

	Sample population		National population*	
	n	%	*n*	%
Female	1031	46.8	24915	48.9
Male	1171	53.2	26035	51.1
Auckland	747	33.9	17878	35.1
North Island	915	41.6	21100	41.4
South Island	540	24.5	11972	23.5
Low-decile (1-3)	630	28.6	9735	19.1
Mid-decile (4-7)	637	28.9	23146	45.4
High-decile (8-10)	935	42.5	18069	35.5
1-2 years residency	174	7.9	n/a	-
3-7 years residency	116	5.3	n/a	-
> 8 years residency	1912	86.8	n/a	-
European/Pakeha	1339	60.8	30468	59.8
Maori	406	18.4	10496	20.6
Pasifika	204	9.3	4229	8.3
Asian	206	9.4	4942	9.7
Other	46	2.1	815	1.6

*Source: Ministry of Education, Data Management Unit, July 2003 school rolls.

So as to manage the complexity of the data and reveal the diversity and scope of findings, reporting of the results is distributed over four chapters in Part Two of the thesis. Chapters 3, 4 and 5 focus respectively on what students do, what they know and what they think about drowning risk and water safety as posited in the first and second tiers of the conceptual framework (see pages 8-20, Chapter 1). Chapter 6 of the results section focuses on the range of mediating variables thought to influence the socio-cultural construction of youth drowning risk and water safety, as identified in the third tier of the conceptual framework. Each of the variables identified in the first three tiers of the framework are analysed by the social demographic dependent variables, gender, socio-economic status via the decile rating of the school attended, and ethnicity, as identified in the fourth tier at the base of the framework.

3 Chapter Aquatic Recreation and Behaviour – What Students Do

This chapter reports the nature of youth aquatic recreation and students' self-reported behaviour when doing that aquatic activity in order to determine the extent of exposure to drowning risk. The aquatic activity was subdivided into activity specifically related to swimming and other aquatic recreational activities that did not have swimming as a primary objective such as fishing or surfing. The chapter is divided into four sections:

1) Swimming activity - where and how often;
2) Behaviour during swimming activity;
3) Other aquatic recreational activities - where and how often; and
4) Behaviour during other aquatic activities.

Each of these attributes is systematically analysed by gender, socio-economic status and ethnicity in order to determine differences in risk exposure and at-risk behaviour among the student population.

3.1 Swimming Activity: Where and How Often?

Table 9 shows the nature of student swimming activity during the previous year as identified in question 9 of the questionnaire. Almost all students (n = 2164; 98.3%) indicated that they had engaged in some swimming activity. The public swimming pool was used most frequently by nearly nine out of ten students (n = 1950; 88.6%), followed in descending order by patrolled surf beaches visited by three quarters of the students (n = 1677; 76.2%), non-patrolled surf beaches (n = 1495; 67.8%), flat-water beaches (n = 1420; 64.8%), lakes or ponds (n = 1402; 63.7%), and private pools (n = 1147; 52.1%) or rivers/creeks (n = 1038; 47.1%).

Table 9 shows that the frequency of student swimming activity in the previous year was reported in four frequency categories that included: *never*, *not often* (1-9 times), *quite often* (10-19 times) and *very often* (more than 20 times). Almost one half swam between 1-9 times at a public pool (n = 980; 44.5%) and more than one third swam there *often* (n = 499; 22.7%) or *very often* (n = 327; 14.9%). Many students swam at patrolled surf beaches either *quite often* (n = 442; 20.1%) or *very often* (n = 471; 21.4%). Slightly fewer students had swum at non-patrolled surf beaches either *quite often* (n = 342;

15.5%) or *very often* (n = 337; 15.3%), flat water beaches either *quite often* (n = 282; 12.8%) or *very often* (n = 296; 13.4%), or in a lake either *quite often* (n = 305; 13.9%) or *very often* (n = 211; 9.6%). Rivers and creeks were the least frequented of all swimming locations with more than one half of students never using them for swimming (n = 1164; 52.9%).

Table 9. *Location and Frequency of Student Swimming Activity in the Previous Year*

Swimming location	**Never**		**Not often (1-9 times)**		**Quite Often (10-19 times)**		**Very Often (20 + times)**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Public/school pool	252	11.4	980	44.5	499	22.7	327	14.9
Patrolled surf beach	525	23.8	898	40.8	442	20.1	471	21.4
Non-patrolled surf beach	708	32.2	856	38. 9	342	15.5	337	15.3
Flat-water beach	782	35.5	927	12.8	282	12.8	296	13.4
Lake, pond, waterhole	800	36.3	887	40.3	305	13.9	211	9.6
Private pool	1055	47.9	586	26.6	234	10.6	327	14.9
River, creek	1164	52.9	704	32.0	184	8.4	150	6.8

Results of analyses on swimming frequency and location by gender, socio-economic status and ethnicity revealed some differences in patterns of swimming activity. When frequency of swimming activity was summated, no significant gender differences were found in the extent of swimming activity between males and females. However, some significant gender differences were found in the choice of swimming location, with more females swimming in private pools, at patrolled or flat water surf beaches, and more males swimming in rivers and creeks (see Table 3.1, Appendix 2). No significant gender differences were found in the use of public pools, lakes and ponds, and un-patrolled surf beaches.

Table 10 shows that more males swam *very often* at non-patrolled surf beaches (males 14.9%, females 11.8%) and fewer males swam *very often* at patrolled surf beaches (males 10.3%, females 15.0%) and flat-water beaches (males 8.7%, females 10.6%).

Table 10. *Location and Frequency of Student Swimming Activity by Gender*

Swimming location	Never		Not Often (1-9 times)		Quite Often (10-19 times)		Very Often (20 times +)	
	Male *n/%*	Female *n/%*	Male *n/%*	Female *n/%*	Male *n/%*	Female *n/%*	Male *n/%*	Female *n/%*
Home pool	608 58.1	447 43.4	292 24.9	294 28.5	111 8.5	123 11.9	160 13.7	167 16.2
Public pool	156 13.3	96 9.3	502 42.9	478 46.4	259 22.1	240 23.3	257 21.9	217 21.0
Patrolled surf beach	309 26.4	216 21.0	471 40.2	427 41.4	209 17.8	233 22.5	182 10.3	155 15.0
Un-patrolled surf beach	378 32.3	330 32.0	438 36.7	418 40.5	181 15.5	161 15.6	174 14.9	122 11.8
Flat-water beach	448 38.3	334 32.4	489 41.8	438 42.5	132 11.3	150 14.5	102 8.7	109 10.6
Lake, pond	434 37.1	366 35.5	455 38.9	432 41.9	169 14.4	136 11.6	113 9.7	97 9.4
River, creek	604 51.6	560 54.3	366 31.3	338 32.8	118 10.1	66 6.4	83 7.1	67 6.5

Significance differences were found when swimming activity was analysed against socio-economic status via the decile rating of the school attended (see Table 3.2, Appendix 2). Inter-group analysis showed no significant difference in swimming activity between students attending decile 4-7 (mid-decile) and decile 8-10 (high-decile) schools, but significant differences between students attending decile 1-3 (low-decile) schools and those from both mid- and high-decile schools (see Table 3.3, Appendix 2).

Table 11 shows that students from low-decile schools participated in less swimming activity than others. They were more likely than students from mid- or high-decile schools to never have used any of the aquatic locations for swimming and less likely to report frequent usage of any location for swimming activity. More students from low-decile schools never used public pools (15.4% compared with 10.2% and 9.6% respectively) or private home pools (55.2% compared with 46.6% and 43.9% respectively). More students from high-decile schools than from low- and mid-decile schools used private pools *very often* (18.3% compared with 10.8% and 13.8% respectively). Similar patterns of high frequency use by students from high-decile schools and low frequency use by students from low-decile schools were discernible for all other swimming locations.

Table11. *Location and Frequency of Student Swimming Activity by Socio-economic Status via Decile Rating of School Attended*

Swimming location	Never			Not Often (1-9 times)			Quite Often (10-19 times)			Very Often (20 times +)		
	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*
Home pool	348	297	410	151	181	254	63	71	100	68	88	171
	55.2	46.6	43.9	24.0	28.4	27.2	10.0	11.1	10.7	10.8	13.8	18.3
Public pool	97	65	90	298	267	415	137	154	208	98	151	222
	15.4	10.2	9.6	47.3	41.9	44.5	21.7	24.2	22.2	15.6	24.2	23.7
Patrolled surf beach	185	120	220	262	277	359	119	132	191	64	108	165
	29.4	18.8	23.5	41.6	43.5	38.5	18.9	20.7	20.4	10.2	17.0	17.7
Un-patrolled surf beach	227	177	304	240	248	368	90	121	131	73	91	132
	36.0	27.8	32.5	38.1	38.9	39.4	14.3	19.0	14.0	11.6	14.3	14.1
Flat-water beach	255	200	327	271	273	383	71	86	125	33	78	100
	40.5	31.4	35.0	43.0	42.9	41.0	11.3	13.5	13.4	5.2	12.2	10.7
Lake, pond	284	185	331	233	274	380	71	101	133	42	77	91
	45.1	29.0	35.4	37.0	43.0	40.6	11.3	15.9	14.2	6.7	12.1	9.7
River, creek	394	300	470	160	227	317	43	62	79	33	48	69
	62.5	47.1	50.3	25.4	35.6	33.9	6.8	9.7	8.4	5.2	7.5	7.4

Significant differences were found when swimming activity was analysed against ethnicity (see Table 3.4, Appendix 2). Inter-group analysis of swimming activity found significant differences between ethnic groups with the exception of European/Pakeha and Maori students, whose frequency of swimming activity did not differ (see Table 3.5, Appendix 2).

Table 12 shows that European/Pakeha and Maori students reported more swimming activity than Pasifika and Asian students. European/Pakeha and Maori students were less likely to have never swum, and more likely to have often swum, at any of the locations than Pasifika and Asian students. For example, European/Pakeha and Maori students were twice as likely to use patrolled surf beaches *very often* than Pasifika students, and six times more likely than Asian students (17.4% and 17.7% compared with 8.8% and 2.9% respectively). Higher frequency use by European/Pakeha and Maori students is also evident with respect to swimming at non-patrolled surf beaches, lakes/ponds and rivers/creeks. Asian students reported least swimming activity irrespective of location. More than one half of Asian students had never used patrolled surf beaches and more than two thirds had never used non-patrolled surf beaches, lakes

Table 12. *Location and Frequency of Student Swimming Activity by Ethnicity*

Swimming location	Never				Not Often (1-9 times)				Quite Often (10-19 times)				Very Often (20 times +)			
	Eur	**Ma**	**Pac**	**Asia**	Eur	Ma	Pac	Asia	**Eur**	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**
	n/%	*n/%*	*n/%*	*n/%*	***n/%***	***n/%***	***n/%***	***n/%***	**n/%**	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Home pool	554 41.4	215 53.0	108 52.9	151 73.3	372 27.8	111 27.3	62 30.4	30 14.6	157 11.7	35 8.6	20 9.8	18 8.7	256 19.1	45 11.1	14 6.9	7 3.4
Public pool	144 10.8	37 9.1	23 11.3	39 18.9	600 44.8	171 42.1	90 44.1	97 47.1	289 21.6	108 26.6	58 28.4	36 17.5	306 22.9	90 22.2	33 16.2	34 16.5
Patrolled surf beach	259 19.3	70 17.2	72 35.3	108 52.4	543 40.6	188 46.3	73 35.8	75 36.4	304 22.7	76 18.7	41 20.1	17 8.3	233 17.4	72 17.7	18 8.8	6 2.9
Un-patrolled surf beach	354 26.4	103 25.4	85 41.7	143 69.4	565 42.2	149 36.7	76 37.3	52 25.2	219 16.4	88 21.7	21 10.3	8 3.9	201 15.0	66 16.3	22 10.8	3 1.5
Flat-water beach	445 33.2	132 32.5	72 35.3	109 52.9	570 42.6	171 42.1	88 43.1	84 40.8	177 13.2	58 14.3	28 13.7	13 6.3	147 11.0	45 11.1	16 7.8	0
Lake, pond	407 30.4	116 28.6	105 51.5	146 70.9	615 45.9	154 37.9	64 31.4	43 20.9	182 13.6	80 19.7	25 12.3	13 6.3	135 10.1	56 13.8	10 4.9	4 1.9
River, creek	653 48.8	189 46.6	149 73.0	148 71.8	479 35.8	132 32.5	31 15.2	46 22.3	120 9.0	41 10.1	15 7.4	6 2.9	87 6.5	44 10.8	9 4.4	6 2.9

or rivers. By comparison, only one quarter of European/Pakeha and Maori students had never used non-patrolled surf beaches and less than one half had never used lakes and rivers.

3.2 Swimming Behaviour

Students who had taken part in swimming activity in the previous year (n=2164; 98.3%) were asked whether they had engaged in ten at-risk behaviours related to swimming. Swimming without adult supervision was the most frequently reported at-risk swimming behaviour, reported by three quarters of all students (n = 1603; 74.1%), followed in descending order by swimming outside a patrolled area at a surf beach (n = 1332; 61.6%), swimming when either cold or tired (n = 1225; 56.6%), swimming in a prohibited place (n = 1084; 50.1%), swimming alone (n = 1026; 47.4%), ignoring water safety directions or advice (n = 850; 39.3%), diving in without checking the depth of water (n = 715; 33.0%), swimming in everyday clothes (n = 671; 31.0%) and swimming after taking alcohol or drugs (n = 512; 23.7%). The least reported at-risk swimming behaviour was that of diving headfirst into shallow water (n = 441; 20.4%).

Table 13 shows the frequency of at-risk swimming behaviours as identified in question 11 of the questionnaire expressed in three frequency categories, *never, sometimes* and *often*, with the latter category a combination of *often* and *always* because there were so few responses in the *always* category.

Table 13. *Student Self-reported Behaviours during Swimming Activity*

Swimming behaviours	Never		Sometimes		Often	
	n	%	*n*	%	*n*	%
Swum in clothing	1506	69.2	533	24.5	138	6.3
Swum alone	1151	52.9	832	38.2	194	8.9
Dived into unknown depth	1462	67.2	509	23.4	206	9.5
Swum unsupervised	574	26.4	883	40.6	720	33.1
Swum after alcohol/drugs	1665	76.5	421	19.3	91	4.2
Swum in prohibited area	1093	50.2	888	40.8	196	9.0
Swum when cold/tired	952	43.7	1026	47.1	199	9.1
Swum outside patrol area	845	38.8	930	42.7	402	18.5
Dived into shallow water	1736	79.7	352	16.2	89	4.1
Ignored safety directions	1327	61.0	711	32.7	139	6.4

Swimming without supervision was the most frequently reported at-risk behaviour to happen *often* (n = 720; 33.1%), followed in descending order by swimming outside the patrol area at a surf beach (n = 402; 18.5%), swimming in clothes (n = 138; 6.3%), swimming alone (n = 194; 8.9%), swimming in a prohibited area (n = 196; 9.0%), swimming when cold or tired (n = 199; 9.1%), and ignoring safety signs (n = 139; 6.4%). Diving into shallow water headfirst (n = 89; 4.1%), and using alcohol/drugs when engaged in swimming activity (n = 91; 4.2%) were the reported at-risk behaviours to happen least often.

The data were analysed by gender, socio-economic status and ethnicity in order to determine whether different sectors of the youth population behaved differently while swimming. When swimming behaviours were analysed by gender, significant

differences were evident in all but one of the ten at-risk swimming behaviours, the exception being swimming in everyday clothing (see Table 3.6, Appendix 2). As can be seen in Table 14, females were more likely than males to never have performed any aquatic at-risk behaviours and males were more likely to have often performed at-risk behaviours.

Table 14. *Student Self-reported Behaviours during Swimming Activity by Gender*

	Never				Sometimes				Often			
Swimming behaviours	**Male**		**Female**		**Male**		**Female**		**Male**		**Female**	
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Swum in everyday clothing	788	67.3	718	69.6	283	24.2	250	24.2	83	7.1	55	5.4
Swum alone	561	47.9	590	57.2	459	39.2	373	36.2	134	11.5	60	5.8
Dived into unknown depth	688	58.8	774	75.1	320	27.3	189	18.3	146	12.5	60	5.8
Swum unsupervised	259	22.1	315	30.6	448	38.3	435	42.2	447	38.1	273	26.5
Swum after alcohol/drugs	846	72.2	819	79.4	249	21.3	172	16.7	59	5.0	32	3.2
Swum in prohibited area	510	43.6	583	56.5	514	43.9	374	36.3	130	11.1	66	6.4
Swum when cold/tired	492	42.0	460	44.6	523	44.7	503	48.8	139	11.9	60	5.9
Swum outside patrol	398	34.0	447	43.4	474	40.5	456	44.2	282	24.1	120	11.6
Dived into shallow water	856	73.1	880	85.4	230	19.6	122	11.8	68	5.8	21	2.1
Ignored safety directions	633	54.1	694	67.3	412	35.2	299	29.0	109	9.3	30	3.0

Males were twice as likely to *often* swim alone (males 11.5%, females 5.8%), dive headfirst into an unknown depth of water (males 12.5%, females 5.8%), swim in a prohibited area (males 11.1%, females 6.4%), swim when cold or tired (males 11.9%, females 5.9%), swim outside a patrolled area at a surf beach (males 24.1%, females 11.6%) and dive headfirst into shallow water (males 5.8%, females 2.1%). More females reported *never* having: swum in prohibited areas (females 56.5%, males 43.6%); swum outside patrol areas (females 43.4%, males 34.0%); ignored water safety directions (females 67.3%, males 54.1%); swum alone (females 57.9%, males 47.1%) or swum unsupervised (females 30.6%, males 22.1%).

Table 15 shows that socio-economic status, as measured by the decile rating of the school attended, did not influence the incidence of at-risk swimming behaviour to any great extent. Significant differences were found in only three of the ten at-risk swimming behaviours. They included swimming in everyday clothing, ignoring safety directions and diving without checking the water depth (see Table 3.7, Appendix 2).

Table 15. *Student Self-reported Behaviours during Swimming Activity by Socio-economic Status via Decile Rating of School Attended*

	Never			Sometimes			Often		
Swimming behaviours	**Low-decile**	**Mid-decile**	**High-decile**	**Low-decile**	**Mid-decile**	**High-decile**	**Low-decile**	**Mid-decile**	**High-decile**
	n/%	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Swum in everyday clothing	399 64.6	434 68.5	673 71.9	156 25.2	155 24.4	222 24.1	63 10.2	45 7.1	30 3.3
Ignored safety directions	316 51.1	329 51.9	506 54.8	226 36.6	251 39.6	355 38.5	76 12.3	54 8.5	64 6.9
Dived into water of unknown depth	396 64.1	425 67.0	641 69.5	149 24.1	144 22.7	216 23.4	73 11.8	65 10.2	68 7.3

Further inter-group analysis found no significant differences between the at-risk swimming behaviours of students from low- and mid-decile schools (See Table 3.8, Appendix 2). However, students from low-decile schools were more likely than high-decile school students to have swum in clothes, swum alone, and dived in without checking the depth. No significant differences were found between the at-risk swim behaviours of students attending mid- and high-decile schools.

Significant differences were found when all ten at-risk behaviours were analysed by ethnicity (see Table 3.9, Appendix 2). Further inter-group analysis found significant differences in swim behaviours among ethnic groups with the exception of the incidence of at-risk swimming behaviours between Maori and Pasifika students (see Table 3.10, Appendix 2). Table 16 shows that European/Pakeha and Asian students were less likely to swim when clothed, dive in without checking the depth, and dive into shallow water than Maori and Pasifika students. Asian students were more likely to never have engaged in at-risk practices than all other ethnic groups. For example, more Asian students *never* swum unsupervised compared with European/Pakeha, Maori and

Pasifika students (47.5% compared with 25.2%, 19.4% and 25.2% respectively), *never* swum when cold or tired (66.7% compared with 39.6%, 44.6% and 44.6% respectively), and *never* swum outside patrolled areas at a surf beach (69.7% compared with 34.8%, 30.9% and 48.0% respectively).

Table 16. *Student Self-reported Behaviours during Swimming Activity by Ethnicity*

Swimming behaviours	Never				Sometimes				Often			
	Eur	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**
	n/%	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Swum in clothing	977 73.6	235 58.1	114 56.4	145 73.2	304 22.9	119 29.5	57 28.2	42 21.2	46 3.5	50 12.4	31 15.3	11 5.5
Swum alone	725 54.6	205 50.7	95 47.0	104 52.5	517 39.0	155 38.4	73 36.1	69 34.8	85 6.4	44 10.5	34 16.8	25 12.6
Dived into unknown depth	918 69.2	230 56.9	124 61.4	153 77.3	309 23.3	112 27.7	51 30.2	31 15.7	100 7.6	62 15.4	27 13.4	14 7.0
Swum unsupervised	335 25.2	78 19.4	51 25.2	94 47.5	566 42.7	155 37.1	78 38.6	67 33.8	426 32.1	171 42.4	73 36.1	37 18.7
Swum after alcohol/drugs	1013 76.3	273 67.6	164 81.2	177 89.4	257 19.4	114 28.2	27 13.4	17 8.6	57 4.3	17 4.2	11 5.5	4 2.0
Swum in prohibited area	670 50.5	155 37.1	93 46.0	147 74.2	561 42.3	183 45.3	86 42.6	43 21.7	96 7.3	66 16.4	23 11.4	8 4.0
Swum when cold/tired	525 39.6	180 44.6	90 44.6	132 66.7	697 52.5	177 43.8	81 40.1	54 27.3	105 7.9	47 11.6	31 15.4	12 6.0
Swum outside patrol	462 34.8	125 30.9	97 48.0	138 69.7	600 45.2	188 46.5	79 39.0	46 23.2	265 20.0	91 22.5	26 12.9	14 7.0
Dived into shallow water	1079 81.3	297 73.5	154 76.2	170 85.9	207 15.6	83 20.5	35 17.3	20 10.1	41 3.0	24 6.0	13 6.4	8 4.0
Ignored safety directions	841 63.4	198 49.0	108 53.5	146 73.7	415 31.3	171 42.3	75 37.1	42 21.2	71 5.3	35 8.7	19 9.3	10 5.0

Many European/Pakeha students and Maori students *sometimes* swam outside surf patrol areas (45.2% and 46.5% respectively) and some stated that they did so *often* (20.5% and 22.5% respectively). Fewer Maori and Pasifika students than European/Pakeha and Asian students never ignored water safety directions (49.0% and 53.5% compared with 63.4% and 73.7% respectively). Fewer European/Pakeha or Maori students than Asian and Pasifika students reported never using alcohol/drugs when swimming (76.3% and 67.6% compared with 89.4% and 81.2% respectively), whereas more European/Pakeha students and Maori students reported using alcohol/drugs in conjunction with swimming activity either *sometimes* or *often* (23.7% and 32.4% compared with 10.6% and 19.8% respectively).

3.3 Aquatic Recreational Activities - What and How Often?

Students were asked what aquatic recreational activity other than swimming they had participated in during the previous year. Almost all students (n = 2079; 94.4%) reported having done some water-based recreational activity. Paddling activities (n = 1463; 66.5%) and surfing (n = 1438; 65.3%) were the two most frequently reported activities, followed by small craft boating (n = 1307; 59.4%), boat-based fishing (n = 1245; 56.6%), land-based fishing (n = 1189; 54.0%), large boat/yachting activity (n = 1026; 46.6%), underwater activity (n = 1002; 45.5%), river-based activity such as rafting/tubing (n = 768; 34.9%), and other water sports such as water-skiing (n = 761; 34.6%). The least reported activity was netting/shell-fishing activity (n = 536; 24.4%).

Table 17 shows, in descending order of frequency, participation in aquatic recreation activities as identified in question 12 of the questionnaire, expressed in four frequency categories - *never*, *not often* (1-9 times), *quite often* (10-19 times) and *very often* (more than 20 times).

Table 17. *Other Student Aquatic Recreation Activity in the Previous Year*

Aquatic recreation	Never		**Not Often (1-9 times)**		**Quite Often (10-19 times)**		**Very Often (20 times +)**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Paddling activity	738	33.5	860	39.1	390	17.7	213	9.7
Surfing activity	763	34.7	680	30.9	397	18.0	361	16.4
Boating activity	894	40.6	834	37.9	251	11.4	222	10.1
Boat-based fishing	956	43.4	660	30.0	346	15.7	239	10.9
Land-based fishing	1012	46.0	736	33.0	157	7.1	306	13.9
Underwater activity	1199	54.5	624	28.3	137	6.2	241	10.9
Large-boat activity	1175	53.4	652	29.6	190	8.6	184	8.4
River activity	1433	65.1	577	26.2	131	5.9	60	2.7
Water sport activity	1440	65.4	407	18.5	178	8.1	176	8.0
Netting/ Shell-fishing	1664	75.6	367	16.7	111	5.0	59	2.7

The majority of students reported that they participated *not often* (between 1-9 times per year) in all activities except surfing. Typically, between one half and two thirds of students reported participating less than 10 times per year in paddling activity, small boat activity, boat-based fishing, large craft activity, land-based fishing, underwater activity, and water sports. One third of students who had surfed reported participating *often* (n = 397; 18.0%) or *very often* (n = 361; 16.4%).

No significant differences were found when participation in aquatic recreation was summated and analysed by gender. Significant differences between male and female participation were found when activities were analysed individually. Significantly more males took part in small-craft boating, fishing from a boat, land-based fishing, netting/shellfish gathering and underwater activity (see Table 3.11, Appendix 2).

Table 18. *Other Student Aquatic Recreation Activity in the Previous Year by Gender*

Aquatic recreation	Never				Not Often (1-9 times)				Quite Often (10-19 times)				Very Often (20 times +)			
	Male		Female		Male		Female		Male		Female		Male		Female	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Small-craft boating	447	38.2	447	43.4	434	37.1	400	38.8	153	13.1	98	9.5	137	11.7	85	8.2
Large-craft boating	613	52.3	562	54.5	354	30.2	298	28.9	103	8.8	81	7.9	101	8.6	89	8.6
Paddling activity	388	33.1	350	33.9	466	39.8	394	38.2	209	17.8	181	17.6	108	9.2	105	10.2
Boat-based fishing	434	37.1	522	50.6	373	31.9	287	27.8	220	18.8	126	12.2	144	12.3	95	9.2
Land-based fishing	423	36.1	589	57.1	422	36.0	304	29.5	203	17.3	103	10.0	123	10.5	34	3.3
Netting/ Shell-fishing	824	70.4	840	81.5	228	19.5	139	13.5	76	6.5	35	3.4	43	3.7	15	1.5
Surfing activity	413	35.3	350	33.9	339	28.9	341	33.1	201	17.2	196	19.0	218	18.6	143	13.9
River activity	754	64.4	679	65.9	310	26.5	267	25.9	69	5.9	62	6.0	38	3.2	22	2.1
Water sport activity	765	65.3	675	65.5	220	18.8	187	18.1	99	8.5	79	7.7	87	7.4	89	8.6
Underwater activity	606	51.8	593	57.5	338	28.9	286	27.7	140	12.0	101	9.8	87	7.4	50	4.8

Table 18 shows that similar proportions of males and females *never* or *not often* engaged in small boat activity, but more males participated *quite often* or *very often*. Fishing activity, either from a boat or land, was strongly gender-oriented, with more females than males *never* participating in boat-based fishing (females 50.6%, males

37.1%) or land-based fishing (females 57.1%, males 36.1%), but more males than females participating *very often* in boat-based (males 12.3%, females 9.2%) and land-based fishing (males 10.5%, females 3.3%). More males reported participating *very often* in surfing (males 18.6%, females 13.9%), and fewer females participated in netting, shellfish gathering and underwater activity.

Significant differences were found when aquatic recreation activity was summated and analysed against socio-economic status (see Table 3.12, Appendix 2). Significantly lower participation rates were found between students from low-decile schools compared with those from mid- and high-decile schools, but no difference was found between students from mid- and high-decile schools (see Table 3.13, Appendix 2). Table 19 shows that students from low-decile schools were least likely to participate in any aquatic recreational activities except for land-based fishing and underwater activity. More students from high-decile schools participated *very often* in small craft boating, large craft boating, boat-based fishing, surfing, water sports and underwater activity.

Table 19. *Other Student Aquatic Recreation by Socio-economic Status via Decile Rating of School Attended*

Aquatic recreation	**Never**			**Not Often (1-9 times)**			**Quite Often (10-19 times)**			**Very Often (20 times +)**		
	Low-decile	**Mid-decile**	**High-decile**	**Low-decile**	**Mid-decile**	**High-decile**	**Low-decile**	**Mid-decile**	**High-decile**	**Low-decile**	**Mid-decile**	**High-decile**
	n/%	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Small-craft boating	311 49.4	256 40.2	327 35.0	232 36.8	250 39.2	352 37.6	48 7.6	79 12.4	124 13.3	38 6.0	52 8.2	132 14.1
Large-craft boating	408 64.8	351 55.1	416 44.5	162 25.7	189 29.7	301 32.2	35 5.6	51 8.0	98 10.5	24 3.8	46 7.2	120 12.8
Paddling activity	265 42.1	189 29.7	284 30.4	233 37.0	256 40.2	371 39.7	89 14.1	129 20.3	172 18.4	42 6.7	63 9.9	108 11.6
Boat-based fishing	299 47.5	258 40.5	399 42.7	169 26.8	221 34.7	270 28.9	108 17.1	91 14.3	147 15.7	53 8.4	67 10.5	119 12.7
Land-based fishing	266 42.2	288 45.2	458 49.0	203 32.2	228 35.8	295 31.6	112 17.8	76 11.9	118 12.6	48 7.6	45 7.1	64 6.8
Netting/ Shellfishing	450 71.4	492 77.2	722 77.2	124 19.7	94 14.8	149 15.9	35 5.6	33 5.2	43 4.6	20 3.2	17 2.7	21 2.2
Surfing activity	282 44.8	200 31.4	281 30.1	179 28.4	223 35.0	278 29.7	90 14.3	112 17.6	195 20.9	78 12.4	102 16.0	181 19.4
River activity	464 73.7	376 59.0	593 63.4	129 20.5	193 30.3	255 27.3	19 3.0	50 7.8	62 6.6	17 2.7	18 2.8	25 2.7
Water sport activity	480 76.2	417 65.5	543 58.1	89 14.1	121 19.0	197 21.1	40 6.3	48 7.7	90 9.6	20 3.2	51 8.0	105 11.2
Underwater activity	361 57.3	350 54.9	488 52.2	166 26.3	187 29.4	271 29.0	69 11.0	61 9.6	111 11.9	33 5.2	39 6.1	65 7.0

Significant differences were found when aquatic recreation was analysed against ethnicity (see Tables 3.14, Appendix 2). European/Pakeha students reported higher levels of participation than all other ethnic groups in aquatic recreation involving boating or paddling craft. More European/Pakeha and Maori students took part in surfing and underwater activity than did Pasifika and Asian students. In addition, Maori students had greater participation levels than either Pasifika or Asian students, and Pasifika students had greater participation levels than Asian students (see Tables 3.15, Appendix 2). More Maori and Pasifika students participated in land-based fishing and netting/shellfish gathering activities than all other ethnic groups. Asian students had lower levels of participation in any aquatic recreational activity with the exception of land-based fishing where their participation was no different from that of European/Pakeha students, but less than that of Maori and Pasifika students.

3.4 Aquatic Recreation Behaviour

Students who had taken part in aquatic recreation other than swimming in the previous year (n = 2079; 94.4%) were asked if they had engaged in six at-risk behaviours commonly associated with aquatic activities.

Table 20. *Student Self-reported Behaviour during Aquatic Recreation in the Previous Year*

Aquatic recreation behaviours	**Never**		**Sometimes**		Mostly		**Always**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Told adult beforehand	184	8.9	605	29.1	502	24.1	788	37.9
Had adult supervision	223	10.7	915	44.0	539	25.9	403	19.4
Wore a lifejacket	392	18.9	560	27.0	471	22.7	653	31.5
Checked weather/water	591	28.4	670	32.2	410	19.7	409	19.7
Gone on your own	1212	58.3	713	34.3	122	5.9	32	1.5
Used alcohol/drugs	1642	79.0	360	17.3	44	2.1	33	1.6

Table 20 shows behaviours during aquatic activities other than swimming as identified in question 14 of the questionnaire, expressed in four frequency categories - *never, sometimes, mostly* and *always*. Some participants reported that they were: *never* supervised by an adult (n = 222; 10.7%); *never* told an adult of their intentions beforehand (n = 184; 8.9%); *never* wore lifejackets during boating activity (n = 394; 18.9%) and *never* checked the weather or water conditions beforehand (n = 591; 28.4%). Many students had *sometimes* done the activity on their own (n = 867; 41.7%) or used alcohol/drugs in association with aquatic activities (n = 437; 21.0%).

Significant differences were found between males and females when at-risk behaviours were analysed against gender, with the exception of checking the weather/water conditions beforehand (see Table 3.16, Appendix 2). Table 21 shows that females were more likely never to have performed, and males more likely to have often performed, any of the at-risk behaviours during aquatic recreation.

Table 21. Student Self-reported Behaviour during Aquatic Recreation by Gender

Aquatic recreation behaviours	**Never**		**Sometimes**		**Mostly**		**Always**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
	n/%	***n/%***	***n/%***	***n%***	***n/%***	***n/%***	***n/%***	***n/%***
Told adult beforehand	122	62	366	239	268	234	347	441
	11.1	6.4	33.2	24.5	24.3	24.0	31.5	45.2
Wore a lifejacket	238	154	317	243	233	238	313	340
	21.6	15.9	28.8	24.9	21.2	24.4	28.4	34.8
Have adult supervision	151	72	505	410	259	280	189	214
	13.7	7.4	45.9	42.0	23.5	28.7	17.2	21.9
Checked weather/water	334	257	343	327	198	212	229	180
	33.1	26.3	31.2	33.5	18.0	21.7	20.8	18.4
Gone on your own	559	653	430	263	74	48	20	12
	50.8	66.9	40.9	26.9	6.7	4.9	1.8	1.2
Used alcohol/drugs	809	833	241	119	31	13	22	11
	73.5	85.4	21.9	12.2	2.8	1.3	2.0	1.1

The difference is particularly noticeable at the extremes of the frequency range in several of the reported behaviours. For example, fewer females *never* told an adult beforehand (females 6.4%, males 11.1%), *never* wore lifejackets (females 15.9%, males

21.6%), or *never* had adult supervision (females 7.4%, males 13.7%). In contrast, more females than males *always* told an adult beforehand (females 45.2%, males 31.5%), *always* wore lifejackets (females 34.8%, males 28.4%), or *always* had adult supervision (females 21.9%, males 17.2%). Also, more than two thirds of females *never* did aquatic activity on their own compared to one half of males (females 66.9%, males 50.8%), and more females than males *never* used alcohol/drugs in conjunction with aquatic activity (females 85.4%, males 73.5%).

At-risk behaviour during aquatic recreation was not greatly affected by socio-economic status (see Table 3.17, Appendix 2). Inter-group analysis showed that significantly more students from low-decile schools than other groups did aquatic activity without adult supervision or alone (see Table 3.18, Appendix 2). Significant differences were found in five of the six at-risk aquatic recreation behaviours when measured against ethnicity, with use of alcohol/drugs during aquatic recreation being the only behaviour to show no significant difference (see Table 3.19, Appendix 2). However, further inter-group analysis did not find any consistent pattern of at-risk behaviour from any one ethnic group (see Tables 3.20 and 3.21, Appendix 2).

Table 22. *Student Self-reported Behaviour during Aquatic Recreation by Ethnicity*

Aquatic	**Never**				**Sometimes**				**Mostly**				**Always**			
recreation	**Eur**	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**
behaviours	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Wore	189	84	58	45	332	131	46	36	322	75	29	44	448	96	50	49
lifejacket	14.6	21.7	31.5	25.9	25.7	33.9	25.0	20.7	24.9	19.4	15.8	25.3	34.7	24.9	27.2	28.2
Used	1016	281	153	158	231	94	19	10	30	5	6	2	15	7	6	4
alcohol/drugs	78.7	72.8	83.2	90.8	17.8	24.4	10.3	5.7	2.3	1.3	3.3	1.1	1.2	1.8	3.3	2.3
Had adult	114	47	23	30	591	187	64	60	353	91	48	36	234	63	49	48
supervision	8.8	12.2	12.5	17.2	47.8	48.4	34.8	34.5	27.3	23.5	26.1	26.8	18.1	16.3	26.6	27.6
Told adult	73	41	32	31	356	140	52	50	330	85	44	35	533	121	56	58
beforehand	5.6	10.6	17.4	17.8	27.6	36.3	28.3	28.7	23.2	22.0	23.9	20.1	41.0	31.3	30.4	33.3
Gone on your	767	207	89	119	446	143	73	41	66	28	16	11	13	9	6	3
own	59.4	53.6	48.4	68.4	34.5	37.0	39.7	23.6	5.1	7.3	8.7	6.3	1.0	2.3	3.3	1.7
Checked	352	122	64	41	424	123	52	58	275	60	28	40	242	82	40	35
conditions	27.3	31.6	34.8	23.6	32.8	31.9	28.3	33.3	21.3	15.5	15.2	23.0	18.7	21.4	21.7	20.1

Table 22 shows that more Maori, Pasifika and Asian students than European/Pakeha students either *never* or *sometimes* wore a lifejacket when boating (55.6%, 56.5%, 53.5% compared with 40.3% respectively). Similarly, more Maori, Pasifika and Asian students *never* or *sometimes* told an adult of their intentions before participating in aquatic recreation (46.9%, 45.7%, 46.5% compared with 33.2% respectively). More European/Pakeha and Maori students than Pasifika and Asian students *never* or *sometimes* had adult supervision (56.6% and 60.6% compared with 47.3% and 51.7% respectively). While the differences in alcohol consumption between ethnic groups was not significant, more Asian and Pasifika students *never* used alcohol/drugs in conjunction with aquatic recreation than European/Pakeha and Maori students (90.8% and 83.2% compared with 78.7% and 72.8% respectively). In contrast, more European/Pakeha and Maori students than Asian or Pasifika students reported *sometimes* using alcohol/drugs (17.8% and 24.4% compared with 5.7% and 10.3% respectively).

4 Chapter Water Safety Knowledge – What Students Know

This chapter reports on what water safety skills and knowledge New Zealand youth possess that may mediate drowning risk in an aquatic environment. Firstly, the chapter presents analyses of student estimates of their swimming ability, ability to perform a deep-water rescue and resuscitation skills. Secondly, the chapter reports on cognitive understanding of water safety principles related to small boat safety and surf safety.

4.1 Swimming Ability

Students were asked to estimate their swimming ability in seven distance categories as identified in question 17 of the questionnaire. Table 23 shows that more than one third of the students reported that they could swim less than 50 m (n = 850; 38.6%). Of these, some could not swim any distance (n = 89; 4.0%), some could swim less than 25m (n = 200; 9.1%) and the remainder could swim between 25-50 m (n =561; 25.5%). The cumulative total of those who thought they could swim 100 m or less included over one half of the respondents (n = 1192; 54.1%). More than one quarter of students estimated that they could swim between 100-400 m (n = 592; 26.9%) and almost one fifth of the students thought that they could swim more than 400 m (n = 417; 18.9%).

Table 23. *Swimming Ability in Seven Distance Categories by Gender*

Swimming ability	**Male**		***Cum***	**Female**		**Cum**	**Total**		**Cum**
	n	**%**	**%**	***n***	**%**	**%**	**n**	**%**	**%**
Cannot swim	43	3.7	3.7	46	4.5	4.5	89	4.0	4.0
Less than 25 m	90	7.7	11.4	110	10.7	15.1	200	9.1	13.1
Between 26–50 m	274	23.4	34.8	287	27.8	43.0	561	25.5	38.6
Between 51-100 m	169	4.4	49.2	173	16.8	59.7	342	15.5	54.1
Between 101-200 m	161	13.7	62.9	143	13.9	73.6	304	13.8	67.9
Between 201-400 m	163	13.9	76.9	125	12.1	85.7	288	13.1	81.0
More than 400 m	270	23.1	100.0	147	14.3	100	417	18.9	100.0

Significant differences were found between the self-estimated swimming abilities of females and males, with more females reporting lesser swimming ability and more males estimating greater swimming ability (see Table 4.1, Appendix 2). Slightly more females estimated that they could not swim at all (females 4.5%, males 3.7%), could swim less than 25 m (females 15.1%, males 11.4%), or could swim between 25-50 m (females 27.8%, males 23.4%). Cumulatively, more females than males estimated that they could swim less than 100 m (females 59.7%, males 49.2%). In contrast, more than one third of males compared with only one quarter of females thought they could swim more than 100 m (males 37.1%, females 26.4%). Males and females estimates of being able to swim between 100-200 m and between 200-400 m were similar. However, more males reported being able to swim more than 400 m than females (males 23.1%, females 14.3%).

Significant differences were found when self-estimated swimming ability was analysed against socio-economic status and ethnicity (see Table 4.2, Appendix 2). Students from low-decile schools reported significantly poorer ability, and students from high-decile schools significantly better ability, than other students (see Table 4.3, Appendix 2).

Table 24. *Swimming Ability and Socio-economic Status via Decile Rating of School Attended*

Swimming ability	**Low-decile**		***Cum %***	**Mid-decile**		**Cum %**	**High-decile**		**Cum %**
	n	***%***		***n***	***%***		**n**	**%**	
Cannot swim	41	6.5	6.5	30	4.7	4.7	18	1.9	1.9
Less than 25 m	93	14.8	21.3	59	9.3	14.0	48	5.1	7.1
Between 26–50 m	179	28.4	49.7	172	27.0	41.0	210	22.5	29.5
Between 51-100 m	87	13.8	63.5	94	14.8	55.7	161	17.2	46.5
Between 101-200 m	94	14.9	78.4	92	14.3	70.0	119	12.7	59.5
Between 201-400 m	59	9.4	87.8	80	12.6	82.6	149	15.9	75.4
More than 400 m	77	12.2	100.0	11o	17.3	100.0	230	24.6	100.0

Table 24 shows that more students from low-decile schools than from mid- or high-decile schools were unable to swim 25 m (21.3% compared with 14.0% and 7.1% respectively) or 50 m (49.7% compared with 41.0% and 29.5% respectively). Fewer low-decile school students thought they were able to swim 100-400 m (24.3% compared with 26.9% and 28.8% respectively) or more than 400 m (12.2% compared with 17.3% and 24.7% respectively). The difference between the swimming ability of students from high- and low-decile schools particularly is evident with regards to being unable to swim more than 25 m (21.3% compared with 7.3%) and being able to swim more than 400 m (12.2% compared with 24.7%).

Significant differences were found when swimming ability was analysed against ethnicity, with the exception of comparison between Pasifika and Asian students (see Table 4.4, Appendix 2). Table 25 shows that European/Pakeha students reported the highest, Pasifika and Asian students the lowest, estimates of swimming proficiency. Maori students reported greater swimming proficiency than Pasifika or Asian students. Fewer European/Pakeha students than Maori, Pasifika or Asian students thought they were able to swim less than 25 m (7.5% compared with 13.8%, 26.9% and 32.0% respectively) or less than 100 m (47.1% compared with 55.7%, 72.5% and 77.2% respectively). More European/Pakeha students thought that they could swim more than 100 m (52.8% compared with 42.0%, 27.5% and 22.9% respectively) or more than 400 m (23.2% compared with 14.3%, 7.8% and 11.7% respectively).

Table 25. *Swimming Ability and Ethnicity*

Swimming ability	**European/Pakeha**		**Maori**		**Pasifika**		**Asian**	
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Cannot swim	22	1.6	10	2.5	19	9.3	31	15.0
Less than 25 m	79	5.9	46	11.3	36	17.6	35	17.0
Between 26–50 m	302	22.6	122	30.0	61	28.9	66	32.0
Between 51-100 m	228	17.0	48	11.8	32	15.7	27	13.1
Between 101-200 m	185	13.8	74	18.2	25	12.3	14	6.8
Between 201-400 m	212	15.8	48	11.8	15	7.4	9	4.4
More than 400 m	310	23.2	58	14.3	16	7.8	24	11.7

Student swimming ability was compared with participation in swimming and other aquatic activities in order to test the assumption that those with better swimming ability were more likely to participate in aquatic activities and thus be at greater risk of drowning as a consequence of greater exposure. Swimming ability also was tested against associated at-risk behaviours to test the assumption that better swimming ability led to increased at-risk behaviours as a consequence of overconfidence in swimming ability.

Table 26. *Relationship between Swimming Ability, Aquatic Activity and Associated At-risk Behaviours*

	Swimming ability
Swimming activity	.391*
Aquatic recreation activity	.412*
Swimming at-risk behaviours	.093
Aquatic recreation at-risk behaviours	-.001

*Significant at the .01 level.

Table 26 shows a modest degree of relationship between swimming ability and participation in swimming ($r_s = .391$, $p < .01$) and other aquatic activities ($r_s = .412$, $p < .01$), with those of better swimming ability participating more frequently in aquatic recreation. No significant association was found between swimming ability and at-risk behaviour in either swimming or other aquatic activities.

4.2 Rescue Ability

Table 27 shows student self-estimated ability to perform a deep-water rescue as identified in question 18 of the questionnaire, expressed in four ability categories and analysed by gender, socio-economic status and ethnicity. One third of all students had no rescue ability (n = 761; 34.6%) and a quarter of students thought that they would be at great risk (n = 546; 24.8%). One third were confident of their rescue ability (n = 763; 34.7%), and a small proportion reported excellent rescue ability (n = 131; 5.9%).

Table 27. *Rescue Ability by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity*

Rescue ability	No rescue ability		Could attempt, at great risk		Confident of rescue ability		Excellent rescue ability	
	n	%	*n*	%	*n*	%	*n*	%
Male	403	34.4	249	21.3	442	37.7	77	6.6
Female	359	34.8	297	28.8	321	31.1	54	5.2
Low-decile	266	42.1	122	19.4	208	33.0	35	5.6
Mid-decile	208	32.7	178	27.9	213	33.4	38	6.0
High-decile	288	30.9	246	26.4	341	36.5	58	6.2
European/Pakeha	383	28.6	359	26.8	512	38.2	153	11.4
Maori	140	34.5	86	21.2	155	38.2	25	6.2
Pasifika	99	48.5	41	20.1	55	27.0	9	4.4
Asian	121	58.7	44	21.4	32	15.5	9	4.4
Total	762	34.6	546	24.8	763	34.7	131	5.9

No significant differences were found between males and females in self-estimated rescue ability (see Table 4.5, Appendix 2). However, Table 27 shows that more females thought that they would be at great risk if they attempted a rescue (females 28.8%, males 21.3%). More males expressed confidence in their rescue ability (males 37.7%, females 31.1%) and a greater proportion of males thought that they had excellent rescue skills (males 6.6%, females 5.2%).

Significant differences were found when rescue ability was analysed against socio-economic status (see Table 4.5, Appendix 2). Inter-group analysis found significant differences between students from low-decile schools and those attending mid- or high-decile schools, but no difference between students from mid- and high-decile schools (see Table 4.6, Appendix 2). Table 27 shows that more students from low-decile schools than from mid- or high-decile schools estimated that they could not perform a rescue (42.1% compared with 32.7% and 30.9% respectively). Slightly fewer students from low-decile schools reported being confident about their rescue ability (38.6% compared with 39.4% and 42.7% respectively).

Significant differences in rescue ability were found between students of different ethnicities in all inter-group comparisons except for comparisons between Pasifika and

Asian students (see Table 4.7, Appendix 2). Table 27 shows that more European/Pakeha and Maori students were confident of their rescue ability than Pasifika and Asian students (38.2% compared with 27.5% and 15.5% respectively). More European/Pakeha students thought that they had excellent rescue ability (11.4% compared with 6.2%, 4.4% and 4.4% respectively). Maori students were more confident of their rescue ability than Pasifika and Asian students. More than one half of Asian students reported no rescue ability (n = 121; 58.7%) and less than one fifth had confidence in their rescue ability (n = 42; 19.9%).

4.3 Resuscitation Ability

Table 28 shows student self-estimated ability to perform cardio-pulmonary resuscitation (CPR) as identified in question 19 of the questionnaire, expressed in four ability categories and analysed by gender, socio-economic status and ethnicity. Many students estimated that they either could not perform CPR (n = 939; 42.6%) or had a poor understanding of CPR skills (n = 513; 23.3%). More than one quarter were confident in their ability to perform CPR (n = 602; 27.3%), and a small proportion held current CPR qualifications (n = 148; 6.7%).

Table 28. *Resuscitation (CPR) Ability by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity*

Resuscitation (CPR) ability	**Cannot perform CPR**		**Poor CPR skills**		**Confident of CPR skills**		**Qualified in CPR skills**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Male	530	45.3	261	22.3	297	25.4	83	7.1
Female	409	39.7	252	24.2	305	29.6	65	6.3
Low-decile	300	47.6	130	20.6	155	24.6	45	7.1
Mid-decile	263	41.1	152	23.9	182	28.6	41	6.4
High-decile	377	40.2	231	24.8	265	28.4	62	6.6
European/Pakeha	487	36.4	342	25.5	409	30.5	101	7.5
Maori	183	45.1	84	20.7	113	27.8	26	6.4
Pasifika	120	58.8	42	20.6	36	17.6	6	2.9
Asian	130	63.1	36	17.5	30	14.6	10	4.9
Total	939	42.6	513	23.3	602	27.3	148	6.7

Significant differences were found when CPR ability was analysed against gender (see Table 4.8, Appendix 2). As can be seen in Table 28, more males reported no CPR skills (males 45.3%, females 39.7%) and slightly more females were confident about their CPR skills (females 29.6 %, males 25.4%).

Significant differences also were found when CPR ability was analysed against socio-economic status (see Table 4.8, Appendix 2). Inter-group analysis found no significant differences between students attending low- and mid-decile schools, or between students from mid- and high-decile schools (see Table 4.9, Appendix 2). However, significant differences were found between students from low-decile and high-decile schools. Table 28 shows that more students from low-decile schools could not perform CPR (47.6% compared with 40.2% respectively) and fewer students from low-decile schools reported being confident about their CPR skills (24.6% compared with 28.4% respectively).

Significant differences were again evident when CPR ability was analysed against ethnicity (see Table 4.8, Appendix 2). Inter-group analysis found significant differences in CPR ability among most ethnic groups, with the exception of Asian students compared with Pasifika students (see Table 4.32, Appendix 2). Table 28 shows that fewer European/Pakeha students than Maori, Pasifika and Asian students reported not being able to perform CPR (36.4% compared with 45.1%, 58.8% and 63.1% respectively). Maori students reported greater confidence in their capacity to perform CPR skills than either Pasifika or Asian students. More European/Pakeha and Maori students than Pasifika and Asian students were confident in their ability to perform CPR (30.5% and 27.8% compared with 17.6% and 14.6% respectively).

4.4 Knowledge of Small Boat Safety

Table 29 shows student understanding of small boat safety as identified in question 24 of the questionnaire. Students were asked what essential safety equipment would be required for a boating trip, what pre-event safety preparation they would engage in, and what safety rules they would impose as skippers.

Table 29. *Small Boat Safety Knowledge expressed in terms of Safety Items, Boat Safety Preparation and On-board Safety Rules*

Safety items identified	**Safety items** n/%	Cum%	**Safety factors identified**	**Safety preparation** ***n/%***	***Cum%***	**On-board rules** ***n/%***	***Cum%***
No safety items	185 8.4	8.4	**No safety factors**	385 17.5	17.5	521 23.7	23.7
1-2 safety items	411 18.7	27.1	**1 safety factor**	521 23.7	41.1	696 31.6	55.3
3-4 safety items	774 35.1	62.2	**2 safety factors**	808 36.7	77.8	692 31.4	86.7
5-6 safety items	591 26.8	89.1	**3 safety factors**	398 18.1	95.9	248 11.3	98.0
>7 safety items	220 10.0	99.0	**>4 safety factors**	87 4.0	99.7	42 1.9	99.8

Some students did not recall any essential safety items (n = 185; 8.4%) and almost one fifth of students (n = 411, 18.7%) reported 1-2 boat safety items. Most students listed 3-6 safety items (n = 1365; 61.9%) and some students were able to list 7 or more safety items (n = 220; 10.0%). Some students reported either no essential boat safety preparation (n = 385; 17.5%) or identified one preparatory safety task (n = 521; 23.7%). Most students listed two or more essential safety preparation tasks (n = 1295; 58.8%), and, of these, some listed four or more preparatory tasks (n = 87; 4%). Almost one quarter of students listed no safety rules (n = 521; 23.7%) and one third listed one safety rule that they would implement (n = 696; 31.6%). Less than half of the students thought that they would implement two or more safety rules on board (n = 1026; 44.6%) and, of these, some listed three or more safety rules that they would implement (n = 290; 13.3%).

Significant differences in small boat safety knowledge were found between males and female students when the essential safety items, safety preparation and onboard rules were summated and when compared individually (see Table 4.11, Appendix 2). Table 30 shows that fewer females recalled no essential safety items (females 6.3%, males 10.2%), no safety preparation (females 13.8%, males 20.8%) and no on-board safety rules (females 17.3%, males 29.3%). A greater number of females recalled more than

five essential safety items (females 41.6%, males 34.4%), more than three important safety preparation tasks (females 26.6%, males 18.1%) and more than three onboard safety rules (females 18.1%, males 8.9%).

Table 30. *Small Boat Safety Knowledge by Gender*

Safety items identified	**Safety items**		**Safety factors identified**	**Safety preparation**		**On-board rules**	
	Female	**Male**		**Female**	**Male**	**Female**	**Male**
	n/%	***n/%***		***n/%***	***n/%***	***n/%***	***n/%***
No safety items	65 6.3	120 10.2	No safety factors	142 13.8	243 20.8	178 17.3	343 29.3
1-2 safety items	180 17.5	231 19.7	1 safety factor	207 20.1	314 26.8	284 27.6	412 35.2
3-4 safety items	357 34.7	417 35.6	2 safety factors	406 39.5	402 34.3	380 37.0	312 26.6
5-6 safety items	296 28.7	295 25.2	3 safety factors	215 20.9	183 15.6	154 15.0	94 8.0
>7 safety items	132 12.9	108 9.2	>4 safety factors	58 5.7	29 2.5	32 3.1	10 0.9

Significant differences were found when each component of small boat safety knowledge was analysed individually and when summated as small boat safety knowledge against socio-economic status (see Tables 4.12 - 4.13, Appendix 2). Table 31 shows that more students from low-decile schools were unable to identify two safety items when compared to students from mid- and high-decile schools (34.9% compared

Table 31. *Small Boat Safety Knowledge by Socio-economic Status*

Safety items	Safety items			Safety factors	Safety preparation			On-board rules		
	Low-decile n/%	Mid-decile n/%	High-decile n/%		Low-decile *n/%*	Mid-decile *n/ %*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*
No safety items	66 10.5	64 10.0	55 5.9	No safety factors	141 22.4	128 20.1	116 12.4	194 30.8	146 22.9	181 19.4
1-2 safety items	153 24.3	110 17.3	148 6.7	**1 safety factor**	163 25.9	157 24.6	201 21.5	199 31.6	208 32.7	289 30.9
3-4 safety items	220 34.9	221 34.7	333 35.6	**2 safety factors**	218 34.6	225 35.3	365 39.0	167 26.5	202 31.7	323 34.5
5-6 safety items	137 21.7	176 27.6	278 29.7	3 safety factors	88 14.0	98 15.4	212 22.7	61 9.7	70 11.0	117 12.5
>7 safety items	54 8.5	66 10.4	120 12.9	**>4 safety factors**	19 3.0	29 4.5	39 4.5	8 1.3	11 1.7	23 2.5

with 27.3% and 12.6% respectively). Also, more students from low-decile schools failed to recall any boat safety preparatory actions (22.4% compared with 20.1% and 12.4% respectively) or identify any on-board safety rules they would establish (30.8% compared with 22.9% and 19.4% respectively).

Significant differences were also found when components of small boat safety knowledge were analysed individually and when summated as small boat safety knowledge against ethnicity (see Table 4.14, Appendix 2), with the exception of comparisons between Maori and Pasifika students (see Table 4.15, Appendix 2). Table 32 shows that European/Pakeha students were least likely of all ethnic groups to not identify safety items, pre-event safety preparation and on-board safety rules. They were also more likely to identify more than five essential safety items, identify three or more necessary acts of safety preparation, and list three or more onboard safety rules. Table 32 also shows that Asian students were most likely to identify no safety items, safety preparation and on-board safety rules.

Table 32. *Small Boat Safety Knowledge by Ethnicity*

Safety items	**Safety items**				**Safety factors**	**Boat trip preparation**				**On-board safety rules**			
	Eur	**Ma**	**Pac**	**Asia**		**Eur**	**Ma**	**Pac**	**Asia**	**Eur**	**Ma**	**Pac**	**Asia**
	n/%	**n/%**	**n/%**	**n/%**		***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
No safety items	70 5.2	42 10.2	14 6.9	55 26.7	**No safety factors**	**160** 11.9	90 22.2	37 18.1	89 43.2	247 18.4	118 29.1	53 26.0	91 44.2
1-2 safety items	193 14.4	80 19.7	53 26.0	74 35.9	**1 safety factor**	282 21.1	113 27.8	73 35.8	44 21.4	418 31.2	128 31.5	75 36.8	62 30.1
3-4 safety items	488 36.4	156 38.4	72 35.3	45 21.8	**2 safety factors**	527 39.4	153 37.7	62 30.4	47 22.8	461 34.4	115 28.3	57 27.9	45 21.8
5-6 safety items	405 30.2	98 24.1	50 24.5	22 10.7	**3 safety factors**	300 22.4	43 10.6	25 12.3	21 10.2	175 13.1	40 9.9	18 8.8	7 3.4
>7 safety items	182 8.7	30 7.4	15 7.4	10 4.9	**>4 safety factors**	67 5.0	7 1.7	7 3.4	5 2.4	35 2.6	5 1.2	1 0.5	1 0.5

4.5 Knowledge of Surf Safety

Table 33 shows student understanding of surf safety as identified in question 25 of the questionnaire. Students were asked to identify surf hazards, list safety decisions and show where they would locate themselves on the surf beach illustrated in the question. Some students did not identify any surf hazards (n = 417; 18.9%), one quarter identified one surf hazard (n = 560; 25.4%), more than one third identified two surf hazards (n = 813; 36.9%) and almost one fifth identified three or more hazards (n = 406; 18.4%).

Table 33. *Surf Safety Knowledge expressed in terms of Surf Hazard Identification, Safety Decisions and Safety of Location*

Safety factors	Surf hazard identification n/%	*Cum. %*	Safety decisions *n/%*	Cum. %	Risk factor	Safety of location n/%	Cum. %
No safety factors	417 18.9	18.9	649 29.5	29.5	**Extreme risk**	610 27.7	27.7
1 safety factor	560 25.4	44.3	698 31.7	61.2	**High risk**	84 3.8	31.5
2 safety factors	813 36.9	81.3	592 26.9	88.1	**Moderate risk**	209 9.5	41.0
3 safety factors	328 14.9	96.2	228 10.4	98.4	**Low risk**	1282 58.2	99.2
>4 safety factors	78 3.5	99.7	28 1.2	99.7			

Almost one third of all students either made no safety decisions (n = 649; 29.5%) or made one safety decision (n = 698; 31.7%), and the remainder of students made two or more effective safety decisions (n = 848; 38.5%) about their day's activities. When asked where they would locate themselves on the beach and when doing water activity, most students chose the most safe option (n = 1282; 58.2%) and more than one quarter chose the extreme risk option (n = 610; 27.7%).

Significant differences between males and females were found when surf safety knowledge was analysed against gender (see Table 4.16, Appendix 2). Table 34 shows that fewer females failed to identify any surf hazards (females 15.9%, males 21.7%) and more females identified three or more potential hazards (females 22.2%, males 15.6%). Fewer females listed no safety decisions about their day's activity (females 22.1%, males 36.1%) and twice as many females than males made three or more safety

decisions (females, 15.8%, males 8.1%). When asked to select where they would position themselves on the beach, one fifth of females and one third of males chose the extreme risk option (females 20.8%, males 34.1%), and two thirds of females compared with one half of males chose the low risk option (females 66.7%, males 51.6%).

Table 34. *Surf Safety Knowledge by Gender*

Safety factors	Hazard identification		Safety decisions		Risk factor	Safety of location	
	Female n/%	Male n/%	Female n/%	Male n/%		Female n/%	Male n/%
No safety factors	163 15.9	254 21.7	227 22.1	422 36.1	**Extreme risk**	213 20.8	397 34.1
1 safety factor	256 25.0	304 26.0	312 30.4	386 33.0	**High risk**	27 2.6	57 4.9
2 safety factors	379 36.9	434 37.1	325 31.7	267 22.8	**Moderate risk**	100 9.8	109 9.4
3 safety factors	183 17.8	145 12.4	141 13.8	87 7.4	**Low risk**	682 66.7	600 51.6
>4 safety factors	45 4.4	33 2.8	20 2.0	8 0.7			

Significant differences were found when surf safety knowledge was summated and when components were analysed individually against socio-economic status, except for responses regarding the safety of location (see Table 4.17, Appendix 2). Significant differences were found between all decile groups when inter-group comparisons were made (see Table 18, Appendix 2). These differences are shown in Table 35 with fewer students from high-decile schools than from low- or mid-decile schools not recognising

Table 35. *Surf Safety Knowledge by Socio-economic Status via Decile Rating of School*

Safety factor	Hazard identification			Safety decisions			Risk factor	Safety of location		
	Low-decile n/%	Mid-decile n/%	High-decile n/%	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*		Low-decile n/%	Mid-decile n/%	High-decile n/%
No safety factors	159 25.2	137 21.5	121 12.9	247 39.2	195 30.6	207 22.1	**Extreme risk**	198 31.4	172 27.0	240 25.7
1 safety factor	174 27.6	159 25.0	227 24.3	193 30.6	197 30.9	308 32.9	**High risk**	34 5.4	18 2.8	32 3.4
2 safety factors	223 35.4	221 34.7	369 39.5	132 21.0	174 27.3	286 30.6	**Moderate risk**	44 7.0	60 9.4	105 11.2
3 safety factors	56 8.9	93 14.6	179 19.1	51 8.1	63 9.9	114 12.2	**Low risk**	353 56.0	383 60.1	558 59.7
>4 safety factors	18 2.9	24 3.8	36 3.8	6 1.0	6 0.9	17 1.8				

any surf hazards (12.9% compared with 21.5% and 25.2% respectively) or failing to make safety decisions (22.1% compared with 39.2% and 30.6% respectively). Fewer students from low-decile schools than from either mid- or high-decile schools chose the low risk option of where to go on the beach (56.0% compared with 60.1% and 59.7% respectively) and more chose the extreme risk option (31.4% compared with 27.0% and 25.7% respectively).

Significant differences also were found when surf hazard identification, decision-making about surf activity and choice of location scores were analysed separately and when summated as a measure of surf safety knowledge against ethnicity (see Table 4.19, Appendix 2). Significant differences were found in inter-group comparisons between all ethnic groups with the exception of comparisons between Maori and Pasifika students (see Table 4.20, Appendix 2). Table 36 shows that fewer European/Pakeha students did not identify any surf hazards, made no safety decisions and did not identify the safest location. Many Asian students did not identify any surf hazards (n = 85; 41.3%), make any surf safety decisions (n = 102, 49.5%) or identify the safest location on the beach (n = 103; 50.0%). They also were less likely than all other ethnic groups to be able to identify three or more surf hazards or be able to identify two or more decisions about their surf safety. In addition, fewer Asian students than all other ethnic groups chose the lowest risk beach location (n = 72; 35.0%).

Table 36. *Surf Safety Knowledge by Ethnicity*

Safety factor	**Hazard identification**				**Safety decisions**				**Risk factor**	**Safety of location**			
	Eur	**Ma**	**Pac**	**Asia**	***Eur***	***Ma***	***Pac***	***Asia***		**Eu**	**Ma**	**Pac**	**Asia**
	n/%	**n/%**	**n/%**	**n/%**	***n/%***	***n/%***	***n/%***	***n/%***		***n/%***	***n/%***	***n/%***	***n/%***
No safety factors	156 11.7	108 26.6	56 27.5	85 41.3	277 20.7	163 40.1	87 42.6	102 49.5	**Extreme risk**	269 20.1	141 34.7	80 39.2	103 50.0
1 safety factor	330 24.6	106 26.1	55 27.0	55 26.7	429 32.0	131 32.3	58 28.4	68 33.0	**High risk**	43 3.2	14 3.4	14 6.9	12 5.8
2 safety factors	528 39.4	149 36.7	66 32.4	56 27.2	432 32.3	84 20.7	43 21.1	22 10.7	**Moderate risk**	144 10.8	30 7.4	15 7.4	19 9.2
3 safety factors	263 19.6	35 8.6	16 7.6	8 3.9	173 12.9	25 6.2	15 7.4	13 6.3	**Low risk**	870 65.0	218 53.7	95 46.6	72 35.0
>4 safety factors	62 4.7	6 1.5	11 5.4	2 1.0	28 2.1	3 0.7	1 0.5	1 0.5					

5 Chapter Perception of Drowning Risk and Water Safety Attitudes - What Students Think

This chapter reports on students' perception of drowning risk and their attitudes towards water safety in order to determine whether what youth think about drowning risk and water safety predisposes them to greater or lesser drowning risk than others.

5.1 Perceptions of Drowning Risk

Table 37 shows student perceptions of drowning risk as identified in question 20 of the questionnaire, expressed in four categories including *extreme risk, high risk, slight risk* and *no risk*. Most participants categorised being in the deep end of a swimming pool (n = 1601; 72.7%) as *no risk*, and some reported capsizing in a canoe offshore (n = 474; 21.5%) or falling into a deep river fully clothed (n = 502; 22.8%) as *no risk*. Very few students considered that being caught in a rip at a surf beach (n = 162; 7.4%) or being swept off isolated rocks (n = 122; 5.5%) as *no risk*.

Table 37. *Student Perceptions of Drowning Risk.*

Risk scenario	Extreme Risk		High Risk		Slight Risk		No Risk	
	n	%	*n*	%	*n*	%	*n*	%
Capsized canoe 100 metres offshore	190	8.6	491	22.3	1046	47.5	474	21.5
Caught in rip current at surf beach	560	25.4	926	42.1	553	25.1	162	7.4
Chased toy into deep end of swimming pool	84	3.8	111	5.0	405	18.4	1601	72.7
Fell into deep river when fully clothed	225	10.2	541	24.6	933	42.4	502	22.8
Swept off isolated rocks whilst fishing	1026	46.6	775	35.2	278	12.6	122	5.5

Many students considered that being swept off isolated rocks (n = 1026; 46.6%) or being swept out in a rip at a surf beach (n = 560; 25.4%) constituted an *extreme risk*. One third of students considered that falling into a deep river when fully clothed (n =

766; 34.8%) constituted an *extreme risk* or *high risk*, whereas almost two thirds considered that it was only *slight risk* or *no risk* (n = 1435; 65.2%). Similarly, one third of students thought that capsizing a canoe 100 metres from shore created *extreme risk* or *high risk* (n = 681; 30.9%), and more than two thirds thought that it was only *slight risk* or *no risk* (n = 1520; 69.0%).

Significant differences were found between male and female risk perception for four of the five aquatic scenarios, the exception being the risk involved in the deep end of a swimming pool (see Table 5.1, Appendix 2). Table 38 shows that more females than males reported *extreme risk* or *high risk* for each of the aquatic scenarios, whereas more males than females reported perceptions of *slight risk* or *no risk.*

Table 38. *Student Perceptions of Drowning Risk by Gender*

Risk scenario	Extreme Risk		High Risk		Slight Risk		No Risk	
	Male	Female	Male	Female	Male	Female	Male	Female
	n/%	*n/%*	n/%	n/%	n/%	n/%	n/%	n/%
Capsized canoe 100 metres offshore	83 7.1	107 10.4	215 18.4	276 26.8	549 46.9	497 48.2	324 27.7	150 14.5
Caught in rip current at surf beach	231 19.7	329 31.9	469 40.1	457 44.3	347 29.6	206 20.0	124 10.7	38 3.7
Chased toy into deep end of swimming pool	42 3.6	42 4.1	60 5.1	51 4.9	206 17.6	199 19.3	863 73.7	738 71.6
Fell into deep river when fully clothed	102 8.7	123 11.9	250 21.3	291 28.2	507 43.3	426 41.3	312 26.6	190 18.4
Swept off isolated rocks whilst fishing	478 40.8	548 53.2	423 36.1	352 34.1	191 16.3	87 8.4	79 6.7	43 4.2

More females than males reported *extreme risk* for being caught in a rip current at a surf beach (females 31.9%, males 19.7%), being swept of isolated rocks whilst fishing (females 53.2%, males 40.8%), capsizing in a canoe (females 10.4%, males 7.1%) and falling into a river (females 11.9%, males 8.7%). More males than females considered there was *no risk* in capsizing a canoe 100 metres from shore (males 27.7%, females 14.5%), being caught in a rip at a surf beach (males 10.7%, females 3.7%), falling into a deep river fully clothed (males 26.6%, females 18.4%) or of being swept off isolated rocks by a wave while fishing (males 6.7%, females 4.2%).

Significant differences were found when drowning risk perceptions were analysed against socio-economic status, with the exception of being swept off isolated rocks

whilst fishing (see Table 5.2, Appendix 2). No significant differences in risk perception were found between students from low- and mid-decile schools, but significant differences were found between students from low- and mid-decile schools compared with students from high-decile schools (see Table 5.3, Appendix 2). Table 39 shows that students from high-decile schools reported lower estimates of personal risk for each of the risk scenarios than students from either of the other decile groups. Students from high-decile schools were less likely to report *extreme risk* for all scenarios than students from low- and mid-decile schools. They also reported more *slight risk* or *no risk* estimates than students from low-decile schools for three of the five scenarios, the exceptions being caught in a rip at a surf beach and being swept off isolated rocks when fishing.

Table 39. *Student Perceptions of Drowning Risk by Socio-economic Status via Decile Rating of School Attended*

Risk scenario	Extreme Risk			High Risk			Slight Risk			No Risk		
	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*	Low-decile *n/%*	Mid-decile *n/%*	High-decile *n/%*
Capsized canoe 100 m offshore	76 12.1	55 8.6	59 6.3	147 23.3	163 25.6	181 19.4	283 44.9	302 47.4	461 49.4	123 19.5	117 18.4	232 24.9
Caught in rip current at surf beach	195 31.0	179 28.1	186 19.9	244 38.7	278 43.6	404 43.3	133 21.1	139 21.8	279 29.9	57 9.0	41 6.4	64 6.9
Chased toy into deep end of pool	23 3.7	37 5.8	24 2.6	46 7.3	32 5.0	33 3.5	144 22.9	129 20.3	132 14.1	416 66.0	439 68.9	744 79.7
Fell into deep river fully clothed	74 11.7	78 12.2	73 7.8	162 25.7	181 28.4	198 21.2	260 41.3	246 38.6	426 45.7	133 21.1	132 20.7	236 25.3
Swept off isolated rocks	281 44.6	318 49.9	426 45.7	226 35.9	204 32.0	345 37.0	81 12.9	77 12.1	119 12.8	41 6.5	38 6.0	43 4.6

Significant differences were found when drowning risk perceptions for all risk scenarios were analysed against ethnicity (see Table 5.4, Appendix 2). No significant differences were found between European/Pakeha and Maori students, or between Pasifika and Asian students, but significant differences were found in all other ethnic group comparisons (see Table 5.5, Appendix 2).

Table 40 shows that more European/Pakeha and Maori students reported *slight risk* or *no risk* estimates when compared with Pasifika and Asian students. More Pasifika and Asian students reported *extreme risk* or *high risk* estimates than European/Pakeha or Maori students, except for being swept off isolated rocks while fishing. Asian students were more likely than all other ethnic groups to perceive *extreme risk* in all scenarios except being swept off isolated rocks while fishing.

Table 40. *Perceptions of Drowning Risk by Ethnicity*

Risk scenario	Extreme Risk				High Risk				Slight Risk				No Risk			
	Eu	**Ma**	**Pa**	**As**	**Eu**	**Ma**	**Pa**	**As**	**Eu**	**Ma**	**Pa**	**As**	**Eu**	**Ma**	**Pa**	**As**
	n/%	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Capsized canoe offshore	62 4.6	33 8.1	32 15.7	52 25.2	293 22.9	93 22.9	67 32.8	59 28.6	718 53.6	185 45.6	74 36.3	53 25.7	296 22.1	94 23.2	31 15.2	42 20.4
Caught in rip current	281 21.0	108 26.6	83 40.7	75 36.4	604 45.1	168 41.4	71 34.8	61 29.6	373 27.9	95 23.4	31 15.2	44 21.4	81 6.0	34 8.4	19 9.3	26 12.6
Chased toy deep pool	26 1.9	15 3.7	18 8.8	19 9.2	36 2.7	16 3.9	31 15.2	25 12.1	210 15.7	76 18.7	51 25.0	60 29.1	1067 79.7	298 73.4	104 51.0	102 49.5
Fell into river fully clothed	92 6.9	41 10.1	36 17.6	48 23.3	329 24.6	99 24.4	56 27.5	42 20.4	612 45.7	171 42.1	66 32.4	70 34.0	306 22.9	94 23.2	46 22.5	46 22.3
Swept off isolated rocks	630 47.1	178 43.8	105 51.5	91 44.2	504 37.6	143 35.2	58 28.4	53 25.7	157 11.7	56 13.8	25 12.3	35 17.0	48 3.6	28 6.9	16 7.8	27 13.1

The risk perception responses were compared with swimming, rescue and CPR ability, and student knowledge of surf and boat safety, in order to determine whether water safety knowledge impacted on aquatic risk perception. Some evidence was found to suggest that those with better water safety knowledge estimated less threat of drowning. Table 41 shows a slight degree of relationship between drowning risk perception and the practical competencies of swimming ability ($r_s = .325$, $p < .01$) and rescue ability ($r_s = .247$, $p < .01$), though only a weak relationship between risk perception and CPR ability ($r_s = .131$, $p < .01$). No evidence was found of a relationship between drowning risk perception and water safety knowledge as measured by the questions on boat and surf safety knowledge.

Table 41. *Relationship between Perceptions of Drowning Risk, Participation in Aquatic Recreation, Water Safety Knowledge and Self-reported Behaviours*

	Drowning risk perception
Swim ability	.325*
Rescue ability	.247*
CPR ability	.131*
Boat safety	.014
Surf safety	-.005
Total swimming activity	.207*
Total other aquatic activity	.235*
Swimming behaviour	.189*
Aquatic recreation behaviour	.080*

*Significant at the .01 level.

Perceptions of drowning risk were compared with the amount of aquatic activity students undertook in order to determine whether lack of experience heightened perception of drowning risk. Table 41 shows a slight degree of relationship between risk perception and total swimming activity ($r_s = .207$, $p < .01$) and risk perception and other aquatic activity ($r_s = .235$, $p < .01$), which provides some indication that those with greater aquatic experience estimated lesser threat of drowning.

Drowning risk perception also was compared with at-risk behaviours during swimming and other aquatic recreation activities because perceptions of risk are often viewed as playing a central role in motivating adolescents' behaviour. Table 41 shows that there was little evidence to suggest a strong relationship between at-risk swim behaviour and perception of drowning risk ($r_s = .189$, $p < .01$), or between at-risk aquatic recreation behaviour and perception of drowning risk ($r_s = .080$, $p < .01$).

5.2 Water Safety Attitudes

Table 42 shows student attitudes towards water safety as identified in question 23 of the questionnaire. The question sought responses to 14 water safety-related statements, using a four-point scale that indicated whether students *strongly agreed, agreed, disagreed,* or *strongly disagreed* with the statements.

Table 42. *Student Attitudes Towards Water Safety*

Water safety attitudes	Strongly agree		Agree		Disagree		Strongly disagree	
	n	%	*n*	%	*n*	%	*n*	%
Safety rules in public swimming pools spoil fun	256	11.6	714	32.4	923	41.9	305	13.9
Swimming outside patrol flags on surf beach is okay if surf looks safe	162	7.4	786	35.7	900	40.9	350	15.9
Wearing lifejacket unnecessary in small boat 100 m offshore	110	5.0	675	30.7	1042	47.3	371	16.8
Drinking alcohol on a boat okay provided skipper stays sober	232	10.5	808	36.7	663	30.1	495	22.5
You should avoid crossing a river on your own	305	13.9	1026	46.6	715	32.5	150	6.8
Homeowners shouldn't have to fence their swimming pools	206	9.4	474	21.5	900	40.9	617	28.0
Swimming alone is risky even for good swimmers	282	12.8	1202	54.6	599	27.2	115	5.2
Lifeguards shouldn't be able to tell you where to swim	122	5.5	437	19.8	1137	51.6	502	22.8
Swimming in ordinary clothes is okay if you don't have swimsuit	117	5.3	728	33.1	972	44.1	381	17.3
Wearing a lifejacket is unnecessary for good swimmers	83	3.8	320	14.5	1247	56.6	547	24.8
Having a beer whilst fishing in a boat is okay on a calm day	192	8.7	776	35.2	843	38.3	387	17.6
Swimming after surf patrol is finished is ok if people in water	137	6.2	1207	54.8	714	32.4	139	6.3
Diving headfirst into shallow water is ok if you know how to dive	148	6.7	433	19.7	892	40.5	725	32.9
Swimming in clothes is alright if you don't go out too deep	136	6.2	1008	45.8	817	37.1	237	10.8

Many students either *agreed* or *strongly agreed* that: swimming pool rules spoiled their fun (n = 970; 44.0%); wearing everyday clothes in the water was acceptable in shallow water (n = 1144; 52.0%) or if you did not have proper swimwear (n = 845; 38.4%); homeowners should not have to fence their pools (n = 680; 30.9%); swimming alone (n

= 714; 32.4%) or crossing a river alone (n = 865; 39.3%) was acceptable and that diving headfirst into shallow water was safe if the person knew how to dive (n = 581; 26.4%).

With regards to surf safety, many students *agreed* or *strongly agreed* that: swimming at a surf beach after the surf patrol had finished was acceptable if other people were in the water (n = 1344; 61.0%); swimming outside patrolled areas was acceptable if the surf looked safe (n = 848; 43.1%) and lifeguards should not be able to tell them where to swim (n = 559; 25.4%). In terms of boat safety, many students either *agreed* or *strongly agreed* that: alcohol consumption on board was acceptable providing the skipper remained sober (n = 1040; 47.2%); having a beer whilst fishing from a boat on a calm day was acceptable (n = 968; 43.9%); lifejackets were unnecessary within 100 m of shore (n = 785; 35.6%) and wearing a lifejacket was unnecessary for good swimmers (n = 403; 18.3%).

Significant differences were found between males and females when attitudes were analysed against gender (see Table 5.6, Appendix 2). Table 43 shows that more female students *disagreed* or *strongly disagreed* that: swimming pool rules spoiled their fun (females 72.7%, males 40.8%); swimming outside patrolled areas at a surf beach was acceptable if it looked safe (females 65.8%, males 48.8%) or after patrols had finished if others were in the water (females 44.2%, males 34.2%); homeowners should not have to fence their pools (females 76.2%, males 61.4%); lifeguards should not be able to tell them where to swim (females 84.4%, males 65.7%); wearing a lifejacket was unnecessary within 100 m of shore (females 70.7%, males 58.4%) and good swimmers did not need to wear lifejackets (females 87.9%, males 75.9%). More females also *disagreed* or *strongly disagreed* that diving headfirst into shallow water was acceptable if you knew how to dive (females 82.0%, males 65.2%) and swimming in clothes was acceptable if you did not have swimming gear (females 65.3%, males 58.1%) or provided that you did not go out too deep (females 50.9%, males 45.2%).

Table 43 also shows noticeable gender differences on alcohol consumption. More females *disagreed* or *strongly disagreed* that consuming alcohol on board was acceptable provided the skipper stayed sober (females 62.1%, males 53.7%) or while fishing from a boat on a calm day (females 68.4%, males 44.8%). In addition to this,

more females *strongly disagreed* that alcohol consumption was acceptable if the skipper stayed sober (females 26.3%, males 19.2%) or while fishing on a calm day (females 21.8%, males 13.8%). More females *agreed* or *strongly agreed* that crossing a river alone should be avoided (females 64.9%, males 56.6%), and that swimming alone was risky even for good swimmers (females 71.4%, males 63.9%).

Table 43. *Student Attitudes Towards Water Safety by Gender*

Water safety attitudes	Strongly agree		Agree		Disagree		Strongly disagree	
	Male n/%	Female n/%	Male n/%	Female n/%	Male n/%	Female n/%	Male n/%	Female n/%
Safety rules in public swimming pools spoil fun	196 16.7	60 5.8	496 42.4	218 21.1	363 31.0	560 54.3	115 9.8	190 18.4
Swimming outside patrol flags on surf beach okay if surf looks safe	128 10.9	34 3.3	470 40.1	316 30.6	430 36.7	470 45.6	142 12.1	208 20.2
Wearing lifejacket unnecessary in small boat 100 m offshore	86 7.3	24 2.3	400 34.2	275 26.7	515 44.0	527 51.1	169 14.4	202 19.6
Drinking alcohol on a boat okay provided skipper stays sober	172 14.7	60 5.8	461 39.4	347 33.7	313 26.7	350 33.9	224 19.1	271 26.3
You should avoid crossing a river on your own	139 11.9	166 16.1	523 44.7	503 48.8	417 35.6	298 28.9	91 7.8	59 1.7
Homeowners shouldn't have to fence their swimming pools	144 12.3	62 6.0	294 25.1	180 17.5	471 40.2	429 41.6	260 22.2	357 34.6
Swimming alone is risky even for good swimmers	147 12.6	135 13.1	601 51.3	601 58.3	348 29.7	251 24.3	74 6.3	41 4.0
Lifeguards shouldn't be able to tell you where to swim	89 7.6	33 3.6	312 26.6	125 12.1	557 47.6	580 56.3	212 18.1	290 28.1
Swimming in ordinary clothes is okay if you don't have swimsuit	80 6.8	37 3.6	410 35.0	318 30.8	469 40.1	503 48.8	211 18.0	170 16.5
Wearing a lifejacket is unnecessary for good swimmers	68 5.8	15 1.5	213 18.2	107 10.4	611 52.2	636 61.7	277 23.7	270 26.2
Having a beer whilst fishing in a boat is okay on a calm day	162 13.8	30 2.9	483 41.2	293 28.4	363 31.0	480 46.6	162 13.8	225 21.8
Swimming after surf patrol is finished is ok if people in water	101 8.6	36 3.5	671 57.3	536 52.0	332 28.4	382 37.1	66 5.6	73 7.1
Diving headfirst into shallow water is ok if you know how to dive	103 8.8	45 4.4	295 25.2	138 13.4	419 35.8	473 45.9	353 30.1	372 36.1
Swimming in clothes is alright if you don't go out too deep	100 8.5	36 3.5	540 46.1	468 45.4	402 34.3	415 40.3	128 10.9	109 10.6

Some differences were found when the individual water safety attitudes were summated and then analysed against socio-economic status and ethnicity (see Table 5.7, Appendix 2). No significant differences were found in the overall water safety attitude scores between students attending mid-decile schools compared with students from either low-

or high-decile schools, but significant differences were found between students from low- and high-decile schools (see Table 5.8, Appendix 2). When analysed individually, significant differences were found in attitudes towards five of the 14 statements when analysed against socio-economic status (see Table 5.9, Appendix 2). These five attitudes are reported in Table 44 which shows more students from low-decile schools than from mid- or high-decile schools *agreed* or *strongly agreed* that: swimming pool rules spoiled fun (50.9% compared with 39.9% and 42.2% respectively); home pools should not be fenced (33.9% compared with 31.6% and 29.5% respectively); lifeguards should not be able to tell them where to swim (30.0% compared with 28.3% and 22.6% respectively); lifejacket use in a small boat was unnecessary for a good swimmer (22.8% compared with 17.3% and 16.0% respectively) and diving headfirst into shallow water was acceptable if the person knew how to dive (30.6% compared with 26.8% and 23.2% respectively).

Table 44. Student Attitudes Towards Water Safety by Socio-economic Status via Decile Rating of School Attended

Water safety attitudes	**Strongly agree**			**Agree**			**Disagree**			**Strongly disagree**		
	Low-decile *n/%*	**Mid-decile** *n/%*	**High-decile** *n/%*	**Low-decile** *n/%*	**Mid-decile** *n/%*	**High-decile** *n/%*	**Low-decile** *n/%*	**Mid-decile** *n/%*	**High-decile** *n/%*	**Low-decile** n/%	**Mid-decile** n/%	**High-decile** n/%
Safety rules in public swimming pools spoil your fun	104 16.5	66 10.4	86 9.2	217 34.4	188 29.5	309 33.0	215 34.1	297 46.6	411 44.0	92 14.6	84 13.2	129 13.8
Homeowners shouldn't have to fence their swimming pools	74 11.7	60 9.4	72 7.7	140 22.2	130 20.4	204 21.8	256 40.6	253 39.7	391 41.8	158 25.1	192 30.1	267 28.6
Lifeguards shouldn't be able to tell you where to swim	47 7.5	37 5.8	38 4.1	142 22.5	122 19.2	173 18.5	306 48.6	331 52.0	500 53.5	133 21.1	145 22.8	224 24.0
Wearing a lifejacket is unnecessary for good swimmers	40 6.3	21 3.3	22 2.4	104 16.5	89 14.0	127 13.6	329 52.2	380 59.7	538 57.5	155 24.6	145 22.8	247 26.4
Diving headfirst into shallow water is ok if you know how to dive	55 8.7	44 6.9	49 5.2	138 21.9	127 19.9	168 18.0	250 39.7	261 41.0	381 40.7	185 29.4	203 31.9	337 36.0

Significant differences were found when attitudes were summated and analysed against ethnicity, with the exception of comparisons between Maori and Pasifika students (see Table 5.10, Appendix 2). Significant differences in water safety attitudes were also found when the 14 statements were analysed individually against ethnicity (see Table 5.11, Appendix 2). The responses were dichotomised for ease of interpretation and

reporting, and presented in Table 45 as students who *agreed* or *disagreed* with the 14 statements on the basis of ethnic grouping.

Table 45. *Student Attitudes Towards Water Safety by Ethnicity*

	Agree				Disagree			
Water safety attitudes	**Eur**	**Maori**	**Pasifika**	**Asian**	**Eur**	**Maori**	**Pasifika**	**Asian**
	n/%	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***	***n/%***
Safety rules in public swimming pools spoil fun	530 39.6	219 54.2	120 58.8	83 40.3	807 60.4	185 45.8	84 41.2	123 59.7
Swimming outside patrol flags on surf beach is okay if surf looks safe	589 44.0	182 45.0	89 43.6	66 32.1	748 56.0	222 55.0	115 56.3	140 67.9
Wearing lifejacket unnecessary in a small boat 100 m offshore	456 34.1	166 41.1	84 41.2	59 28.6	881 65.9	238 58.9	120 58.8	144 71.4
Drinking alcohol on a boat okay provided skipper stays sober	666 49.8	205 50.5	85 41.6	62 30.1	671 50.2	199 49.2	119 58.4	144 69.9
You should avoid crossing a river on your own	845 63.2	230 56.9	118 57.8	110 53.4	492 36.8	174 43.0	86 42.1	96 46.6
Homeowners shouldn't have to fence their swimming pools	402 30.1	128 31.2	71 34.8	68 33.0	935 69.9	278 68.8	133 65.2	148 67.0
Swimming alone is risky even for good swimmers	910 68.1	271 67.1	141 69.1	128 62.1	427 31.1	133 32.7	63 30.9	78 37.9
Lifeguards shouldn't be able to tell you where to swim	292 21.8	122 30.0	80 39.2	61 24.8	1045 78.1	282 69.4	124 60.7	145 75.2
Swimming in ordinary clothes is okay if you don't have swimsuit	463 34.6	177 43.6	98 48.0	91 44.2	874 65.4	227 56.0	106 52.0	115 55.8
Wearing a lifejacket is unnecessary for good swimmers	197 14.7	93 23.0	58 28.4	47 22.8	1140 85.2	311 76.6	146 71.6	159 77.2
Having a beer whilst fishing in a boat is okay on a calm day	635 47.5	171 42.1	84 41.1	58 28.2	702 52.5	235 57.4	120 58.8	148 71.8
Swimming after surf patrol is finished is ok if people in water	864 64.6	266 65.5	98 48.0	91 44.2	473 35.4	138 34.0	106 52.0	116 55.8
Diving headfirst into shallow water is ok if you can dive	287 21.5	139 34.2	76 37.2	61 29.6	1050 78.5	265 65.2	128 62.7	145 70.4
Swimming in clothes is alright if you don't go out too deep	648 48.5	235 57.9	119 58.3	117 56.8	689 51.5	169 41.7	85 41.7	89 43.2

Table 45 shows that most European/Pakeha students *disagreed* that: swimming pool rules spoil fun; lifeguards should not be able to tell swimmers where to swim; swimming in everyday clothes is acceptable in the absence of swimming gear or provided that the swimmer does not go out too deep; lifejackets are not necessary for good swimmers; and diving headfirst into shallow water is safe if the swimmer knows how to dive. More Asian students than others *disagreed* that: swimming outside surf

patrolled areas or after surf patrols was acceptable; wearing a lifejacket was unnecessary close to shore; and drinking alcohol on a boat was acceptable provided the skipper stayed sober or whilst fishing from a small boat on a calm day. Most Pasifika students *disagreed* that drinking alcohol was acceptable provided the skipper stayed sober or when fishing on a calm day, and that swimming after patrol hours at a surf beach was safe if others were in the water.

More Maori and Pasifika students *agreed* that rules in swimming pools spoiled their fun, that wearing a lifejacket was not necessary within 100 m of shore, and that diving headfirst into shallow water was safe if you knew how to dive. More European/Pakeha and Maori students *agreed* that it was appropriate to consume alcohol on board provided that the skipper stayed sober and that it was safe to swim after patrol hours at a surf beach if there were people in the water. More Pasifika students than other ethnic groups *agreed* that lifejackets were unnecessary for good swimmers, that swimming in clothing was acceptable if you did not have swimming gear and that swimming in clothes was safe provided that the swimmer did not go out too deep.

In order to test the assumption that water safety knowledge positively influences water safety attitudes, the practical skills of swimming, rescue and CPR ability, as well as boat and surf safety knowledge were evaluated against water safety attitude scores.

Table 46. *Relationship between Water Safety Attitudes and Components of Water Safety Knowledge*

	Water safety attitude
Swim ability	-.049
Rescue ability	-.005
CPR ability	.068
Boat safety	.288*
Surf safety	.297*

* Significant at the .01 level.

Table 46 shows that a modest degree of relationship was found between water safety attitudes and cognitive understanding of water safety principles as measured by the boat

safety (r_s = .288, p < .01) and surf safety components (r_s = .297, p < .01), but no significant relationship was found between water safety attitudes and the self-reported practical skills of swimming, rescue and CPR.

Water safety attitude scores were analysed against swimming and other aquatic recreation behaviours in order to test the assumption that water safety attitudes influenced drowning risk behaviour. They also were analysed against risk perception scores in order to ascertain whether safety attitudes influenced drowning risk estimation.

Table 47. *Relationship between Water Safety Attitudes, Behaviour and Drowning Risk Perception*

	Water safety attitude
Swim behaviour	.442*
Aquatic recreation behaviour	.465*
Drowning risk perception	-.239*

*Significant at the .01 level.

Table 47 shows a moderate degree of relationship between attitudes and behaviours indicating that those with favourable attitudinal responses also reported safe behaviours during both swimming (r_s = .442, p < .01) and other aquatic recreation activity (r_s = .465, p < .01). A slight degree of relationship was found between drowning risk perception and water safety attitude scores (r_s = -.239, p < .01). Given that a low score in the risk estimates indicated heightened perception of risk, this finding suggests some association between positive water safety attitudes and heightened perception of aquatic risk.

6 Chapter Socio-cultural Influences on Youth Water Safety Knowledge, Attitudes and Behaviours

This chapter reports on the effects of socio-cultural influences on youth water safety, with particular reference to those forces that shape student water safety knowledge, their attitudes towards drowning risk and water safety, and their behaviour in an aquatic environment as reported in the preceding sections. These include educational influences, familial influences, societal influences, peer influences and previous life-threatening aquatic experience.

6.1 Student Perceptions of Important Influences on Water Safety

Table 48 shows how students ranked the three most important influences on their water safety knowledge as identified in question 7 of the questionnaire. When all choices were summated, family (n = 1876; 85.2%), school (n = 1754; 79.7%) and friends (n = 1245; 56.5%) were the most frequently identified influences on water safety knowledge.

Table 48. *The Three Most Important Influences on Water Safety Knowledge by Gender*

Influences on water safety knowledge		**First choice**		**Second choice**		**Third choice**		**Total**	
		n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Friends	Female	30	2.9	127	12.3	245	22.8	1245	56.5
	Male	408	34.8	265	22.6	170	14.5		
Family	Female	457	42.7	266	24.9	202	18.9	1876	85.2
	Male	345	29.5	373	31.9	233	19.9		
School	Female	313	29.5	375	35.0	207	19.3	1754	79.7
	Male	239	20.4	285	24.3	335	28.6		
Clubs and other organisations	Female	138	13.4	130	12.6	148	13.8	751	34.1
	Male	87	7.4	100	8.5	148	12.6		
Media	Female	85	20.0	123	29.0	216	20.2	888	40.3
	Male	84	18.1	132	12.3	248	21.2		

Significant differences were found between males and females when the three most important influences on water safety knowledge were analysed against gender, with the exception of the role of the media (see Table 6.1, Appendix 2). Nearly twice as many

males identified friends as one of the three most important influences on their understanding of water safety, (males 71.9%, females 39.0%). Table 48 shows that males were ten times more likely than female students to identify friends as their most important water safety influence (males 34.8%, females 2.9%). In contrast, females were more likely to acknowledge the primacy of family (females 44.3%, males 29.5%), school (females 30.4%, males 20.4%), and other organisations (females 13.4%, males 8.3%) in influencing their understanding of water safety.

No significant differences were found when the role of friends as the most highly ranked influence on water safety was analysed by socio-economic status (see Table 6.1, Appendix 2). However, significant differences were found between socio-economic groups with regard to the influence of family, schools and other organisations. Table 49 shows that fewer students from low-decile schools than from mid- or high-decile schools reported either the family (28.3% compared with 39.4% and 32.8% respectively) or schools (22.2% compared with 25.7% and 26.6% respectively) as their dominant water safety influence. More students from high-decile schools than low- or mid-decile schools reported clubs and other organizations as their dominant water safety influence (13.6% compared with 6.1% and 9.1% respectively). The influence of the media was not affected by socio-economic status with only a small proportion of students (between 7.4% - 8.3%) identifying the media as their most important water safety influence.

Table 49. *The Most Important Influence on Water Safety by Socio-economic Status via Decile Rating of School Attended and Ethnicity*

Most important influence	**Friends**		**Family**		**School**		**Group, club**		**Media**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Low-decile	150	23.8	244	28.3	140	22.2	40	6.3	52	8.3
Mid-decile	110	17.3	251	39.4	164	25.7	58	9.1	48	7.5
High-decile	178	19.0	307	32.8	248	26.6	127	13.6	69	7.4
European/Pakeha	257	19.3	429	32.2	360	27.0	185	13.9	100	7.5
Maori	95	23.5	192	47.5	73	18.1	16	4.0	28	6.9
Pasifika	41	20.1	94	46.1	51	25.0	10	4.9	8	3.9
Asian	36	17.9	71	35.3	59	29.4	10	5.0	25	12.4

No significant differences were found when the role of friends as the most important influence on water safety was analysed against ethnicity, but considerable differences were found in the influence of family, school and other organisations (see Table 6.1, Appendix 2). Table 49 shows that Maori and Pasifika students more than European/Pakeha and Asian students identified the family as their dominant water safety influence (47.5% and 46.1% compared with 32.2% and 35.3% respectively). Fewer Maori students than European/Pakeha, Pasifika and Asian students identified schools as the most important influence (18.1% compared with and 27.0%, 25.0% and 29.4% respectively). European/Pakeha students were three times more likely than other ethnic groups to identify clubs and other organizations as their dominant water safety influence (13.9% compared with 4.0%, 4.9% and 5.0%).

6.2 Peer Influences

Table 50 shows student recall of the eight at-risk behaviours that they observed their peers performing during aquatic activity as identified in question 15 of the survey. Where participants never had been with their peers to observe behaviours, nil responses were recorded and screened out of the data to leave only the observed behaviours.

Table 50. *Observation of Peer Behaviours by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity**

Peer Behaviour	Not worn lifejacket		Swum not supervised		Outside surf patrol		Encourage risk		Alcohol /drugs		Ignored advice		Swum in prohibited		Dived headfirst	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Male	703	72.2	953	85.5	808	75.2	575	54.3	311	33.0	576	53.9	687	63.5	414	38.4
Female	478	59.8	775	78.8	577	60.6	242	26.0	218	24.2	242	25.2	392	40.7	166	17.4
Low-decile	312	67.4	473	80.0	401	69.1	260	45.1	145	27.4	255	43.6	334	56.8	171	29.0
Mid-decile	348	64.8	511	82.8	387	65.0	216	37.0	174	31.3	228	38.1	303	50.3	164	27.8
High-decile	521	67.3	744	83.5	597	70.1	341	41.2	210	27.8	335	39.6	442	51.8	245	28.8
European	801	71.1	1101	85.5	895	71.6	485	37.7	322	25.0	468	37.7	650	52.2	339	27.2
Maori	219	66.6	346	87.2	275	72.4	180	47.1	131	36.0	182	47.0	234	59.8	119	31.2
Pasifika	88	62.9	149	78.4	116	62.0	86	47.8	45	27.4	101	54.6	113	59.8	65	35.0
Asian	56	62.9	108	58.4	75	43.9	50	29.2	26	17.0	49	28.7	61	34.9	45	25.7
Total	1181	66.6	1728	82.3	1385	68.3	817	41.1	529	28.7	818	41.1	1079	52.8	580	28.5

*Ethnicity figures exclude the 'other ethnicity' category and therefore totals differ from the gender and school decile variables

In descending order of frequency, the at-risk behaviour performed by friends were: swimming without adult supervision (n = 1728; 82.3%); swimming outside a patrolled area at a surf beach (n = 1385; 68.3%); not wearing a lifejacket in a small craft (n = 1181; 66.6%); swimming in prohibited places (n = 1079; 52.8%); encouraging risk (n = 817; 41.1%) and ignoring water safety directions (n = 818; 40.3%). Diving headfirst into shallow water (n = 580; 28.5%) and using alcohol/drugs during aquatic activity (n = 529, 28.7%) were the least observed behaviours.

Significant differences were found between males and females when the observation of peers' at-risk behaviours were analysed against gender (see Table 6.2, Appendix 2). Table 50 shows that males observed more at-risk behaviours amongst their friends across all aquatic settings. The gender differences were particularly noticeable in: the non-wearing of lifejackets (males 72.2%, females 59.8%); swimming outside of patrolled areas at a surf beach (males 75.2%, females 60.6%); encouraging risk in the aquatic environment (males 54.4%, females 26.0%); ignoring water safety advice and directions (males 53.9%, females 25.2%); swimming in prohibited places (males 63.5%, females 40.7%) and diving headfirst into shallow water (males 38.4%, females 17.4%). Slightly smaller differences were observed for swimming without adult supervision (males 85.5%, females 78.8%) and for using alcohol/drugs during aquatic activity (males 33.0%, females 24.2%).

No significant differences were found in seven of the eight at-risk behaviours of peers when analysed by socio-economic status via the decile rating of the school attended. The only at-risk behaviour to be influenced by socio-economic status was encouraging risk among others (see Table 6.3, Appendix 2). In this regard, Table 50 shows that students from low-decile schools more than from mid- or high-decile schools observed their friends' encouraging risk (45.1% compared with 37.0% and 41.2% respectively).

Significant differences were found between ethnic groups in the observation of friends' at-risk behaviour, with the exception of diving headfirst into shallow water (see Table 6.4, Appendix 2). Table 50 shows that European/Pakeha and Maori students more than Pasifika and Asian students observed their friends not wearing lifejackets (71.1% and 66.6% compared with 62.9% for each respectively), swimming unsupervised (85.5%

and 87.2% compared with 78.4% and 58.4% respectively), and swimming outside patrol areas (71.6% and 72.4% compared with 62.0% and 43.9% respectively). Maori and Pasifika students more than European/Pakeha and Asian students observed their friends encouraging risk (47.1% and 47.8% compared with 37.7% and 26.0% respectively), ignoring water safety advice and directions (47.0% and 54.6% compared with 37.7% and 28.7% respectively), swimming in prohibited places (59.8% for both compared with 52.2% and 34.9%) and diving headfirst into shallow water (31.2% and 35.0% compared with 27.2% and 25.7% respectively). Asian students were least likely of all ethnic groups to have observed any at-risk behaviour among their friends in an aquatic environment.

6.3 Familial Influences

Table 51 shows student recall of family influences on water safety as identified in question 16 of the questionnaire. Eight family-related situations were originally selected, but one, family experience of a life-threatening incident, was later discarded because many students either didn't know or chose not to respond.

Table 51. *Familial Influences on Water Safety by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity**

Familial influences	Given water safety advice		Paid for swim lessons		Done first aid training		Supervised family water activity		Discussed water safety issues		Stopped you doing water activity		Encouraged improving swimming	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Male	959	81.9	580	49.5	543	46.4	903	77.1	334	28.5	464	39.6	583	49.8
Female	818	79.0	622	60.3	563	54.6	924	89.6	352	34.1	488	47.3	568	55.1
Low-decile	510	81.0	193	30.6	272	43.2	483	76.7	181	28.7	241	38.3	266	42.2
Mid-decile	549	86.2	337	52.9	348	54.6	543	85.2	217	34.1	282	44.3	343	53.8
High-decile	818	87.5	672	71.9	486	52.0	801	85.7	288	30.8	429	45.9	542	58.0
European	1176	81.8	902	67.4	725	54.1	1176	87.8	430	32.1	628	46.9	779	58.2
Maori	344	84.9	122	30.1	194	47.8	331	81.2	113	27.9	154	38.0	185	45.7
Pasifika	156	76.5	47	23.0	87	38.6	153	75.0	70	34.3	86	42.2	78	38.2
Asian	160	77.7	104	50.5	76	36.9	129	62.6	56	27.2	65	31.6	82	39.8
Total	1877	85.2	1202	54.6	1106	50.2	1827	83.0	686	31.2	952	43.2	1151	52.3

*Ethnicity figures exclude the 'other ethnicity' category and therefore totals differ from the gender and school decile variables

The most-frequently reported family influence related to advice on water safety (n = 1877; 85.2%), followed in descending order by supervision of water-related activity (n = 1827; 83.0%), provision of paid swimming lessons (n = 1202; 54.6%), encouragement of swimming proficiency (n = 1151; 52.3%), and parental first-aid training (n = 1106; 50.2%). Being prohibited by family from doing water activity because of safety concerns (n = 952; 43.2%) and family discussion of water safety issues (n = 686; 31.2%) were the least reported actions.

Significant differences were found between females and males when the family water safety-related influences were analysed by gender (see Table 6.5, Appendix 2). Table 51 shows that females reported considerably higher family input in the provision of paid swimming lessons (females 60.3%, males 49.5%), supervision of aquatic activity (females 89.6%, males 77.1%), provision of water safety advice (females 89.0%, males 81.9%) and prohibition of aquatic activity for safety concerns (females 47.3%, males 39.6%). Slightly more females indicated that family members had undergone first-aid training (females 54.6%, males 46.4%), had encouraged swimming proficiency (females 55.1%, males 49.8%) and discussed water safety issues (females 34.1%, males 28.5%).

Significant differences were found when familial influences were analysed against socio-economic status and ethnicity, the exception being the family discussion of water safety issues (see Tables 6.6 and 6.8, Appendix 2). Inter-group analysis showed that these differences in family influences existed across all decile groups and all ethnic groups (see Tables 6.7 and 6.9, Appendix 2). Table 51 shows that fewer students from low-decile schools than from mid- or high-decile schools had swimming lessons paid for by family (30.6% compared with 52.9% and 71.9% respectively), family supervision of water activity (76.7% compared with 85.2% and 85.7% respectively), prohibition of water activity by family for safety reasons (38.3% compared with 44.3% and 45.9% respectively), and family encouragement to improve swimming proficiency (42.2% compared with 53.8% and 58.0% respectively). In addition, they were less likely to have received family water safety advice (81.0% compared with 86.2% and 87.5% respectively) or had family members who had undergone first-aid training (43.2% compared with 54.6% and 52.0% respectively).

Table 51 also shows that more European/Pakeha than Maori and Pasifika students reported that parents had provided paid swimming lessons (67.4% compared with 30.1% and 23.0% respectively), that they had been encouraged by family to develop their swimming ability (58.2% compared with 45.7% and 38.2% respectively), and had been prohibited from aquatic activity for safety reasons (46.9% compared with 38.0% and 42.2% respectively). Fewer Asian students than other ethnic groups had parents who had undergone first-aid training, or had family supervision of their aquatic activity. Fewer Pasifika students than all other ethnic groups had received paid swimming lessons, had received water safety advice from family or had been encouraged to improve swimming proficiency by family.

6.4 Educational Influences

Students were asked if they had been taught swimming and water safety as identified in questions 6 and 7 of the questionnaire. Most students reported that they had been taught to swim (n = 2077; 94.3%) and had been taught water safety (n = 1807; 82.1%). Table 52 shows that schools were regarded as the most important source of swimming learning (n = 832; 37.8%), followed by paid lessons (n = 631; 28.7%) and parents/family (n = 276; 12.5%). The least reported means of learning to swim were being self-taught or friends (n = 210; 9.5%) and by clubs or other groups (n = 128; 5.8%).

More males identified school (males 40.7, females 34.6%) or friends and self-instruction (males 14.5%, females 6.7%) as their primary source of swimming instruction. More females identified private lessons (females 33.9%, males, 24.0%) and parents/family (females 14.4%, males 10.9%) as their primary source of learning to swim. A similarly low number of both sexes reported clubs or groups as the agency that taught them to swim (males 5.9%, females 5.4%).

More students from low-decile schools than from mid- or high-decile schools had not been taught to swim (8.8% compared with 5.6% and 3.9% respectively). Most students from low-decile schools had been taught to swim at school (57.1% compared with 34.7% and 28.4% respectively), followed by friends/self (14.3% compared with 8.7%

and 7.3% respectively) and parents/family members (13.6% compared with 12.6% and 11.9% respectively). They were least likely to identify clubs/groups as a source of swimming knowledge (3.7% compared with 6.0% and 6.7% respectively). More high-decile school students than low- or mid-decile schools had been taught to swim by paid lessons (41.9% compared with 23.3% and 13.8% respectively).

Table 52. *The Teaching of Swimming by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity**

The teaching of swimming	Not Taught		School		Parents, family		Private lessons		Club, group		Self-taught or friends	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Male	71	6.1	476	40.7	128	10.9	281	24.0	70	5.9	145	14.5
Female	54	5.2	356	36.6	148	14.4	350	33.9	58	5.4	65	6.7
Low-decile	50	8.8	323	57.1	77	13.6	78	13.8	23	3.7	81	14.3
Mid-decile	39	5.6	244	34.8	88	12.6	163	23.3	42	6.0	61	8.7
High-decile	36	3.9	265	28.4	111	11.9	392	41.9	63	6.7	58	7.3
European	27	2.0	438	32.7	166	12.4	512	38.2	99	7.4	97	7.2
Maori	23	5.7	193	47.5	69	17.0	50	12.3	18	4.4	53	13.2
Pasifika	17	8.3	120	58.9	22	10.8	9	4.4	1	0.5	35	17.1
Asian	49	23.8	64	31.1	17	8.3	46	22.3	8	3.9	22	10.6
Total	125	5.7	832	37.8	276	12.5	631	28.7	128	5.8	210	9.5

*Ethnicity figures exclude the 'other ethnicity' category and therefore totals differ from the gender and school decile variables

Table 52 also shows that European/Pakeha and Asian students were least likely to identify schooling (32.7% and 31.1%) and most likely to cite paid swimming lessons (38.2% and 22.3%) as the primary source of swimming instruction when compared with other ethnic groups. Maori and Pasifika students were most likely to identify school (47.5% and 58.9% respectively) and least likely to identify paid lessons (12.3% and 4.4% respectively) as the most important source of their swimming instruction.

Significant differences were found when water safety education was analysed against gender, socio-economic status via the school decile rating and ethnicity (see Table 6.10, Appendix 2). Table 53 shows the nature and extent of water safety taught in school. More males (males 20.5%, females 14.6%), more students from low-decile schools than from mid- or high-decile schools (26.5% compared with 15.5% and 13.8% respectively)

and more Asian than European/Pakeha, Maori or Pasifika students (41.3% compared with 12.6%, 16.3%, and 29.9% respectively) had not received any water safety education at school.

Table 53. *The Teaching of Water Safety Topics by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity**

Teaching of water safety at school	**Not Taught**		**Pool Safety**		**Surf Safety**		**River Safety**		**Boat Safety**		**Underwater Safety**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Male	245	20.9	838	71.6	520	44.4	310	26.5	323	27.6	270	23.1
Female	150	14.5	800	77.7	515	50.0	287	27.8	297	28.8	255	24.7
Low-decile	167	26.5	426	67.6	247	39.2	144	22.9	165	26.2	156	24.8
Mid-decile	99	15.5	495	77.7	336	52.7	180	28.3	171	26.8	153	24.0
High-decile	129	13.8	717	76.7	452	48.3	273	29.2	285	30.5	216	23.1
European	169	12.6	1074	80.2	737	55.0	404	30.2	398	29.7	321	24.0
Maori	66	16.3	311	76.6	180	44.3	111	27.3	119	29.3	115	28.3
Pasifika	61	29.9	127	62.3	56	27.5	31	15.2	55	27.0	51	25.0
Asian	85	41.3	100	48.5	44	21.3	37	18.0	38	18.5	29	14.1
Total	395	17.9	1638	74.4	1035	47.0	597	27.1	620	28.2	525	23.8

*Ethnicity figures exclude the 'other ethnicity' category and therefore totals differ from the gender and school decile variables

Many students reported that they had studied pool safety (n = 1638; 74.4%), followed in descending order by surf safety (n = 1035; 47.0%), boat safety (n = 620; 28.2%), river safety (n = 597; 27.1%), and underwater safety (n = 525; 23.8%) at school. No significant differences were found between males and females when the water safety topics taught were analysed by gender, although Table 53 shows that slightly more females had been taught pool safety (females 77.6%, males 71.6%) and surf safety (females 50.0%, males 44.4%). No significant differences were found between different socio-economic groups when water safety topics taught were analysed by the decile rating of school attended, although Table 53 shows that fewer students from low-decile schools than from mid- or high-decile schools had been taught pool safety (67.6% compared with 77.7% and 76.7% respectively), surf safety (39.2% compared with 52.7% and 48.3% respectively), and river safety (22.9% compared with 28.3% and 29.2% respectively).

With the exception of boat safety, some significant differences were found when water safety topics taught were analysed against ethnicity, (see Table 6.11 and 6.12, Appendix 2). No differences were found between European/Pakeha and Maori students or between Pasifika and Asian students. Table 53 shows that more European/Pakeha and Maori students were taught pool safety than Pasifika and Asian students (80.2% and 76.6% compared with 62.3% and 48.5% respectively). Pasifika and Asian students reported less surf safety education than either Maori or European/Pakeha students (27.5% and 21.3% compared with 44.3% and 55.0% respectively). Asian students also were the least likely ethnic group to have been taught river, boat and underwater safety.

6.5 Previous Experience of Life-threatening Aquatic Incident

Table 54 shows the number of students who had experienced a life-threatening aquatic situation and their rescue from the situation as identified in question 21 of the questionnaire.

Table 54. *Experience of a Life-threatening Aquatic Incident and Rescue by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity**

	Life-threatening aquatic experience		**Rescue experience**					
			Self-rescue		**Friends**		**Others**	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Male	393	33.6	237	60.3	109	27.7	47	11.9
Female	417	40.4	194	46.5	161	38.6	62	14.9
Low-decile	233	37.0	119	51.1	80	34.3	34	14.5
Mid-decile	246	38.6	113	45.9	97	39.4	36	14.6
High-decile	331	35.5	199	60.1	93	28.1	39	11.8
European/Pakeha	490	36.6	281	57.3	149	30.4	60	12.2
Maori	140	34.5	62	44.3	53	37.9	25	17.8
Pasifika	90	44.1	44	48.9	33	36.7	13	14.5
Asian	70	34.0	37	52.9	25	35.7	8	11.4
Total	810	36.8	431	53.2	270	33.3	109	13.5

*Ethnicity figures exclude the 'other ethnicity' category and therefore totals differ from the gender and school decile variables

More than one third of students reported having experienced a life-threatening aquatic situation (n = 810; 36.8%). Of these, more than half reported self-rescue (n = 431;

53.2%), friends had been involved in one third of the rescues (n = 270; 33.3%) and strangers, lifeguards or others (n = 109; 13.5%) had rescued the remainder.

Significant differences were found when the incidence of life-threatening experience was analysed against gender, but not against socio-economic status and ethnicity (see Table 6.13, Appendix2). Table 54 shows that more females had experienced a life-threatening aquatic incident (females 40.6%, males 33.6%). Table 54 also shows more males reported self-rescue from the life-threatening situation (males 60.3%, females 46.4%), while more females reported being rescued by friends/family members (females 38.6%, males 27.7%) and by strangers, lifeguards, or others (females 15.0%, males 12.0%).

Table 55 shows the effect of the life-threatening experience on current participation in aquatic activity as identified in question 22 of the questionnaire. A small number of students were too afraid to take part in water-based activities (n = 31; 3.8%) while almost a third still took part but with caution (n = 245; 30.2%). Many students had not been affected and continued to take part confidently (n = 534; 65.9%).

Table 55. *Effect of Life-threatening Experience on Current Aquatic Activity by Gender, Socio-economic Status via Decile Rating of School Attended and Ethnicity**

Effect of life-threatening aquatic experience	**Too afraid to take part**		**Take part with caution**		**Take part confidently**	
	n	***%***	***n***	***%***	***n***	***%***
Male	16	4.1	104	26.5	273	69.5
Female	15	3.6	141	33.8	261	62.6
Low-decile	18	7.7	71	30.3	144	61.8
Mid-decile	7	2.8	73	29.6	166	67.5
High-decile	6	1.8	101	30.4	224	67.7
European/Pakeha	13	1.5	127	25.9	350	71.4
Maori	5	3.6	40	28.6	95	67.9
Pasifika	6	6.7	36	40.0	48	53.3
Asian	6	8.6	32	45.7	32	45.7
Total	31	3.8	245	30.2	534	65.9

*Ethnicity figures exclude the 'other ethnicity' category and therefore totals differ from the gender and school decile variables

No significant differences were found when the impact of the life-threatening experience on continued participation in aquatic activity was analysed against gender and socio-economic status. However, some significant differences were found in the impact of these experiences between European/Pakeha and Maori students when compared with Pasifika and Asian students (see Table 6.14, Appendix 2). Table 55 shows that Pasifika and Asian students more than European/Pakeha and Maori students reported that the experience had a cautionary effect on their current aquatic activity (40.0% and 45.7% compared with 25.9% and 28.6% respectively). European/Pakeha and Maori students more than Pasifika and Asian students reported that the experience had not affected their current aquatic practice (71.4% and 67.9% compared with 53.3% and 45.7% respectively).

6.6 Summary of Results

In summary, the following salient findings are reiterated here prior to discussion in the concluding chapters on the construction of drowning risk and water safety as postulated in the conceptual framework underpinning the study (see Section 1.3, Chapter 1).

6.6.1 Aquatic activities: What students do

- Almost all Year 11 students reported participating in some swimming activity (98.3%) and other forms of aquatic recreation (94.4%) in the previous year. Most students had swum at a public/school pool (88.6%) and patrolled surf beaches (76.2%); approximately one half had swum in private pools and rivers.
- No gender differences were found regarding frequency of swimming, but differences were found in the choice of location, with males more likely to often swim at un-patrolled surf beaches and inland locations such as lakes and rivers.
- Students from low-decile schools and of Asian ethnicity were least likely to swim in any location or take part in other forms of aquatic recreation; students from high-decile schools and Maori and European/Pakeha students were most likely to participate in swimming and other aquatic activity.
- Two thirds of students had participated in paddle craft and surfing activities, which were the two most popular recreational activities other than swimming. Two thirds

of males had participated in land- and boat-based fishing activities compared with less than half of females.

- Three quarters of students had swum without adult supervision, and approximately one half had swum outside a patrolled area at a surf beach, swum when cold/tired, swum in a prohibited place, or swum alone. Approximately one third had ignored safety directions, dived in without checking the depth, or swum in everyday clothes.
- One fifth of students had never worn lifejackets, or had used alcohol/drugs during aquatic recreation and one quarter had never checked the weather/water conditions beforehand.
- Female and Asian students were the least likely groups to have performed any at-risk behaviours during any form of aquatic recreational activity.

6.6.2 Swimming and water safety knowledge: What students know

- One third of students estimated that they could swim less than 50 m and more than one half could not swim more than 100 m. More females, students from low-decile schools, and Pasifika and Asian students estimated poor or no swimming ability than males, students from high-decile schools, and European/Pakeha students.
- More than one half of students expressed doubts about their ability to perform a deep-water rescue or CPR skills. Males, European/Pakeha students and those from high-decile schools were most confident about their rescue ability. More than half of Asian students and four in ten students from low-decile schools reported no rescue ability or CPR ability.
- In an illustrated question on boat safety, one quarter of students failed to name more than two essential boat safety items or identify any onboard rules related to small boat safety, and one fifth failed to identify any essential acts of safety preparation.
- In an illustrated question on surf safety, one fifth of students failed to identify any surf hazards, and more than one quarter failed to make any surf safety decisions, or to identify the safest beach location.

6.6.3 Drowning risk perception and water safety attitudes: What students think

- Two thirds of students considered a capsize from a canoe or a fall into a river of slight or no risk to their safety; one third thought that being caught in a rip current

at an un-patrolled surf beach posed only slight or no risk. Less than one half of students considered being swept off isolated rocks while fishing as an extreme risk.

- More females, students attending low- and mid-decile schools, and Asian and Pasifika students had a heightened perception of drowning risk; more males, students attending high-decile schools and European/Pakeha and Maori students had a lesser perception of drowning risk for the same scenarios.
- More than half of students thought that swimming after a surf patrol had finished was acceptable, one third thought that swimming outside the patrolled area was acceptable if it looked safe, and one quarter thought that lifeguards should not be able to tell swimmers where to swim. More than one third thought that lifejackets were unnecessary close to shore, and that on-board alcohol consumption was acceptable if the skipper remained sober or it was a calm day.
- Significant differences were found between male and female attitudes towards water safety with females most likely to demonstrate positive safety attitudes.

6.6.4 Socio-cultural influences on youth water safety

- Male students were ten times more likely than females to identify friends as their most important source of water safety knowledge. Females ranked family as their most important influence. One third of females and one fifth of males recognised schools as the most important influence.
- Students from low-decile schools and Maori or Pasifika students were most likely to cite schools, and students from high-decile schools and European/Pakeha students were most likely to cite paid lessons, as their source of swimming ability.
- Three quarters of students reported having been taught pool safety, but less than half had done surf safety, river safety, boat safety and underwater safety at school. More males, students from low-decile schools, and Pasifika and Asian students had not been taught any water safety.
- More than two thirds of students had seen their peers swim without adult supervision, swim outside a patrolled area at a surf beach, or not wear a lifejacket.
- More males than females had observed their friends perform at-risk behaviours, especially with regards to the non-wearing of lifejackets, swimming outside a

patrolled area, encouraging risk, ignoring advice, swimming in prohibited places and diving headfirst into shallow water.

- Females reported greater family input into their water safety than males, especially in the provision of paid swimming lessons, supervision, water safety advice and parental prohibition of aquatic activity. Students from low-decile schools and Asian students reported lowest levels of family input.
- More than one third of students, particularly female and Pasifika students had experienced a life-threatening aquatic incident. As a consequence, a small proportion no longer took part in aquatic activity, one third took part with greater caution, and two thirds continued to take part with confidence.
- More female students reported that the experience had made them more cautious. European/Pakeha and Maori students, as well as those from high-decile schools were least likely to have been more cautious as a consequence of the experience.

Part 3.

Discussion and Conclusion

7 Chapter Discussion

The main purpose of this study was to gain a comprehensive understanding of the nature of youth aquatic recreation and the role of water safety knowledge, attitudes and behaviours in mediating the risk of drowning associated with aquatic recreation. The main results show that the risk of drowning associated with youth aquatic recreation is a complex amalgam of many factors and forces interacting at several levels of influence. The preceding four chapters of results provides clear evidence of this complexity by highlighting considerable variation in: youth participation in aquatic recreational activities; youth water safety knowledge, attitudes and behaviours, and the socio-cultural influences that impact on youth understanding of water safety.

7.1 Aquatic Recreation and Drowning Risk Exposure

The evidence presented in chapter 3 confirms that New Zealand youth frequently engage in a wide range of aquatic recreational activities. Most youth had engaged in swimming (n = 2164; 98%) and other water-related activities (n = 2060; 94%) in the previous year and, on the face of it, such high levels of participation in recreational activity would seemingly support the notion that drowning risk is consequently high among New Zealand youth as suggested by Langley and Smeijers (1997). However, analysis of drowning risk by exposure to risk alone provides only a superficial account of the complex forces and factors underpinning the likelihood of drowning as a consequence of aquatic recreation. Rather, it appears that gender, socio-economic and ethnicity differences in water safety knowledge, attitudes and behaviours as posited in the conceptual framework (see Figure 1, chapter 1) play complex, pivotal and varying roles in shaaping the drowning risk of young people in, on or around water.

A number of examples are presented here in order to illustrate the limitations of risk exposure in comprehensively explaining drowning risk. In the case of youth swimming (the activity most frequently engaged in prior to drowning), much of the activity took place in relatively safe environments with almost all youth (n = 1950; 88%) having swum at public or school pools (see Table 9, chapter 3). Such sites can be considered relatively low-risk since they generally are closely regulated and supervised

environments. Drowning statistics confirm that they are infrequent sites of youth drowning accounting for only 8 deaths (7%) in the 15-19 year age group between 1992-2001 (Source: WSNZ Drownbase™, 2002). That most youth swimming in New Zealand took place in relatively safe environments is consistent with overseas studies on drowning incidence. Brenner, Trumble, Smith, Kessler and Overpeck (2001) found that of 407 unintentional drownings among 15-19 year old American youth in 1995, only 47 (12%) occurred in swimming pools compared with 280 (69%) that occurred in freshwater locations.

The frequency of student swimming activity at high-risk locations, such as non-patrolled surf beaches and other open water locations, was not great. Less than one sixth of students had swum more than 20 times in the previous year at any location other than patrolled surf beaches. In the case of rivers, less than one in ten had swum in a river or creek more than 20 times in the previous year and more than half of students (53%) had never used them. In spite of this low usage, more people drown in rivers than any other New Zealand aquatic environment and one fifth of victims (21%) are under 18 years of age (WSNZ, 2002b). Given the relatively low exposure to high-risk environments reported by students, it would appear that the reasons for increased risk of drowning as a consequence of recreational swimming at these sites lie elsewhere than in high frequencies of exposure to risk.

Evidence of high exposure to risk also fails to adequately explain the complex nature of drowning risk when applied to other forms of aquatic recreation. Surfing and paddling activities were the most popular activities other than swimming, with approximately two thirds of students having engaged in surfing (n = 1438; 65%) and paddling activities (n = 1463; 67%). Thus, on the basis of exposure to risk, one would expect surfing and paddling activities to be major contributors to the drowning statistics. However, this is not the case since these activities accounted for only 12% (n = 7) of youth fatalities between 1992-2001 (Source: WSNZ Drownbase™, 2004). Furthermore, surf rescue statistics from 1990-1995 show that surfing was almost six times less likely than swimming (surfing 10%, swimming 57%) to be the activity engaged in prior to rescue (Moran, 1996). Reduced drowning and rescue incidence may be attributed to the presence of buoyancy aids (lifejackets, wetsuits and the in-built flotation in surfboards,

kayaks and wave skis). Alternately, another plausible explanation might lie in the relatively high frequency in which students participated, with one third of students surfing *often* (n = 397; 18%) or *very often* (n = 361; 16%). Such frequent exposure might have allowed opportunity to develop appropriate skills and knowledge with which to counter any increased risk associated with increased surfing participation. In other words, frequent surfing activity, rather than exacerbate risk through greater exposure to danger, might have actually reduced risk by providing opportunity to develop compensatory risk-reducing skills and abilities.

In contrast to surfing and paddling activity, fewer students participated in boating activity in small craft (n = 1307; 59%) or large craft (n = 1026; 47%). More importantly perhaps, most of those who had participated in small craft boating reported making less than 10 trips in the previous year (n = 834; 38%) and only one in ten students reported making more than 20 trips (n = 222; 10%). Yet in spite of much less exposure to risk than surfing or paddling previously discussed, boating accounted for more than one-quarter (n = 16; 27%) of recreational drowning fatalities in the 15-19 years age group between 1992-2001 in New Zealand (Source: WSNZ Drownbase™, 2004). Lack of experience and opportunity to develop water safety skills as a consequence of only occasional boating activity might be a more plausible explanation for high incidence of boating fatalities than high exposure to risk. Similar conclusions have been reported elsewhere with lack of experience in youth being strongly associated with increased risk of fatal boating incidents in a study on recreational boating in Ohio (Molberg, Hopkins, Paulson & Gunn, 1993). Given the high level of mortality associated with youth boating and the extent of casual boating reported in this study, interventions aimed at making youth boating practice safer through targeted boating education might help reduce boating fatalities among youth.

One frequently cited reason why more males drown than females is because males are exposed to greater risk as a consequence of their higher participation rates in aquatic recreation (Brenner, et al., 2001; Howland et al., 1996; Quan & Cummings, 2003). Howland et al. (1996) found that males in the 16-25 year age group had significantly more total annual aquatic activity days for the prior year (males 61.4 days, females 51.5 days; $p = .02$) and did more swimming in natural bodies of water. However, when

swimming activity was analysed by gender in the present study, no significant difference was found in the total amount of swimming activity between males and females. Gender-based differences in frequency of risk exposure as a result of swimming activity are thus unlikely to account for the extensive differences in drowning incidence between males and females in this age group.

When the other dimension of risk exposure, the extent or magnitude of drowning risk from swimming was considered, some differences were evident between males and females in their choice of swimming location. More females than males swam at low-risk locations including private pools (females 57%, males 47%), flat-water beaches (females 68%, males 62%) or patrolled beaches (females 79%, males 68%). No significant differences were found in the use of high-risk locations such as non-patrolled surf beaches (females 68%, males 68%) and lakes (females 64%, males 62%), although slightly more males than females swam *often/very often* at non-patrolled surf beaches (males 30%, females 27%), lakes or ponds (males 24%, females 21%), or rivers and creeks (males 17%, females 13%). Gulliver and Begg (2005) reported similar results with 21-year-old Dunedin females more likely to choose low-risk locations such as patrolled surf beaches (females 59%, males 55%), whereas males were more likely to use non-patrolled beaches (males, 52%, females 41%). However, irrespective of these gender-related differences in choice of low- and high-risk locations for swimming, it is unlikely that poor choice of location alone can adequately explain why six times more young males than females (males 18, females 3) aged 15-19 years drowned while swimming between 1992-2001 (Source: WSNZ Drownbase™, 2004). Paradoxically, even though significantly more females than males swam at patrolled surf beaches, twice as many males (males 63%, females 37%) in the 16-19 years age group were involved in surf incidents necessitating rescue between 1995-2000 (Source: SLSNZ Rescue Statistics, 2004). On patrolled surf beaches at least, drowning risk from swimming for males would appear to be more about what male youth bring to the activity in terms of their understanding and practice of water safety and less about increased exposure to risk through more frequent participation.

Males did report higher levels of participation than females in aquatic activities other than swimming, especially in the traditionally male-oriented outdoor pursuits of boat-

and land-based fishing, netting and shell-fishing, and underwater activity. For example, almost two thirds (n = 737; 63%) of males had engaged in boat-based fishing compared with less than one half (n = 508; 49%) of females. Gulliver and Begg (2005) have reported similar gender-oriented differences in boating activity (males 73%, females 57%) among young adult New Zealanders. However, even though statistically significant, these differences in activity level are unlikely to fully account for the seven-fold difference in boating fatalities (males 14, females 2) between 1992-2001 among youth (Source: WSNZ Drownbase™, 2004). Drowning risk for males during boating recreation, like swimming activities previously discussed, appears to again be more about differences in what male youth bring to their aquatic activity than simply a reflection of gender differences in risk exposure.

Some differences in levels of participation in aquatic recreation, and therefore exposure to risk of drowning, were evident when analysed by ethnicity with European/Pakeha and Maori youth engaging in more aquatic activity than Pasifika and Asian youth. On this basis, drowning risk, measured by risk exposure alone, should be greater for European/Pakeha and Maori students since they engaged in much greater aquatic activity than others. However, drowning and surf rescue statistics for the 16-19 year age group do not confirm this probability. European/Pakeha youth, who constitute 61% of the youth population, are only slightly over-represented in drowning statistics, comprising 63% of the drowning toll between 1992-2001 (Source: WSNZ Drownbase™, 2004). In addition, the proportion of surf rescue incidents in which they were victims (62% of surf rescues between 2001-2004), closely matched their representation in the population (Source: SLSNZ Rescue Statistics 2005).

Some evidence was found among New Zealand youth to support the contention of Smith and Brenner (1995) that students from specific ethnicities, including indigenous populations, were at greater risk as a consequence of "increased exposure to dangerous bodies of water such as rivers and lakes and decreased access to protected (supervised) swimming areas" (p. 159). Maori students, like their European/Pakeha counterparts, took part in more aquatic activity than other minority groups and were most likely to have often used non-patrolled surf beaches, lakes or rivers. They are also over-represented in youth drowning statistics, comprising 21% of the youth population (see

Table 8, page 59) yet 32% of drowning victims between 1992-2002 (Source: WSNZ Drownbase™, 2004). Maori and European/Pakeha students were twice as likely to have used patrolled surf beaches very often than Pasifika students, and six times more likely than Asian students (18% and 17% compared with 9% and 3% respectively). They were also far more likely to have swum at the more dangerous locations of non-patrolled surf beaches very often (16% and 15% compared with 11% and 2% respectively), lakes (14% and 10% compared with 5% and 2% respectively) and rivers (10% and 7% compared with 4% and 2% respectively).

More than one third of Maori and Pasifika students compared with one fifth of European/Pakeha students had participated in netting/shellfish gathering (35% and 37% compared with 21% respectively). The risk of drowning for Maori and Pasifika students may therefore be exacerbated by their participation in the collection of seafood via land-based fishing and netting/shellfishing activity. These findings among Polynesian youth might be indicative of increased incidence of drowning among the adult Maori population as postulated by Langley et al. (2000). They might also help explain why Maori drown at nearly twice the rate of non-Maori, with recreational activity (*mahi wai*) and food gathering (*kohi kai*) being the leading causes of drowning (WSNZ media release, 18 November, 2003).

Pasifika and Asian students undertook significantly less aquatic recreational activity than European/Pakeha and Maori students. With the exception of land-based fishing, Asian students were least likely of all ethnic groups to participate in aquatic recreation. On the basis of risk exposure alone, one might therefore assume that these groups were at lower risk of drowning than other youth. However, drowning statistics do not support such an assumption. For example, Asian peoples, who constitute 12% of the national drowning toll yet comprise only 6.6% of the population, are over-represented in recent drowning statistics (Source: WSNZ Drownbase, 2004). If Asian youth participated less frequently than others in aquatic activity, it is reasonable to assume that recent increases in drowning and rescue incidence might be more about their understanding and practice of water safety and less about their exposure to risk. Evidence to support this contention is presented later in the chapter in discussion on the mediating role of water safety knowledge on drowning risk.

The impact of socio-economic status on drowning risk as a consequence of differing levels of participation in aquatic recreation does not appear great. Students from high-decile schools took part in more swimming and other aquatic recreational activity, whereas those from low-decile schools took part in considerably less. Not surprisingly, more students from high-decile schools than those from mid- or low-decile schools participated more frequently in activities that required some capital expense including, for example, small craft boating (14% compared with 6% and 8% respectively) and yachting (13% compared with 7% and 4% respectively). The only exceptions to this pattern were land-based fishing and netting/shell-fishing where no significant differences in participation were found across socio-economic groups. The reasons for this probably lie in the economic importance of fishing and shellfish gathering among lower socio-economic groups. More students from low-decile schools participated very frequently in these activities than students from mid- or high-decile schools (9% compared with 7% and 5% respectively). Similarly, more students from low-decile schools frequently took part in land-based fishing, a possible reflection of ease of access and low cost of participation (25% compared with 19% and 16% respectively).

The analysis of youth aquatic recreation reported in chapter 3 provided a comprehensive description of the circumstances in which drowning incidence might occur. The examples provided in the discussion above have highlighted, however, limitations in the use of exposure to risk alone as a predictor of future drowning risk. Subsequent discussion will therefore focus on the explanatory force of factors associated with the water safety knowledge, attitudes and behaviours that youth bring to their aquatic recreational activity to explain drowning risk.

7.2 Water Safety Knowledge

Water safety knowledge was evaluated in terms of student self-reported swimming, rescue and CPR abilities, and their theoretical understanding of boat and surf safety. Increased swimming ability, often regarded as the cornerstone of drowning prevention, has been assumed to be protective in a drowning situation especially among youth and adult populations (Brenner, Saluja & Smith, 2003). If this is the case, results from this study suggest that the swimming proficiency of many New Zealand youth does little to offset the dangers associated with frequent aquatic activity. More than one third of students (n = 850; 39%) estimated that they could swim less than 50 m, a distance that has been used in previous studies to classify subjects as non-swimmers (Mael, 1995; Whipp, 2001). Less than one half (n = 1009; 46%) thought that they could swim 100 m and less than one fifth (n = 417; 19%) thought they could swim more than 400 m. Given the emphasis that New Zealand society places on the ability to swim and its presumed protective value in drowning prevention, it is of concern that more than one half of Year 11 students (n = 1192; 54%) estimated that they could swim less than 100 m. Irrespective of any shortcomings associated with self-estimation of swimming abilities (Howland et al., 1996; Robertson, 1992), results from this study do little to support claims that the prime reason for a decline in drowning incidence in recent years is an improvement in swimming ability (Ozanne-Smith & Wrigglesworth, 2002; Ozanne-Smith, Wrigglesworth & Staines, 2003; Royal Life Saving Society of Australia, 2002, 2003).

When swimming ability was analysed by gender, more females than males reported being able to swim less than 25 m (females 20%, males 15%), whereas more males than females reported being able to swim more than 400 m (males 23%, females 14%). These results concur with other studies on drowning where self-estimates of swimming ability differ between males and females (Howland et al., 1996; Lindberg & Steensburg, 2000; Quan & Cummings, 2003). Gulliver and Begg (2005) have reported similar proportions of 21-year-old Dunedin young adults not being able to swim 50 m (females 19%, males 10%). Overseas, a national telephone survey of 5,234 adults in the United States found less than one fifth of males (16%) and almost one third of females (30%) could swim less than one length of a swimming pool (Gilchrist, Sacks & Branche,

2000). This gender-based difference in self-estimated swimming ability is interesting given the much higher incidence of male drowning in New Zealand and worldwide. Howland et al. (1996) suggest that males probably overestimate their swimming ability and are more likely to place themselves at greater risk than females in aquatic settings. While evidence of gender differences among New Zealand youth in self-reported swimming ability and use of at-risk settings reported here supports such a notion, further study is required to determine whether male swimming proficiency is real or imagined. In addition, further study is also required to ascertain whether females underestimate their abilities and are consequently more cautious of drowning danger. Evidence to support an association between risk perception and swimming competency by gender is presented later in the chapter.

Students from low-decile schools consistently reported poor swimming ability, a finding that is likely to enhance their risk of drowning in an aquatic emergency. The difference between their self-reported swimming ability and that of students from high-decile schools was particularly noticeable. Almost twice as many students from low-decile schools than from high-decile schools stated that they could swim less than 50 m (50% compared with 29%), yet twice as many students from high-decile schools claimed that they could swim more than 400 m (25% compared with 12%). The consequence of such disparity in swimming ability is that, even though students from low-decile schools participated in less aquatic activity than students from high-decile schools, they might be at greater risk of drowning during that limited activity because of the reduced protective benefit associated with increased swimming proficiency.

Disparities were also found when swimming ability was analysed by ethnicity. Twice as many European/Pakeha and Maori students claimed that they could swim more than 100 m compared with Pasifika and Asian students (53% and 44% compared with 27% and 23% respectively). Pasifika and Asian students are at greater risk of drowning than European/Pakeha and Maori students, even though they participated less frequently in aquatic activity. One third of Asian students (n = 66; 32%), and more than one quarter of Pasifika students (n = 55; 27%), thought that they could swim less than 25 m, giving them little protection in the event of either intentional or unintentional immersion in open-water. The lack of swimming ability found among ethnic minorities in this study

is consistent with findings in overseas studies that have associated high drowning incidence among ethnic minorities with poor swimming ability (Mael, 1995; O'Flaherty & Pirie, 1997; Schuman, et al., 1977; Smith & Brenner, 1995).

Some have argued that the protective effect of being able to swim might be offset by the increased exposure to drowning risk inherent in utilising that skill (Baker et al., 1992; Barss, 1995; Robertson, 1983; Smith, 1995). The present study did find some evidence to support these claims (see Table 26, chapter 4). Increased swimming ability was moderately associated with increased participation in swimming ($r_s = .391$, $p = .01$) and other aquatic recreational activities ($r_s = .412$, $p = .01$), although these results suggest that the strength of that relationship is, at best, modest. The lack of strong relationship between swimming ability and aquatic activity among youth is difficult to explain given the popularity of aquatic activity previously reported. It would appear that students choose to do aquatic activity for other reasons, such as personal choice and opportunity, rather than because they possess the ability to swim.

Some writers (Baker et al., 1992; Brenner, Saluja & Smith, 2003) have speculated that improved swimming ability might lead to overconfidence resulting in increased risk-taking behaviour in the aquatic environment. In order to test the veracity of this speculation, the swimming ability of students was compared with a composite score of all swimming risk-taking behaviours and another score of all other aquatic risk-taking behaviours. Results of this comparison do not support the notion that improved swimming ability increased risk-taking behaviour among youth taking part in this study (see Table 26, chapter 4). No significant association was found between greater swimming proficiency and an increase in risk-taking behaviour when swimming or when participating in other aquatic activities.

To further test claims of an association between swimming ability and risky behaviour, individual at-risk behaviours were also compared. Little or no relationship was found between swimming ability and swimming outside patrol flags ($r_s = .187$, $p < .01$), swimming alone ($r_s = .038$, *ns*), swimming in prohibited places ($r_s = .028$, *ns*) and ignoring safety advice ($r_s = .007$, *ns*). Such findings refute speculation by Brenner, Saluja and Smith (2003) that children and adults, who are confident in their swimming

abilities are more likely to adopt at-risk behaviours including swimming in unsafe settings such as remote natural bodies of water, swimming alone, or with no lifeguard present. In addition, no evidence was found to support the claim by Baker et al., (1992) that improved swimming ability could lead to "swimming in places with hazardous currents or undertows" (p.183).

Little or no relationship was found between swimming ability and at-risk behaviours during aquatic activities other than swimming. These included mixing alcohol/drugs with aquatic activity (r_s = .068, *ns*), having no adult supervision (r_s = .061, *ns*), doing activity alone (r_s = .007, *ns*), failing to wear a lifejacket (r_s = .139, $p < .01$), failing to tell an adult beforehand (r_s = .150, $p < .01$) and failing to check the weather conditions (r_s = .133, $p < .01$). On the basis of these findings, the ability to swim is unlikely to predispose youth to engage in at-risk behaviour in the aquatic environment.

Two other practical attributes of water safety, rescue knowledge and CPR skills, were also analysed to test a widely held belief among the lifesaving community that such skills mediate drowning risk. Such a belief seems tenable especially since many students in the study had reported swimming at unsupervised sites such as non-patrolled surf beaches, rivers and lakes, locations that are unlikely to have ready access to emergency services. In addition, many students (n = 270) reported having been rescued by friends from a life-threatening experience. However, as was the case with swimming ability, reliance on the protective value of such knowledge and its presumed role in reducing drowning risk may be misplaced. More than one third of students (n = 762; 35%) had no rescue skills and a further quarter (n = 546; 25%) expressed doubts about their ability to perform a deep-water rescue. This widespread lack of rescue ability may help explain why potential rescuers became victims in 6% of all drowning incidents in New Zealand in 2002 (WSNZ, 2002a).

When self-reported rescue ability was analysed by gender, more males were confident that they could perform a deep-water rescue (males 38%, females 31%) or had excellent rescue skills (males 7%; females 5%). In contrast, more females thought that they would be at great risk if they attempted a rescue (females 29%; males 21%). Whether differences in rescue ability between males and females are real or imagined is difficult

to determine, especially given the propensity for males to overestimate their aquatic abilities as reported in the other drowning studies (Howland et al., 1996). Further research is required to determine whether the protective value of lifesaving skills is real and whether it reduces or exacerbates risk, especially among male youth who may be overconfident about their ability.

Rescue ability also varied quite markedly among different ethnic groups, but to a lesser degree by socio-economic status. More Asian and Pasifika students than European/Pakeha and Maori students had no rescue ability (59% and 49% compared 29% and 34% respectively). In contrast to this, more European/Pakeha and Maori students than Pasifika and Asian students were confident of their rescue abilities, which may afford some protection during their more frequent participation in aquatic activity. As was the case with swimming, whether the limited rescue ability of one in every two Pasifika and Asian students is offset by their less frequent participation in aquatic recreation is difficult to ascertain.

A lack of rescue ability has also been reported among 21-year-old Dunedin young adults, the majority of whom (n = 486; 52%) had not received any lifesaving training (Gulliver & Begg, 2005). Similar findings in overseas studies have prompted recommendations that all school children should be taught basic water rescue skills (Smith & Brenner, 1995; CDC, 1986). However, even though the level of rescue ability reported in the present study was poor, teaching in-water rescue activities in schools may not reduce drowning risk. A more viable alternative might be the teaching of safety awareness skills that reduce risk by preventing a crisis occurring in the first instance rather than teaching crisis management skills that may further endanger lives. Evidence that such preventative knowledge is lacking is presented in later discussion on students' cognitive understanding of water safety.

The third practical skill, cardio-pulmonary resuscitation (CPR), was included in the study because many in the field of drowning prevention believe it mediates drowning risk by providing a capacity for immediate revival of a drowning victim. The ability of bystanders to perform CPR has long been advocated as an important community skill and one that should be taught to youth in order to reduce death by drowning (American

Academy of Pediatrics, 1993a; European Resuscitation Council, 2000; CDC, 2002b). However, in spite of such widespread advocacy, this study found a lack of CPR knowledge among New Zealand youth. Two thirds (n = 1452; 67%) had either poor or no CPR ability, only one quarter were confident in their ability to perform CPR (n = 602; 27%), and an even smaller proportion had current CPR qualifications (n = 148; 7%). Such findings are consistent with another recent New Zealand study, which reported that 45% of secondary school pupils in 173 schools were taught no CPR, 20% were taught once and only 13% were taught CPR more than twice (Lafferty, Larsen & Galletly, 2003). Similarly, low levels of CPR ability were reported in a telephone survey of 400 adult subjects in Wellington with less than one in ten respondents able to accurately recall compression-to-ventilation ratios (Larsen, Pearson, & Galletly, 2004). Overseas studies also report similar low levels of CPR ability (Liller, Kent, Arcari & Mc Dermott, 1993; Gagliardi, Neighbors, Spears, Byrd, & Snarr, 1994). In contrast to both local and overseas studies, Gulliver and Begg (2005) found that almost two-thirds (n = 588; 63%) of 21-year-olds from Dunedin claimed to have been certified in CPR, a claim that is not consistent with self-reported ability of subjects in this study.

As was the case with swimming and rescue ability, disparities in the ability to perform CPR were evident by gender, socio-economic status and ethnicity. More than one third of females (n = 370; 36%), students from high-decile schools (n = 327; 35%), and European/Pakeha students (n = 510; 38%) were confident of their ability to perform CPR. Those with poor CPR skills included almost half of males (n = 530; 45%), students from low-decile schools (n = 300; 48%), and more than half of Asian (n = 130; 63%) and Pasifika (n = 120; 59%) students. This lack of skill suggests that many students might be incapable of rendering assistance in a drowning emergency. It also suggests that those most likely to need the skill, young males who often swim unsupervised and in unregulated environments, are the least prepared in the event of an emergency necessitating resuscitation. Given the persistence of the problem of unsupervised swimming among the adolescent population reported here (see Table 9, chapter 3) and in other studies (Smith & Brenner, 1995; Howland et al., 1996), and the lack of CPR skills reported in Table 27 (see chapter 4), the teaching of CPR skills in high schools might be an effective way of enhancing the skill base of the public to deal with drowning emergencies. However, given that less than one in ten students (7%)

reported having CPR qualifications, the opportunity for all high school students to gain appropriate knowledge through present curricular activity is clearly not available. Similar findings in recent local (Lafferty, Larsen & Galletly, 2003) and overseas studies (Lester, Donnelly & Morgan, 1994; Lester, Weston, Donnelly, Assar & Morgan, 1994; Lewis, Fulstow & Smith, 1997; Reder & Quan, 2003) have resulted in demands for increased funding, more time in the curriculum, more certified instructors and compulsory CPR training in schools. On the basis of evidence presented here, similar improvements to the education of New Zealand youth might reduce the risk of drowning especially since many youth reported swimming without supervision and in locations where emergency services are often not immediately available.

Cognitive understanding of water safety principles and practice was the final knowledge component believed to influence drowning risk among youth. It is generally assumed by many engaged in safety promotion that such safety knowledge is likely to reduce injury risk by enhancing decision-making when confronted with potential harm (Laflamme, Svanström & Schelp, 1999). Responses to questions on boat and surf safety from this study however, indicate that many youth did not have a good understanding of water safety principles and were therefore at greater risk of drowning when at a surf beach or when boating. More than one quarter of students (n = 596; 27%) failed to recall more than two essential on-board safety items required for a fishing trip on a small boat. Furthermore, nearly one in ten students (n = 184; 9%) failed to identify any boating safety items, including the need to carry lifejackets on board. This suggests that some students were either ignorant of, or chose to ignore, one of the fundamental tenets of safe boating and one that is a legal requirement for all boaters in New Zealand. When asked what safety preparation they would initiate when organizing such a boat trip, almost one in five students (n = 385; 18%) reported no effective safety preparation prior to departure. In other words, these students failed to recall even the most rudimentary preparatory procedures such as checking that lifejackets were available on board, checking the weather, checking other safety items and informing others of their intentions. In addition, almost one in four students (n = 521; 24%) failed to recall any on-board safety rule, not even the need to regulate fundamentally unsafe boating practices such as alcohol consumption or the non-wearing of lifejackets. This lack of boat safety knowledge is particularly noteworthy because of the frequency of casual

boating activity previously reported and the high incidence of boating-related fatalities previously discussed. Furthermore, the impact of this lack of knowledge is reflected in the unsafe boating practices reported by many youth and discussed later in the chapter in association with unsafe boating attitudes and behaviours.

The lack of surf safety knowledge among Year 11 students was equally disconcerting since most (n = 1677; 76%) had swum at a patrolled surf beach in the previous year. When presented with an aerial picture of North Piha, one of New Zealand's most dangerous surf beaches, nearly one fifth (n = 417; 19%) failed to identify any surf hazards such as rip currents and inshore holes. This lack of awareness is even more alarming because the beach is popular with youth and was the focus of a recent national publicity campaign that included extensive television exposure of the beach highlighting the location of dangerous rips and holes. When asked what safety decisions they would make when organizing a trip with friends to that surf beach, almost one third of students (n = 649; 30%) made no effective safety decisions about their day's activities on the beach or in the surf. In other words, they failed to recall even the most rudimentary and well-publicised advice to 'Swim between the flags'. Furthermore, when asked where they would position themselves on the beach and where they would enter the water, one in four students (n = 610; 28%) chose the least safe of four possible options. They indicated that they would enter the water well away from the clearly marked surf patrol area and position themselves at an isolated part of the beach some distance from the lifeguard club that was also clearly identified in the picture. Only half (n = 1282; 58%) of the students selected the safest option that included swimming between the flags and locating themselves close to the patrolled area of the beach which would provide them with immediate access to lifeguard services in the event of an emergency. Given this evidence of poor decision-making and limited understanding of the surf environment, many youth are likely to place themselves at greater risk of drowning at surf beaches, a likelihood that is reflected in recent surf lifesaving rescue statistics (Surf Lifesaving New Zealand, 2000; 2003; 2004).

As was the case with other aspects of water safety knowledge, cognitive knowledge of water safety principles and practice varied considerably among youth. Gender-related differences in boat and surf safety knowledge indicate that females generally have a

better understanding of water safety than males, and are therefore likely to be at lesser risk when at the beach or when boating. Females were better able to identify potential aquatic dangers (only 16% of females failed to identify any surf hazards compared with 22% of males) and to make effective safety responses to manage associated risk (only 22% of females failed to list any safety decisions about their day's beach activity compared with 36% of males). They also were more likely to identify basic safety rules such as the wearing of lifejackets and no alcohol on board while boating, and swimming between the flags and staying out if in doubt while at a surf beach. The failure of many young males to recall and apply water safety principles in the two questions on boat and surf safety may be indicative of a lack of water safety knowledge, or of a disregard for the necessity of its application, or both. Irrespective of the reasons for this disparity between males and females, education programmes targeted at addressing the lack of water safety knowledge among males would appear warranted as one way to address gender differences in drowning incidence. Similar findings have been reported in overseas studies of youth drowning (Bennett, Quan & Williams, 2002; Bennett, Williams, Gomez, Murrey, Basford & Bernthal, 1998).

When boat and surf safety knowledge were analysed by socio-economic status and ethnicity, lack of knowledge also increased the risk of drowning for students of low socio-economic status and of Asian and Pasifika ethnicity. Students from low-decile schools, and Asian and Pasifika students demonstrated lesser understanding of small boat safety than students from high-decile schools and of European/Pakeha background. For example, three times as many students from low-decile schools as from high-decile schools could not identify more than two essential boat safety items (35% compared with 13%). In addition, almost three times as many Asian students failed to identify two essential boat safety items compared with European/Pakeha students (36% compared with 14%). In terms of surf safety, similar disparities were evident. For example, twice as many students from low-decile schools as from high-decile schools failed to identify any surf hazards (25% compared with 13%). Similarly, twice as many Maori and Pasifika students and four times as many Asian students than European/Pakeha students failed to identify any surf hazards (27%, 28%, 41% compared with 11% respectively). Reasons for these disparities are discussed later in the chapter when socio-cultural influences on water safety knowledge are examined.

The lack of youth water safety knowledge found in this study is not new. In a longitudinal study of 162 New Zealand high schools between 1987-1996, physical education teachers estimated that more than one half of their Year 11 students had insufficient aquatic skills and that there had been little improvement of that ability in the intervening decade (Moran, 1999b). An earlier series of studies that examined the theoretical and practical knowledge of Year 5 and Year 10 students from Dunedin also raised concerns about the 'dismal' performance of most pupils (Dukes, 1985, 1987; Stenning & Dukes, 1987). Dukes (1987) concluded that the overall standard of performance was very poor and that "a high percentage of students were unable to look after themselves even in a simulation of the simplest common aquatic emergency" (p. 19). Results of the present study re-iterate these claims and suggest that, in terms of water safety knowledge, many students today are no better equipped than were their predecessors two decades ago.

A lack of boat safety knowledge among young New Zealanders was also evident in a national survey of Year 4 and Year 8 pupils that evaluated pupil achievements in the curriculum areas of Health and Physical Education (Crooks & Flockton, 1999). In a question on preparation for an imaginary boating trip (similar to that used in the present study), nearly one quarter (23%) of Year 8 students did not prioritise lifejackets as the most essential piece of equipment and almost one half (45%) failed to include other important safety equipment. Results presented in Table 29 (see chapter 4) would suggest that high school students in their final year of compulsory schooling had learned little additional water safety in the intervening years.

In summarizing the role of water safety knowledge in mediating the drowning risk associated with aquatic recreation, this study has found that water safety knowledge varied considerably with regard to gender, socio-economic status and ethnicity. This makes generalizing about the impact of water safety knowledge on the drowning risk associated with aquatic recreation at a population level problematic. Notwithstanding this limitation and assuming that the self-reported information is accurate, results from this study suggest that some individuals, notably males, those attending high-decile schools, and those of European/Pakeha ethnicity, may have greater protective benefit

than others in an aquatic emergency from being able to swim and perform rescues. Females demonstrated a better theoretical understanding of water safety principles and practice than males, thereby reducing risk of drowning during aquatic recreation by providing greater capacity to identify aquatic danger and take appropriate water safety precautions. In terms of ethnicity, the practical and theoretical knowledge base of Asian and Pasifika students would appear to offer the least protection against drowning risk, even though their participation in aquatic recreation was less than other students. Similarly, students from low-decile schools, who also reported a limited understanding of water safety principles and low levels of practical ability, might benefit less from any protective benefit that a sound knowledge of water safety might provide.

Differences in water safety knowledge alone however, are, like exposure to risk from aquatic recreation, unlikely to comprehensively explain drowning risk. Further exploration of how such knowledge, or the lack of it, manifests itself in what youth think and do about water safety and drowning risk, is necessary. Knowing what preconceptions youth hold about water safety and drowning risk and what enduring beliefs shape their subsequent behaviour, as postulated in the second level of the conceptual framework, is the focus of discussion in the following section.

7.3 Water Safety Perceptions, Attitudes and Behaviours

A critical part of what youth think about water safety appears to relate to how youth perceive the risk associated with aquatic activity. Perceptions of drowning risk have not been well studied in the field of drowning prevention. Traditionally, youth have been viewed as being unable to accurately assess risk (Millstein & Halpern-Fisher, 2002). When presented with five aquatic scenarios, reviewed by a panel of experts to assess the degree of risk associated with each scenario prior to the survey (see section 2.3.4, chapter 2 for details), many youth underestimated the extent of drowning risk. Risk perception responses (as reported in Table 37, chapter 5) indicate that some youth were unable to accurately assess the potential threat to their safety. This was especially evident in student responses to the two most dangerous scenarios. Less than half (n = 1026; 47%) considered being swept off isolated rocks by a wave while fishing constituted an *extreme risk*. Only a quarter (n = 560; 25%) considered being caught in a rip at a surf beach was an *extreme risk*, whereas one third (n = 715; 33%) thought they would only be at *slight risk* or *no risk*. It is possible that those students who estimated lower risk for these potentially dangerous situations were well equipped to manage the risk and thus the calculation of lesser risk may have been appropriate. However, given that the panel of experts considered being caught in a rip at a non-patrolled surf beach, or being swept off isolated rocks by a wave while fishing, to be examples of extreme risk to anyone irrespective of possible survival ability, the likelihood of underestimation of risk is the most plausible explanation.

Differences in risk perception were most apparent when analysed by gender. Even in the most extreme risk scenarios, many males did not rate the risk of drowning highly. For example, four in every 10 males (n = 471; 40%) considered being caught in a rip current at a surf beach to be only *slight/no risk*. In addition, almost one quarter (n = 270; 23%) also thought that being swept off isolated rocks by a wave when fishing to be only *slight/no risk*. Given that only 23% of males reported being able to swim 400 m in a swimming pool, this underestimation of risk is alarming. In contrast, half as many females as males considered being swept off isolated rocks while fishing (females 12%, males 23%) or being caught in a rip current at a surf beach (females 24%, males 40%) as only *slight/no risk* to their life. These findings of male underestimation of drowning

risk offer strong explanatory evidence as to why more young New Zealand males drown than females. They also re-iterate previous claims in overseas studies that males were more likely to underestimate risk in the aquatic environment (Bennett, Quan, & Williams, 2002; Bennett et al., 1998; Howland et al., 1996; Howland & Hingson, 1988; Orlowski, 1987, 1989).

Differences in drowning risk perception by socio-economic status and ethnicity were not as pronounced as those by gender. Discernible differences were found between students from low-decile schools, who consistently reported higher risk estimates than students from high-decile schools across all scenarios. For example, only one fifth of students from high-decile schools considered being caught in a rip at a surf beach to be an *extreme* risk compared with almost one third of students from low-decile schools (20% compared with 31%). Similarly, for the same scenario, fewer European/Pakeha and Maori students estimated *extreme* risk than Pasifika and Asian students (21% and 27% compared with 41% and 36% respectively). Differences in youth risk perception as a function of socio-economic status and ethnicity have not been widely studied, but the estimations of heightened risk among students of lower socio-economic status and minority ethnicities found in this study are consistent with studies on other aspects of social health. Sobal, Klein, Graham, and Black (1988) found that black American youth reported more health concerns than white students, Alexander (1989) reported greater concern among black youth about substance abuse, while Strunin (1991) found that Asian students reported greater concerns about AIDS even though the incidence of the disease in their community was minimal.

A number of possible explanations may account for heightened sense of risk among students of lower socio-economic status or of Asian and Pasifika ethnicity. Firstly, evidence presented in chapter 3 on aquatic activity showed that those from lower socio-economic groups and some ethnic groups had less experience of the type of situation depicted in the risk scenarios. More students from low-decile schools *never* went to a surf beach compared with students from high-decile schools (low-decile 29%, high-decile 23%). Similarly, more Pasifika and Asian than European/Pakeha and Maori students *never* went to either a patrolled surf beach (35% and 52% compared with 19%

and 17% respectively) or an unguarded surf beach (42% and 69% compared with 26% and 24% respectively).

Secondly, heightened perceptions of drowning risk among these groups might also reflect a self-awareness of low survival ability in potentially dangerous aquatic situations. Evidence presented in chapter 4 on water safety knowledge indicated that students attending low-decile schools and some ethnic groups had poor water safety knowledge, especially in terms of swimming ability. Three times as many students from low-decile schools could swim less than 25 m compared with students from high-decile schools (21% compared with 7%). More students from low-decile schools also estimated *extreme* risk for even the most benign of risk scenarios, that of being in the deep end of a swimming pool (low-decile 12%, high-decile 7%). Similarly, four times as many Pasifika students and Asian students could only swim less than 25 m when compared with European/Pakeha students (27% and 32% compared with 7% respectively) and more of them also perceived being in the deep end of a pool to be an *extreme* risk compared with European/Pakeha and Maori students (9% each compared with 2% and 4% respectively).

While these findings suggest that heightened perceptions of drowning risk among certain groups reflects a lack of familiarity and confidence in their ability to cope with the dangers inherent in the aquatic environment, the extent to which knowledge and experience influence youth perceptions of drowning risk has not been well reported. In this study, when risk perception across all scenarios was aggregated and compared with water safety knowledge for all students, those with good swimming skills tended to estimate lower risk while those with poorer ability estimated heightened risk. However, Table 34 (see chapter 5) showed that the strength of that relationship was only moderate ($r_s = .325$, $p < .01$). Swimming ability and other aspects of water safety knowledge thus do not appear to overly influence drowning risk perception. Similarly, lower perceptions of drowning risk were only slightly associated with the increased amounts of swimming ($r_s = .207$, $p < .01$) or other aquatic activity ($r_s = .235$, $p < .01$). On the basis of this evidence, water safety knowledge, ability and experience are not the only arbiters of drowning risk perception, but further study is required to determine what other factors may also shape drowning risk perception.

How drowning risk perception influenced behaviour around water was equally unclear. While recognizing that awareness of drowning risk does not necessarily mean that youth will avoid at-risk behaviour around water, the lack of relationship between risk perception and swimming risk-taking behaviour ($r_s = .189$, $p < .01$) and aquatic risk-taking behaviour ($r_s = .080$, *ns*) is surprising. The extent to which perception of drowning risk shapes behaviour in the aquatic environment requires further study, but the evidence presented here suggests that, while perceptions of risk are necessary for motivating protective behaviour, they alone are not sufficient (Millstein & Halpern-Felsher, 2002).

Considerable differences were found in youth attitudes towards water safety. These differences are discussed in conjunction with self-reported behaviours for four reasons. Firstly, safety attitudes are thought to be pivotal in the shaping of safe behaviours (Laflamme et al., 1999). Secondly, the influence of attitude on behaviours is believed to be strongest when the attitudes and behaviours are closely related (Ajzen & Fishbein, 1977). In this study, the reporting of youth attitudes towards water safety issues and their performance of at-risk behaviours in the aquatic environment were highly related. For example, youth were asked their opinion on swimming outside patrol flags at a patrolled surf beach, and also were asked in another question how frequently they swam outside the flags. Similarly, youth were asked their opinion on the use of lifejackets while boating and also asked how often they wore lifejackets while boating. Thirdly, swimming, surfing and boating activity were identified as key activities in youth aquatic recreation, they thus provide a relevant context for further discussion on important related attitudes and behaviours (see section 7.1). Fourthly, significance differences in youth understanding of surf and boat safety knowledge have been identified that may help explain differences in attitudes and behaviours related to swimming, surf and boat activity (see section 7.2). Subsequent discussion focuses therefore on youth attitudes and behaviours as they relate to swimming, surf and boat safety.

Two factors thought to heighten drowning risk in youth aquatic activity are lack of adult supervision and doing the activity alone (Howland et al., 1996; Smith & Brenner, 1995). The preponderance of unsafe attitudes of New Zealand youth towards such practices

reinforces these claims, with one third (n = 714; 32%) of students disagreeing that swimming alone was always risky, and four in every ten students (n = 865; 39%) disagreeing that crossing a river alone was dangerous. These unsafe beliefs also were reflected in students' self-reported behaviours, with almost one half of students having swum (n = 1026; 47%) or undertaken other aquatic activity (n = 867; 42%) alone. Socio-economic status and ethnicity did not unduly influence this practice but gender did. Females were more likely to *never* swim alone (females 58%, males 47%), whereas males were twice as likely as females to *often* swim alone (males 13%, females 6%). Females also indicated lesser risk-taking behaviour by *never* doing other aquatic activity on their own (females 67%, males 51%).

As well as swimming alone, a widespread lack of adult supervision was reported. Three quarters of students (n = 1603; 74%) had swum without adult supervision, the most frequent at-risk behaviour reported, and of these, one third (n = 720; 33%) reported that they *often* did so. Lack of adult supervision was somewhat less evident in respect of aquatic activity other than swimming. While a greater proportion of students reported some adult supervision during other forms of aquatic recreation, less than half (n = 942; 45%) reported *mostly* or *always* having adult supervision. Differences in supervision were evident by gender with more female aquatic activity supervised, but even then, one in every four females reported that they did most of their swimming unsupervised (males 38%, females 26%). These results are similar to those reported in the 1991 Youth Risk Behaviour Survey (YRBSS) in the United States which found that almost one half of males and one third of females did most of their swimming unsupervised (CDC, 1992).

Given the extensive practice of youth aquatic activity without adult supervision reported here and in other studies (CDC, 1992; Howland et al., 1996; Smith & Brenner, 1995), it is unlikely that youth drowning risk could be reduced by appeals for more adult supervision (through greater parental involvement or increased professional life-guarding). Similarly, attempting to engage youth in more regulated, adult-assisted aquatic activity is likely to be resisted by independent-minded youth and thus unlikely to offer any realistic diminution of drowning risk. What a continuation of youth aquatic activity without adult control does, however, is place an even greater premium on the

coping skills of youth. It therefore would seem critical to invest in education by providing youth with water safety life-skills that would allow them to make informed decisions about their own safety as they move towards adulthood and independence. Evidence previously presented (see section 7.2) of the lack of practical and theoretical knowledge base of many youth however, would suggest that the provision of such education is currently both limited and selective.

Student attitudes and behaviours in relation to surf safety were considered particularly pertinent to drowning risk since most respondents (n = 1677; 76%) had swum at a patrolled surf beach in the previous year and youth are the age group most frequently rescued from the surf as previously reported. One possible reason for the latter is that one quarter of respondents (n = 559; 25%) expressed resistance to being advised or directed about their safety by lifeguards. Male attitudes towards the role of surf lifeguards were especially likely to predispose them to greater drowning risk, with more than twice as many males than females *agreeing/strongly agreeing* that lifeguards should not be able to tell you where to swim (males 34%, females 16%). Further indication of this resistance to direction on water safety was evident in their swimming behaviour, where almost half of the males also reported that they had ignored safety directions or advice in the previous year (males 45%, females 32%).

Unsafe attitudes towards swimming between the patrol flags is another reason why many youth are at greater risk than others in the surf. Almost half of the respondents (n = 948; 43%) expressed the highly unsafe belief that swimming outside patrolled areas was acceptable if the surf looked safe. Given the poor overall knowledge of surf safety previously discussed (see section 7.2), it would appear that many youth are placing themselves at greater risk through a false belief in their ability to make informed judgments about their surf safety. Males again were more likely to demonstrate unsafe attitudes, with one half of males compared with one third of females either *agreeing* or *strongly agreeing* that swimming outside the patrolled areas at a surf beach was acceptable if it looked safe (males 51%, females 34%). Furthermore, six in every ten students (n = 1344; 61%) and two thirds of male students (n = 772; 66%) believed that swimming after the surf patrol had finished was acceptable if other people were in the water. The folly of such thinking becomes apparent when one considers that 80% of

surf rescues occur outside patrolled areas and many rescues take place after surf patrols have finished (Moran, 1996). That such attitudes are so prevalent among youth suggests that, along with generally poor surf safety knowledge, many youth are not well disposed towards safety in the surf. That one in three male youth did not want lifeguard guidance and advice, that one in two felt it safe to swim outside the flags, and that two out of every three males thought it acceptable to swim after patrol hours, suggests that widely publicized surf safety campaigns have had little impact on reducing youth drowning risk by changing unsafe attitudes among males in particular.

The poor understanding of surf safety, reflected in the unsound knowledge and unsafe attitudes previously reported, was also evident in youth self-reported behaviour at surf beaches. Four in every ten students (n = 845; 39%) reported having swum outside a patrolled area in the previous year, a similar proportion to those who held the opinion that it was acceptable to swim outside the flags if it looked safe. The prevalence of this practice was also apparent in peer observation of unsafe behaviour, with more than two thirds of students (n = 1385; 68%) having seen their friends swim outside patrol areas at surf beaches. More males than females reported swimming outside patrolled areas (males 65%, females 56%), and twice as many males than females reported that they *often* swam outside the flags (males 24%, females 12%). In addition, more males than females had observed their peers swimming outside patrolled areas (males 75%, females 61%).

This collective evidence of inadequate surf safety knowledge among male youth, reflected in their unsafe attitudes towards surf safety and manifested in their greater risk-taking behaviour helps explains why twice as many males have been rescued by surf patrols in the past five years (Source: SLSNZ Rescue Statistics, 2000-2004). Furthermore, the observation that a quarter of male youth reported *often* swimming outside patrol flags, in spite of extensive public promotion of the necessity to ‘Swim between the flags’, reinforces claims by Baker and Dietz (1979) that many injuries result less from lack of knowledge or skill than from failure to apply what is known. It tends also to temper claims that providing safer alternative swimming sites and lifeguard facilities may be more effective than teaching high-risk groups such as male adolescents not to swim in hazardous sites (Smith & Brenner, 1995).

Risk of drowning as a consequence of youth recreational boating also was exacerbated by a prevalence of unsafe attitudes and behaviours, especially with regards to the consumption of alcohol during boating. Almost half of the students agreed that alcohol consumption on board was acceptable providing the skipper remained sober (n = 1040; 47%), and that having a beer whilst fishing from a boat on a calm day was acceptable (n = 968; 44%). The prevalence of such attitudes among youth, while disconcerting, is hardly surprising given the example set by many of their adult counterparts. An Auckland study of boater attitudes towards alcohol found that half (n = 312; 52%) of 600 adult boaters agreed that it was safe for passengers to drink alcohol if the skipper remained sober (Injury Prevention Research Centre, University of Auckland, 2001). It would appear that New Zealand youth attitudes towards alcohol consumption and boating activity are little different from their adult counterparts. These attitudes towards alcohol consumption also align with findings in overseas studies that many boaters appear ignorant of the dangers of alcohol consumption to passengers irrespective of the sobriety of the skipper (Howland, Smith et al., 1993; Smith, Keyl et al., 2001).

Acceptance of alcohol consumption during aquatic activity was more noticeable among males. More than half of male youths surveyed agreed that drinking alcohol on a small boat was acceptable provided that the skipper stayed sober (males 54%, females 40%). Similarly, more than half of male youths (males 54%, females 31%) agreed that drinking beer when fishing from a small boat on a calm day was acceptable, which suggests that, like their adult counterparts, many young males do not appreciate the dangers of on-board alcohol consumption when at anchor even in the most benign weather and sea conditions, as previously found by Howland, Hingson et al. (1996).

Further diversity of opinion on alcohol consumption was evident when data were analysed by ethnicity. Pasifika and Asian students expressed safer attitudes towards alcohol consumption during aquatic activity than their European/Pakeha and Maori counterparts. More European/Pakeha and Maori students than Pasifika and Asian students agreed that on-board drinking was acceptable if the skipper remained sober (50% and 51% compared with 41% and 30% respectively), a reflection perhaps of

differing cultural and religious influences among ethnic groups on the role of alcohol in society at large.

Unsafe attitudes towards alcohol consumption during aquatic activity were reflected in the self-reported behaviours of students, with approximately one quarter having used alcohol in association with swimming activity (n = 512; 24%) and during other aquatic activity (n = 437; 21%) in the previous year. Strong gender-based differences in behaviour were again evident, with more than one quarter of males having reported some alcohol intake during swimming activity (males 26%, females 19%) and almost twice as many males consuming alcohol during other forms of aquatic recreation (males 27%, females 15%). More males also had observed friends drinking alcohol during aquatic activity (males 33%, females 24%). The percentage of students in this study who claimed to have mixed alcohol with aquatic activity is similar to the proportion of alcohol-associated youth drownings between 1992-2001 (Source: WSNZ Drownbase™, 2002). Whereas one fifth (21%) of students reported some alcohol consumption during aquatic activity in the present study, alcohol was known to be associated with approximately one sixth (17%) of recreational drowning incidents in the previous decade. The drowning statistics also reflect the strong gender bias reported in this study on the role of alcohol in aquatic recreation, with no young female victims of alcohol-related recreational drowning during that period, compared with almost one-fifth (18 %) of alcohol-related young male fatalities.

Negative attitudes towards alcohol consumption were compared with other negative water safety attitudes to ascertain whether unsafe beliefs among males were related. Most males who thought drinking alcohol in a small boat was acceptable provided the skipper remained sober (n = 633; 54%), also thought that it was acceptable not to wear a lifejacket close to shore (n = 327; 52%), to swim outside patrolled areas (n = 379; 60%) or after patrols had finished (n = 476; 75%). Similarly, most males who thought drinking alcohol on a calm day while fishing was acceptable (n = 646; 55%) also thought that it was acceptable not to wear lifejackets (n = 333; 52%), to swim outside patrolled areas (n = 392; 61%), or after patrols had finished (n = 497; 77%). These unfavourable attitudes manifested themselves in associated risk-taking behaviours around water. Most males who had reported some alcohol consumption during

swimming activity (n = 325; 28%) also reported having swum unsupervised (n = 279; 86%), outside the patrol flags (n = 257; 77%), in a prohibited place (n = 251; 77%) or alone (n = 185; 57%). Similarly, most males who reported consuming alcohol during other aquatic activity (n = 362; 31%) also reported having no adult supervision (n = 275; 76%), not checking conditions before setting out (n = 252; 70%), not wearing a lifejacket (n = 246; 68%) and not telling an adult beforehand (n = 237; 66%).

This clustering of unsafe attitudes and behaviours among males perhaps explains the over-representation of males in drowning statistics as suggested in previous studies. Howland et al. (1996) found that the association between drinking and other risk-taking behaviours was strongly gender-oriented, with males who had consumed alcohol on their last aquatic activity day more likely to swim without lifeguard supervision (males 37%, females 26%) or to swim alone (males 15%, females 4%). Similarly, in a study of young male U.S Army soldiers, Bell, Amoroso, Yore, Senier, Williams, Smith and Theriault (2001) found that alcohol use was associated with a ten-fold increase in reckless behaviour such as violation of safety rules and swimming in an unauthorised area, particularly by those less than 21 years of age. Furthermore, a recent study in Oklahoma by Levy et al. (2004) suggests that those who consumed alcohol during the day were 3.5 times more likely to suffer a submersion injury and that the risk was especially high for underage drinkers aged 15-20 years.

In the area of boat safety, differences in attitudes and behaviours among youth towards the use of buoyancy aids also influenced drowning risk. One-third of students agreed that lifejackets were unnecessary within 100 m of shore (n = 785; 36%), a belief that is particularly problematic since more than half of the students (n = 1192; 54%) also estimated they could swim less than 100 m. One fifth of students (n = 403; 18%) also thought that wearing a lifejacket was unnecessary for good swimmers. Unsafe attitudes towards lifejacket use were further reflected in high levels of at-risk behaviour. One fifth of students (n = 394; 19%) reported that they never wore lifejackets during boating activity, while two thirds (n = 1181; 67%) reported that they had seen their friends not wear a lifejacket. That a substantial number of students did not see the necessity to wear a lifejacket is a cause for concern especially since it is widely reported that the wearing of buoyancy aids could prevent most boating fatalities (United States Coastguard,

2003). A study of 15-19-year-olds in Washington State by Quan, Bennett and Williams (2002) found a similar lack of awareness among a focus group of 84 teenagers who rated being in a small boat without a lifejacket as the least dangerous of ten aquatic-related activities. They also reported that none of 40 young drowning victims in Washington State between 1997-1999 were wearing lifejackets and that observed lifejacket use was lowest in those older than 14 years of age.

Unsafe attitudes towards lifejacket use were especially apparent among the young males surveyed. Twice as many males as females agreed that lifejackets were unnecessary for good swimmers (males 24%, females 12%), while more males agreed that lifejackets were not necessary within 100 m of shore (males 42%, females 29%). Male resistance to lifejacket use was reiterated in reported risk-taking behaviours, with fewer females never wearing lifejackets (females 16%, males 22%) and more females always wearing them (females 35%, males 28%). Also, more males reported observing that their friends had not worn lifejackets (males 72%, females 59%). Quan, Bennett, Cummings, Trusty and Treser (1998) found similar resistance to the wearing of buoyancy aids by male youth and adults in a study of 4,000 boaters in the US Northwest. They suggested that infrequent use of lifejackets was a factor in the higher incidence of boat-related drowning among adolescent males, and that an understanding of user/non-user attitudes may help in structuring safety messages specifically targeted at this high-risk group. On the evidence of unsafe attitudes and at-risk behaviours towards lifejacket use among youth reported here, similar action targeted specifically at young New Zealand males would appear most appropriate in order to bring about a change.

Some differences also were evident when attitudes to lifejacket use were analysed by ethnicity. Maori and Pasifika students were more likely to have unsafe attitudes on lifejacket use than European/Pakeha students. For example, more Maori and Pasifika than European/Pakeha students agreed that lifejackets were unnecessary within 100 m of shore (41% each compared with 34% respectively), or that good swimmers did not need to wear lifejackets (23% and 28% compared with 15% respectively). These unsafe attitudes are also reflected in their risk-taking behaviour when boating. European/Pakeha students more than Maori, Pasifika and Asian students had mostly or always worn a lifejacket during boating activity in the previous year (60% compared

with 44%, 43% and 47% respectively). Similar findings were reported in Canada where the Canadian Red Cross (1998) found lesser proper lifejacket use among drowning victims from indigenous groups compared with non-indigenous Canadians (6% compared with 11%). It is difficult to determine whether failure to use lifejackets reflects unfamiliarity with boating activity, antipathy to their use, or their cost (students attending low-decile schools also showed a less positive attitude to lifejacket use than those attending medium- or high-decile schools).

Another area of potentially dangerous boating practice is the lack of safety preparation beforehand. Only one fifth of students always checked the weather and water conditions before setting out (n = 409; 20%), whereas more than a quarter never checked conditions (n = 591; 28%). Furthermore, more than one third of students (n = 789; 38%) never or only sometimes told an adult of their intentions beforehand. Not surprisingly, males were again to the fore in this risk-taking behaviour with less than a third (n = 347; 32%) always advising an adult of their intentions compared with almost half of females (n = 441; 45%). Clearly, many young New Zealanders do not comply with the fundamental preparatory advice to any boater of always checking conditions before setting out and of always informing a responsible person of your intentions. Evidence of lack of knowledge of safety preparation has already been presented (see chapter 4), with almost one fifth of students (n = 385; 18%) not able to identify any acts of essential safety preparation prior to departure. Whether such widespread unsafe practice reflects a lack of safety knowledge however, or is a deliberate decision to ignore such advice, or a combination of both, is difficult to ascertain.

The relationship between water safety knowledge, attitudes and behaviours (K-A-B) was tested because a fundamental tenet of injury prevention programmes is that by influencing people's knowledge of safety principles, their attitudes will change, and so will their safety performance (Laflamme et al., 1999). The degree of the interrelationship between students' water safety knowledge, attitudes and behaviours was not as strong as might have been anticipated. No significant association was evident between the practical skills of swimming, rescue and CPR ability, and water safety attitudes. The lack of association between a practical skill such as swimming and safety

attitudes is understandable since the ability to swim, like riding a bike, does not ensure that the skill is necessarily performed safely. More surprisingly, only a moderate degree of relationship was found between water safety attitude and boat safety knowledge (r_s = .288, p = .01) and surf safety (r_s = .297, p = .01). A plausible explanation for this modest degree of relationship is that knowledge of water safety principles is but one factor shaping the development of sound water safety attitudes, and that water safety attitudes are formed by many other mechanisms such as group cultures and social norms (discussed later in the chapter).

A slightly stronger degree of relationship was found between water safety attitudes and behaviours during aquatic activities. Favourable water safety attitudes were reflected in safer self-reported behaviours, although the strength of the relationships between attitudes and swimming behaviour (r_s = .442, p = .01) and other aquatic behaviour (r_s = .465, p = .01) were again only moderate. This would suggest that risk-taking behaviour in aquatic activity is more than a function of unfavourable water safety attitudes. Other factors such as social norms, habits and knowledge are also likely to exert some influence on behaviour. Where these factors interact to produce unsafe behaviour and coincide with poor risk management skills, poor perception of drowning risk and unfavourable water safety attitudes, then risk of drowning during aquatic activity is likely to be exacerbated.

7.4 Socio-cultural Influences on Water Safety K-A-B

Evidence presented in chapter 6 on socio-cultural factors that might influence youth water safety suggests that youth understanding of water safety is informed, or perhaps misinformed, in many different ways. When asked what were the three most important influences on their water safety, most students identified family, school and friends. Analysis of the single most important influence however revealed considerable gender differences. One third of males identified friends as their dominant influence, a rate ten times that of females (males 35%, females 3%). The dependence of males on friends is problematic in that it places a premium on the knowledge base and practice of contemporaries. Previous evidence reported elsewhere in the study of poor water safety knowledge and frequent at-risk behaviours among males suggests that the male peers are unlikely to be the best source of sound water safety knowledge for many males. In contrast, females identified adult sources as their most important water safety influences. Almost half of the female respondents compared to one third of males identified family as their most important water safety influence (females 43%, males 29%). Female youth appeared to be more reliant, and males less reliant on agencies such as schools (females 30%, males 20%) or clubs (females 13%, males 7%) for their understanding of water safety.

Socio-economic status and ethnicity did not greatly influence student choice, although more Maori students (n = 95; 24%) and those from low-decile schools (n = 150; 24%) cited friends, whereas fewer cited schools, as their most important water safety influence (18% and 24% respectively). In contrast, European/Pakeha and Asian students and those from high-decile schools (27%, 29% and 27% respectively) considered schools to be the most important influence on their water safety.

Most students had been taught to swim, although, as could be expected, more Asian students and those with short-term residency had not. More than a third of students (n = 832; 38%) identified primary schools and one quarter (n = 631; 29%) identified private swim schools as the agencies responsible. Not surprisingly, more students from low-decile schools identified with school swimming instruction, whereas more students from high-decile schools identified with paid lessons. The reliance on low-decile school

for the promotion of swimming abilities amongst the more economically disadvantaged in society however, may place unrealistic expectations on those schools least able to provide such education. One New Zealand study has found that low- and medium-decile primary schools are less likely to offer aquatic education programmes (Moran, 2002). The low level of swimming abilities reported by students from low-decile schools suggests that these schools may be failing to teach their students to swim and, given the dependence on them as a source of swimming knowledge reported above, assistance that specifically targets low-decile schools may help offset this inequity. Similar conclusions have also been expressed in other recent studies (Moran, 1999b, 2002; Water Safety New Zealand, 2002c).

Although four out of five students (n = 1807; 81%) reported that they had been taught some water safety, disparities in provision were clearly evident. One in four Asian students (n = 85; 41%), a third of Pasifika students (n = 67; 30%) and one quarter of students from low-decile schools (n = 167; 27%) had not been taught water safety at school. The analysis of what water safety topics had been taught at school revealed specific inadequacies (see Table 53 for details). Three quarters of students (n = 1638; 74%) had been taught pool safety, however, other aspects of aquatic safety were not as widely taught. Given the popularity of surf beaches for youth recreation, and the poor surf-related attitudes and behaviours reported in this study, it is of concern that less than one half (n = 1035; 47%) had been taught surf safety. Even fewer students (n = 620; 28%) recalled having been taught any boat safety. This lack of education provision helps to explain the lack of surf safety and boat safety knowledge previously reported and discussed. Furthermore, the lack of water safety education was not confined to boat and surf safety; it was also evident in other important topics. Only one quarter of students recalled having been taught any river safety (n = 597; 28%) or underwater safety (n = 525; 24%), a cause for concern given that almost half of the respondents had used rivers and engaged in underwater activity in the previous year.

Disparities were also evident when individual water safety education topics were analysed by socio-economic status and ethnicity. Fewer students from low-decile schools than from mid- or high-decile schools had been taught surf safety (39% compared with 53% and 48% respectively), and river safety (23% compared with 28%

and 29% respectively). Pasifika and Asian students reported less surf safety education than either Maori or European/Pakeha students (27.5% and 21.3% compared with 44.3% and 55.0% respectively). Previous studies (Moran, 1999b; 2002; WSNZ, 2002c) have indicated several reasons for these inequities including the high-cost nature of aquatics education, a lack of pool facilities among low-decile schools and the prevalence of user-pays programmes offered by some external water safety providers. It seems reasonable to suggest that to remedy inequities in the provision of water safety education evident in this study and previous studies, considerable investment is required in schools that cater for socio-economically disadvantaged students in order to reduce their risk of drowning.

Asian students surveyed reported the least amount of water safety education with only one fifth of students having been taught surf safety (n = 44; 21%), river safety (n = 37; 18%), or boat safety (n = 38; 19%). This lack of water safety education among Asian students, almost half (n = 93; 45%) of whom were recent arrivals in the country, can be explained by their lack of time in the New Zealand education system, and possible language barriers to learning in current water safety programmes. This lack of water safety knowledge may become more problematic as these new, young residents begin to engage in aquatic activity as they become more familiar with New Zealand's aquatically oriented lifestyle. A recent Australian study has made similar observations, and suggested a need for further awareness raising within the Chinese community in New South Wales on safety measures for rock fishing, home pool fencing requirements and the use of lifejackets (Mitchell & Haddrill, 2003).

As previously indicated, peers played an important formative and sometimes pivotal role in informing youth understanding and practice of water safety, especially among males. In an attempt to ascertain the influence of friends on water safety practice, students were asked to recall whether they had ever observed friends performing a range of at-risk behaviours. Not surprisingly, males reported more frequent observation of at-risk behaviours by their friends across all aquatic settings, which is especially problematic since more males than females also cited friends as their most important source of water safety knowledge. The extent of these at-risk practices has already been reported with respect to observation of friends that had swum outside surf patrols (males

75%, females 60%), not worn lifejackets when boating (males 72%, females 60%), and consumed alcohol in conjunction with aquatic activity (males = 33%, females 21%). In addition, males were twice as likely to have observed friends ignore water safety advice (males 54%, females 25%) and to have encouraged others to take risks in the aquatic environment (males 54%, females 26%). The prevalence of the latter, encouragement of risk, reinforces previous findings on the importance of the three 'D's'- drinking, drugs and dares – which are more likely to influence adolescent males than females (O'Flaherty & Pirie, 1997). Changing such entrenched at-risk behaviours among groups of male youth presents a particular challenge to parents, lifeguards and educators alike. Given the acknowledged importance of friends in informing male water safety practice previously reported, it might be appropriate to capitalise on this to promote peer responsibility ('buddy care') as an integral part of male water safety education promoted in schools and other community agencies.

Families also were reported to have had a major influence on youth understanding of water safety. Families are considered to be especially important since parents often act as gatekeepers in determining what physical activity their offspring do and what resources they provide (Welk, Wood & Morss, 2003). Most students reported that families had provided positive input to their water safety by supervising family aquatic activity (n = 1827; 83%) and by giving water safety advice (n = 1877; 85%). More than half also reported that families had provided for the payment for swimming lessons (n = 1202; 55%), or offered encouragement to improve swimming ability (n = 1151; 52%). However, less than half (n = 952; 43.2%) reported that family members had prevented them doing water activity because of concerns for their safety. Whether this response reflects an assertion of youth independence from familial control or an indication of lack of input from family with regards to their teenager's water safety is difficult to ascertain. What it does suggest is that reliance on familial control to directly regulate unsafe aquatic recreational activity is unlikely to substantially reduce youth drowning risk.

Females reported greater positive input from families than males across all possible actions. In particular, females reported greater direct family input via the supervision of aquatic activity (females 90%, males 77%), the giving of water safety advice (females

89%, males 82%) and the prohibition of aquatic activity (females 47%, males 39%). These differences are difficult to explain. They may be the manifestation of a greater protectiveness on behalf of family members/parents towards their female offspring, or a reflection of greater female acceptance of, and male adolescent resistance to, parental authority. Whatever the reasons, the lack of family input into male youth aquatic activity in particular suggests that attempts to influence their water safety behaviour, through the family, may not be an effective means of minimizing youth drowning risk.

The role of family on water safety was not as pronounced among students from low-decile schools and Asian students as those from higher socio-economic backgrounds or other ethnicities. Family unfamiliarity with the aquatic lifestyle of New Zealand and lack of exposure or access to community education programmes are possible reasons for this lack of familial influence. In addition, for overseas students studying full-time in New Zealand as temporary residents, it also might reflect lack of immediate family in New Zealand. Lack of discretionary income and time to spend on family leisure in aquatic activity might also account for less family input into water safety among economically disadvantaged families. In these circumstances, the opportunity to learn by example or through parental instruction is likely to be limited and would help explain the previously reported dependence on friends and school for water safety skills and knowledge for these groups. In contrast, students from high-decile schools and of European/Pakeha origins, reported greater levels of family input. The inequitable nature of water safety provision through family input is perhaps best exemplified in the provision of paid swimming lessons, where students of European/Pakeha background, or from high-decile schools, were twice as likely as Pasifika students or those from low-decile schools, to have had their families pay for lessons.

The inequitable opportunities to experience quality water safety education either formally (through schooling) or informally (through family) identified here is manifested in the poorer swimming abilities and understanding of water safety among students attending low-decile schools and of Asian and Pasifika ethnicity (as reported in chapter 4). Lack of water safety skills and understanding clearly puts these youth at greater risk of drowning than youth from privileged socio-economic backgrounds who are more likely to learn about water safety through both school and family. As

previously stated, providing educational opportunity to learn about water safety through schooling may offer the most equitable solution to address disparities in opportunities to develop water safety knowledge among youth.

While past experience is commonly assumed to be an important factor affecting current beliefs and practices, youth experience of a life-threatening aquatic incident did not appear to be an important influence on the construction of drowning risk. The number of students who claimed to have experienced a life-threatening immersion incident was however, substantial. More than a third of students (n = 810; 37%) claimed to have experienced a life-threatening submersion incident, providing further indication of the extent of the drowning risk among youth and re-affirming earlier claims by Schuman, Rowe, Glazer and Redding (1977) that actual drowning figures are only the tip of the drowning iceberg. More females than males reported having had such an experience (females 40 %; males 33%). Further analysis found no significant association between the higher incidence of near-misses among females and their possible greater exposure to risk environments, increased at-risk behaviours, or poorer protective abilities (such as swimming, rescue and CPR skills). In contrast to this, Gulliver and Begg (2005) found that a greater proportion of males reported higher levels of life-threatening immersion incidents among Dunedin 21-year-olds (females 37%; males 63%). Two age-related reasons might account for this gender-related difference in findings. Firstly, unlike Year 11 youth in this study, older male youth in the Dunedin study may have made more use of high-risk environments and thereby experienced more life-threatening incidents. Secondly, a heightened sense of vulnerability to harm reported by Year 11 females (as reported in chapter 5) may account for the increased reporting of a serious submersion incident at an earlier age than females in the Dunedin cohort. Other studies on youth risk that relate to drug/alcohol use, and sexual behaviour (Parsons, Siegel, & Cousins, 1997) and driving (Mundt, Ross, & Harrington, 1992) also have reported heightened sense of risk among 15-19 year old females.

Contrary to popular belief about the effects of life-threatening immersion incidents on water phobia, personal experience of such an incident did not appear to have any aversive effect on the aquatic activity of many who had experienced such an event. Two thirds of these students continued to take part in aquatic activity with confidence (n =

534; 66%), while less than a third of students reported that the experience had made them more cautious (n = 245, 30%). In addition, more female than male students reported that the experience had made them more cautious (females 34%, males 27%), further suggesting a heightened sensitivity towards drowning risk among females.

Only a small proportion of students who had experienced a life-threatening incident (n = 31; 4%) were too fearful to take part in any further aquatic activity, with students from low-decile schools (n = 18; 8%) and of Asian ethnicity (n = 6; 9%) most affected. Poulton, Menzies, Craske, Langley and Silva (1999) found similarly low proportions in a study of water phobia in New Zealand youth. They found that approximately 5% of Dunedin 18-year-olds with water phobias had experienced difficulties in water that necessitated rescue by the age of nine. They concluded that specific aversive experiences were not of major importance in the genesis of fear of water. Similar conclusions could be drawn from the present study, given that the incidence of experiencing dangerous aquatic situations for youth was relatively common. Yet the fear of further participation affected less than 2% of participants. In addition to having a minimal aversive impact on continued participation, previous experience of a life-threatening incident did not result in widespread change in safety behaviour that was likely to reduce future risk of drowning.

7.5 Summary

The discussion above has provided a comprehensive account of the complexity of youth drowning risk and highlighted the varying, yet pivotal, contribution of water safety knowledge, attitudes and behaviours to the risk of drowning associated with aquatic recreation. The manner in which this research has contributed to a professional understanding of youth drowning and how findings that might influence future youth drowning prevention strategies are highlighted in the following chapter, which concludes the study. Recommendations also are made about the direction of future research that follows from this foundational study and which may further enhance understanding of the youth drowning phenomenon and assist its prevention.

8 Chapter Conclusion

8.1 Key Findings

The results of this study and the preceding discussion confirm that drowning as a consequence of aquatic recreation is a significant, complex and multifaceted phenomenon, which has at its heart, the way in which humans interact with the aquatic environment. In the case of youth drowning, the risk to human life inherent in aquatic activity appears to be greater among New Zealand youth who took part in this study partly because they have been shown to frequently participate in aquatic recreation. More importantly though, the findings of the study indicate that some youth possess a poor understanding of water safety, hold unsound water safety beliefs and attitudes, and often practice at-risk behaviours. Taken separately, any one of these dispositions is capable of heightening risk of drowning during aquatic activity. Taken collectively, they offer a strong explanation of why youth are at greater risk of drowning than others. The key findings of the study that support these conclusions are summarized below.

8.1.1 The nature and extent of aquatic activity

The study initially investigated drowning risk in terms of youth participation in aquatic recreation to ascertain whether high levels of risk exposure could explain high drowning rates among New Zealand youth. Although several previous studies of youth recreation had indicated the popularity of water-based activity, none had comprehensively described the frequency and type of activity engaged in by youth. This study found ample evidence of frequent aquatic activity among New Zealand youth. For example, 98% had participated in some swimming activity, three quarters had swum at a surf beach and two thirds had engaged in surfing or paddling activity. However, the considerable variation found in the amount of aquatic activity among youth makes inferences about youth drowning risk at a population level problematic. When the type and frequency of aquatic activity was analysed by gender, ethnicity and socio-economic status, some differential exposure to risk among youth was evident, although the differences in exposure did not adequately explain the past incidence of drowning or its future likelihood. Variations in the frequency and nature of aquatic activity among

youth were not reflected in drowning statistics. For example, no significant differences were found in swimming participation rates by gender, even though six times as many young adult males than females had drowned while swimming in the previous ten years. Similarly, although significantly more males took part in boating and fishing activities, differences in levels of participation did not adequately explain why seven times as many young males than females had drowned in boating fatalities in the past decade.

Previous studies have cited increased exposure to risk brought about by frequent participation in aquatic recreation as a major contributor to the comparatively high incidence of drowning among New Zealand youth (Langley & Smeijers, 1997). Others, notably Brenner (2002), have suggested however, that high rates of youth drowning are more than a reflection of increased exposure to risk. Evidence presented in this study on New Zealand youth would support the latter view. Predicting drowning risk on the basis of exposure to risk via measurement of activity levels alone would appear, at best, inconclusive, primarily because it fails to take into account what youth bring to that participation in terms of their understanding and practice of water safety. The conclusion seems warranted that high levels of risk exposure alone do not adequately explain the high incidence of drowning among New Zealand youth.

8.1.2 Water safety knowledge, attitudes and behaviours

Further explanation of high drowning risk was sought from analyses of youth water safety knowledge, attitudes and behaviours. Unlike differences in exposure to risk, differences in these dispositions did provide strong explanatory evidence as to why some youth were at greater or lesser risk of drowning during aquatic recreation. When analysed by gender, the lack of water safety knowledge, the prevalence of unsafe attitudes and perceptions, and the engagement in at-risk behaviours among males during aquatic activity were consistent and pronounced. The prevalence of these risk-enhancing dispositions among males provides compelling evidence as to why so many more young males than females drown when participating in aquatic recreation. The effects of socio-economic status and ethnicity on water safety knowledge, attitudes and behaviours were less pronounced, although the data did suggest that the knowledge base of youth from low-decile schools and those of Pasifika and Asian ethnicity provided the least protective potential in the event of unintentional submersion.

The considerable variation in water safety skills and knowledge among New Zealand youth was especially apparent and, from a water safety education perspective, disconcerting. Traditionally, much energy and many resources have been invested in teaching youth swimming and lifesaving skills because such skills were considered to offer considerable protection from the increased risk of drowning associated with an aquatically oriented lifestyle (Moran, 1999a, 1999b). Little evidence was found however, to suggest that youth generally possess the skills necessary to counter any increased exposure to drowning risk as a consequence of frequent aquatic recreation. What the study did find was great variance among youth in all aspects of water safety knowledge, both theoretical and practical, which makes explanation of drowning risk at a population level by assessment of knowledge and skill alone as problematic as by risk exposure alone.

Several key findings illustrate the variability among youth in respect of their water safety knowledge and skill base. Little evidence was found among New Zealand youth to support claims that the reduction in child and youth drowning in recent years can be attributed to improvements in swimming skills as reported by other studies (Ozanne-Smith & Wigglesworth, 2002; Ozanne-Smith, Wigglesworth, & Staines, 2003; Royal Life Saving Society of Australia, 2002). For example, one third of students estimated that they could swim less than 50 m and more than one half thought that they could not swim more than 100 m and more than one half of students expressed doubts about their ability to perform a deep-water rescue or CPR skills. In addition, drowning risk for males, students from low-decile schools and of Asian and Pasifika ethnicity was likely to be exacerbated by their poor understanding of CPR. Paradoxically, males estimated better swimming and rescue ability than females even though they were overrepresented in drowning and rescue statistics, lending weight to claims by Howland et al. (1996) and Bennett et al. (2002) that males were more likely to overestimate their abilities and thereby increase their risk of drowning.

The generally poor theoretical knowledge of boat and surf safety found in the study suggests that many students are ill-equipped to make effective decisions about their own safety, which is especially problematic since most swimming and other activities reported by youth were unsupervised. The widespread lack of understanding of small

boat safety was particularly pertinent given that more than half of students had engaged in boating activity in the previous year. When questioned on boat safety, one quarter of students had failed to name more than two essential boat safety items or identify any on-board rules related to small boat safety, and one fifth had failed to identify any essential acts of safety preparation. The lack of surf safety knowledge was equally pertinent given that two thirds of youth had engaged in surfing activity and three-quarters of them had swum at a surf beach in the previous year. When questioned on their surf safety knowledge, one fifth of students had failed to identify any surf hazards, and more than one quarter had failed to make effective decisions about their safety in the surf. The lack of water safety knowledge was most evident among males, those from low-decile schools and those of Pasifika and Asian ethnicity. Similar findings of generally poor water safety knowledge among New Zealand youth in earlier studies (Dukes, 1985, 1987) and in younger students (Crooks & Flockton, 1999) suggest that the lack of water safety knowledge among young people is endemic. On the basis of this accumulated evidence, it is hard not to conclude that current efforts to educate youth about these critically important areas of water safety are failing many young people, thereby adding to their risk of drowning.

As was the case with student water safety knowledge, considerable variations also were evident among youth drowning risk perception and water safety attitudes. Many clearly underestimated the potential threat to personal safety associated with dangerous aquatic environments. For example, one third of respondents thought that being caught in a rip current at an un-patrolled surf beach posed only slight or no risk. Worse still, less than one half of students considered being swept off isolated rocks while fishing as an extreme risk. Females, students attending low- and mid-decile schools, and Asian and Pasifika students reported a heightened perception of drowning risk; males, students attending high-decile schools, and European/Pakeha and Maori students expressed lower estimates of drowning risk for the same scenarios. The underestimation of drowning risk among young males in particular is problematic especially when associated with the previously discussed male propensity to overestimate swimming and rescue ability. On the basis of evidence presented in this study, it seems likely that young New Zealand males are, like their American counterparts (Howland et al., 1996), more likely to take risks in aquatic settings than young females and, therefore, the likelihood of their drowning is increased.

Evaluation of youth water safety attitudes revealed some widely held unsafe beliefs, many of which again may help explain why youth are over-represented in New Zealand drowning and surf rescue statistics. Several particularly unsafe beliefs evident among New Zealand youth warrant reiteration here. With respect to safety in the surf, more than half of the students thought that swimming after a surf patrol had finished was acceptable, one third thought that swimming outside the patrolled area was acceptable if it looked safe, and one quarter thought that lifeguards should not be able to tell swimmers where to swim. With respect to boat safety, more than one third thought that lifejackets were unnecessary close to shore, and that on-board alcohol consumption was acceptable if the skipper remained sober or it was a calm day. The differences were particularly acute between males and females, with males expressing unsafe attitudes across a wide range of water safety issues relating to alcohol consumption and boating, swimming in the surf, ignoring safety directions, and swimming unsupervised or alone. The disposition of many males towards unsafe practice offers strong explanation for the high incidence of males in drowning and rescue statistics. It also suggests that present efforts to change the mindset of male youth towards their water safety through water safety education should not only be persisted with, but also intensified if further loss of life or injury among young males is to be addressed.

How youth behaved around water offered strong culminating evidence of the critical effect that an understanding of water safety had on drowning risk. Again however, the great variability in safe and unsafe behaviours reported within the sample makes generalisation at a population level difficult. In spite of this difficulty, several salient conclusions can be drawn about gender-related differences in drowning risk as a consequence of how males and females behaved in aquatic settings. Males consistently reported greater at-risk behaviour than females, especially with regard to alcohol consumption during aquatic activity, lifeguard supervision and obeying safety advice, and the wearing of lifejackets. Furthermore, the association of alcohol consumption and a cluster of other at-risk behaviours among young males is especially disconcerting given that a similar clustering of risky behaviours around alcohol use has been identified as a major contributor to drowning fatalities among older males (Bell et al., 2001; Howland et al., 1996). Thus, it would appear that many of the at-risk behaviours reported in drowning fatalities among older males are common practice in males at an

earlier age. Because of this, early educational interventions that address entrenched practices such as mixing alcohol with aquatic recreation should be persisted with and intensified.

Socio-economic status and ethnicity did not greatly influence water safety behaviour, although Asian students consistently reported safer behaviour around water than all other ethnic groups. They also expressed more positive attitudes towards water safety, which suggests that any over-representation in recent drowning and rescue statistics as previously reported might be attributed to their lack of water safety knowledge and skills.

8.1.3 Socio-cultural influences on water safety

The formative influence of peers, family, education and previous experience on the water safety of youth who took part in the study varied considerably. Several key findings suggest that males construct their understanding of water safety and drowning risk differently from that of females. Notably, ten times as many males than females identified peers as the primary source of water safety understanding. This dependence on male peers is problematic because evidence was previously presented on the paucity of male water safety knowledge, their unsafe attitudes and their propensity to perform at-risk behaviours. In addition, males reported observing much higher incidence of unsafe practice among their peer group, thereby reinforcing the undesirability of having friends inform young male water safety practice. Furthermore, only one fifth of males compared to one third of females considered schools to be their dominant source of water safety understanding and knowledge. That schools are not perceived by many male youth to be a source of water safety knowledge suggests that current teaching practices are not meeting youth needs in this critical part of their education. Peer-oriented pedagogies that promote self-care through reciprocal learning (Mosston & Ashworth, 2002) might successfully capitalize on the male dependence on peers for their understanding of water safety. Whether such change can address the substantial deficiencies previously identified in male water safety knowledge, attitudes and behaviours is however, uncertain.

Although more females identified adult sources such as family and schools as their primary source of water safety understanding, parents generally did not appear to exert as much direct control over youth during their aquatic recreation as might be commonly expected. The widely reported lack of parental supervision and lack of parental prohibition of aquatic activity suggests that the shaping of a sound understanding and practice of water safety through parental interventions might not be as effective a form of social control as it might otherwise be in other areas of youth safety such as driving safety or drug use.

Differences in how youth were informed of water safety were also evident when socio-cultural factors were analysed by socio-economic status and ethnicity. For more than a quarter of students from low-decile schools, a third of Pasifika and almost half of Asian students, schools were not seen as major contributors to their understanding of water safety. Notably, only a quarter of students from low-decile schools, or of Asian and Pasifika ethnicity reported having been taught such important topics as surf safety and boat safety—popular activities where safety knowledge has already been shown to be demonstrably lacking. This perceived lack of input by schools is particularly problematic since schools often provide the only setting where the water safety needs of all youth, irrespective of their ethnicity or socio-economic status may be addressed. Clearly, in the minds of many students, the current provision of water safety education in schools does not appear to perform this task adequately. The consequence of this inadequacy might be that those from disadvantaged sectors of society are at greater risk of drowning than others from more privileged backgrounds, as previously postulated by Smith and Brenner (1995). Water safety programmes specifically targeted at low-decile schools and their predominantly Pasifika student populations may offer the best opportunity to address this social and educational inequity.

Finally, more than one third of students reported having experienced a life-threatening incident. The extent of these ‘near-misses’ suggests that the true risk of drowning among New Zealand youth may therefore be greater than previously estimated from drowning statistics. Surprisingly though, experience of such an incident did not appear to have a strong aversive affect on subsequent participation in aquatic recreation. Some, notably females and Asian students, thought that they were more cautious as a consequence of the experience, but most continued to participate confidently in aquatic

activity. Fewer males reported similar caution, reinforcing previous suggestions that changing the mindset of male youth will continue to be the most challenging of all drowning prevention initiatives.

8.2 Implications

Several important implications can be drawn from this research that may affect the future work of drowning prevention theoreticians, researchers and practitioners. For those engaged in theoretical study of, and research into, youth drowning prevention, the study has provided an alternative view of the youth drowning phenomenon. It has done this by developing and applying a conceptual framework for comprehensively analysing drowning risk not only in terms of exposure to risk but also in terms of the critical contribution of water safety knowledge, attitudes and behaviours to the construction of drowning risk. By demonstrating the pivotal, but variable, influences of the many inter-related water safety constructs identified in the framework, and by highlighting the limitations of risk exposure alone in explaining drowning risk, this study has challenged conventional perceptions of drowning risk. The net implication of this is that future studies that fail to recognize the critical role that an individual's understanding of water safety makes to the shaping of drowning risk during aquatic recreation are unlikely to shed further light on drowning incidence or its probability. Researchers will need, therefore, to always consider the relative contribution of water safety knowledge, attitudes and behaviours to drowning risk especially when studying the aquatic recreation of other youth populations or that of other sectors of society.

The implications of this study for the work of practitioners engaged in drowning prevention through water safety promotion, water safety education or rescue services, also are far reaching. The findings of this study have provided the water safety sector with a comprehensive picture of youth drowning risk by identifying: the nature of youth aquatic recreation, shortcomings in water safety knowledge, the prevalence of unsafe attitudes and risk perceptions, and the practice of at-risk behaviours during aquatic activities. The implications of these findings for water safety education are six-fold.

Firstly, the study has identified clearly the nature of youth aquatic recreational practice, and especially what activities are popular within the youth population. Swimming, surfing, paddling, boating and fishing activities were popular activities among youth and programmes that specifically target these activities may provide youth with a better understanding of water safety practices. In addition, youth water safety education may

need to focus on the realistic demands of open water environments because most youth activities take place in open water locations such as surf beaches. Consequently, opportunity to learn about water safety in an open water environment may prove to be more valuable than pool-based activity. Surf beaches in particular have been shown to be popular sites of youth aquatic activity and learning about them on location may make young people's water safety education more relevant. Furthermore, because much of youth aquatic activity is done without adult supervision, water safety education might also need to concentrate on empowering youth to make effective decisions about their own safety. Therefore, programmes that promote risk identification and risk-reduction management skills (both of which have been identified as lacking among many youth) may be effective in teaching youth how to look after themselves in the aquatic environment.

Secondly, a shift to accommodate the nature of youth aquatic activity, as suggested above, might not be effective unless it also addresses the many weaknesses identified in the practical water safety skills base among youth. The widespread lack of swimming ability found among certain sectors of the youth in this study suggests that current efforts to provide New Zealanders with rudimentary skills to survive sudden immersion in deep water are inadequate. This is apparent particularly among Pasifika and Asian students, and those attending low-decile schools. Special assistance to low-decile schools via the provision of subsidies for swimming and water safety lessons would address issues of inequitable educational opportunity identified in this study. Such programmes might be made available either via commercial swim schools or public schools. In addition, mandatory instruction of CPR, available to all students before the end of compulsory schooling (16 years of age), may be a productive way of addressing the generally poor skill levels reported among students, especially since students are likely to continue to engage in unsupervised aquatic activity. Furthermore, to ensure that such a critical lifesaving skill is taught properly, CPR training may be taught best by qualified personnel and fully funded to ensure equity of access. This is a condition clearly not evident at present given that more students from low-decile schools have no knowledge of CPR compared with students from mid- or high-decile schools.

Thirdly, external providers might be the best providers of specialist water safety knowledge. This provision may help address the very apparent lack of surf and boat

safety knowledge identified in this study. The provision of such education, however, cannot be done on a user-pays basis, as is current practice because it disadvantages students attending the under-resourced, low-decile schools. These students have been found to have a lesser understanding of water safety than other students and far fewer reported having had any surf and boat safety education during their schooling. Funding subsidies to assist external providers is one way that such disparities may be addressed.

Fourthly, given that Asian students, who make up the bulk of new settlers in New Zealand, have limited water skills and understanding of water safety, specific education programmes in schools and the community offer great potential for a reduction in drowning risk among this group. A range of educational strategies could be implemented to address the shortcomings in water safety skills and knowledge identified in this study. These might include: school-based induction programmes for new arrivals with an emphasis on water safety and aquatic recreation in New Zealand; water safety information in a range of languages disseminated through migrant community groups and schools; and subsidised commercial swimming and water safety lessons targeted at new arrivals and available through external providers.

Fifthly, any future water safety education should recognise that youth have been shown to construct their understanding of water safety and drowning risk in many different ways. Clearly some youth (but especially male) have been shown to rely heavily on their peers for knowledge of water safety. It is thus incumbent on institutions such as schools to ensure that students are well informed and capable of modeling safe peer practice. Peer-oriented water safety education that capitalizes on the value which youth place on their peers as sources of understanding, may offer an effective alternative to conventional didactic forms of teaching currently employed in many aquatics education programmes.

Sixthly, that alcohol consumption in aquatic activity was already embedded as acceptable practice at a relatively early age, especially among young males, warrants special attention. The widespread acceptance of alcohol consumption during aquatic activity, and the association of alcohol consumption with other unsafe attitudes and behaviours found in this study, suggest that early intervention is not only desirable but also essential. Preventing teenagers engaging in alcohol-related aquatic activity through

community awareness campaigns targeted at youth in general, but at young European/Pakeha and Maori males in particular, may prevent future drowning fatalities among the adult male population.

8.3 Future Research

The results of this study have demonstrated that the construction of drowning risk is complex and multi-factorial. Although robust and providing fresh evidence on the nature of that complexity, the results do, however, require follow-up investigation and research. The dependence on self-reporting inherent in this type of survey research, even though it has provided a comprehensive introductory explanation of the complexity of youth drowning risk, does have limitations. It is important to further examine youth drowning risk through observational studies so that the findings of at-risk behaviour found in this study via self-reported incidence can be corroborated or refuted. In particular, given the extent of youth non-compliance with rules regarding swimming alone or with adult supervision, swimming between the flags and listening to the advice of lifeguards, further observational studies of youth risk behaviour while swimming at patrolled surf beaches are warranted. Similarly, evidence of observed at-risk behaviour would be useful to corroborate the extent of alcohol consumption and the non-wearing of lifejackets, especially by young males, during boating and fishing activity.

Such studies also might profitably be targeted at the late adolescent age group (17-19 years) who were not well represented in the present study of Year 11 students. A longitudinal study that tracks the water safety behaviour and attitudes of youth from Year 11 to Year 13 would be particularly fruitful as it might investigate whether water safety knowledge, attitudes and behaviours consolidate or change at a time when students are experiencing greater social independence from school and family influences. Such research also could determine whether more frequent aquatic activity and at-risk behaviours (such as alcohol consumption and ignoring safety rules) are characteristic of young adult males in the Year 12 and 13 senior school/school-leaving populations.

Further evidence of actual rather than self-reported abilities on youth water safety knowledge and skills also would help ascertain how protective these dispositions are in minimising drowning risk. In particular, finding out more about youth swimming ability in open water and its relationship to self-estimated swimming ability and swimming

ability as measured by distance swum in a swimming pool, would enhance understanding of how swimming skills transfer from a closed- to an open-water environment, and thus provide a more accurate measure of the role of swimming ability in drowning risk. In addition, given the relatively poor levels of water safety knowledge reported in this study, further research is required on individual's cognitive understanding of water safety principles. Rather than rely on written evidence of knowledge, as was the case in this survey research, knowledge also might be examined orally or by observation when youth are participating practically in a range of activities such as a boating trip or a visit to a surf beach, experiences that were included only hypothetically in the present study.

In addition, specific sub-groups that have been identified as having major deficiencies in water safety knowledge and skills could also be studied. Such studies might, for example, focus on students from low-decile schools, or Asian and Pasifika students who have been shown to have poorer swimming and water safety education. This research could be done in conjunction with pilot studies of remedial water safety programmes for specifically targeted school and community programmes. One particularly intriguing prospect is a study on different ways of teaching water safety skills (such as risk management or CPR skills) that recognise differences in the ways that youth construct their understanding of water safety. For example, a study on the use of reciprocal learning, which capitalises on the importance of peers in the acquisition of male water safety knowledge found in this study, might provide for more effective water safety education of males, many of whom appear resistant to current forms of didactic instruction.

As well as further analysis of water safety skills and knowledge, ongoing study of student perceptions of drowning risk is warranted. The marked differences found in estimation of risk between male and female youth provides impetus for further in-depth research, via case or focus group study, on male overestimation of ability and underestimation of risk as previously discussed. Examination of risk assessment using video and on-site analysis of real, rather than imagined, scenarios would be particularly informative, since it would place the risk assessment process in the social context where decision-making about potential harm takes place rather than as part of a hypothetical exercise as was the case with the present study.

As a way of further understanding what youth think about water safety, youth opinions on water safety could be analysed via qualitative study using focus group discussion to determine what collective attitudes about water safety exist among groups of young people. For example, the evidence of peer pressure among males to perform risky acts around water found in this study requires further qualitative and in-depth analysis to help explain why many young males either encourage others to behave dangerously, or why they might respond to such prompts from others.

Finally, further research is required on the role of water safety knowledge, attitudes and behaviours on other water-related injuries that do not have drowning or near-drowning as a consequence. Some evidence has been presented of unsafe attitudes and dangerous behaviours with regard to diving practices that may result in spinal cord injury (SCI). More detailed analysis and reporting of this diving injury risk data was beyond the scope of the present enquiry on drowning risk, and will be the subject of future publication. Such a study will provide a useful starting point for further research on youth knowledge, attitudes and behaviours in relation to dangerous diving practices, especially with regard to the diving habits of young males and the role of alcohol in a social setting.

8.4 Final Comment

Drowning prevention has been referred to as the final frontier of injury prevention (Pless, 1997). This thesis research has challenged that frontier by re-thinking risk of drowning as a multifaceted and complex facet of human interaction with the aquatic environment. The study has provided comprehensive evidence of that complexity by explaining how water safety knowledge, attitudes and behaviours mediate the risk of drowning among young people during their participation in aquatic recreation. In doing so, the study has answered many of the calls from experts in the field of drowning prevention for more research on drowning risk in terms of what people bring to the aquatic environment such as swimming ability and decreased risk-taking behaviours (Brenner, 2002; Harborview IPRC, 2000; Smith & Howland, 1999).

By adopting a broader interpretation of the concept of risk than that traditionally afforded by study of risk as an objective expression of frequency and extent of exposure alone, this study has been able to explain the 'why' of drowning risk as much as the 'what', 'where' and 'when' of the drowning risk associated with aquatic recreation. It has done this by presenting a conceptual framework (see page 20, chapter 1) that facilitated the breakdown and exploration of the many factors thought to shape risk from an ecological perspective. Perhaps its greatest contribution to current knowledge of the youth drowning phenomenon is that it has provided fellow theoreticians and practitioners alike with a new set of lenses through which to more comprehensively view drowning prevention and ways of reducing drowning risk. In doing so, it has hopefully widened the horizons of thinking on drowning risk and drowning prevention to more than an exercise in, and expression of, scientific exactitude.

Furthermore, in providing a conceptual framework capable of comprehensively explaining the complexity of risk in the context of youth drowning, the study has provided a model that could be applied in other areas of risk in society. The conceptual framework and the methodological approach to research that it facilitated in this study would be equally appropriate to guide other studies of youth health such as skin cancer. As has been shown to be the case in this study of drowning risk, finding out what youth bring to their exposure to skin cancer risk in terms of their understanding and practice of

sun safety, as well as ascertaining what formative influences underpin such knowledge, attitudes and behaviours, may be especially informative to those engaged in cancer prevention.

Finally, because the study has provided an insight into how youth construct their knowledge of water safety and how they make sense of it in their world, it should be of great benefit to those engaged in drowning prevention through water safety education. By demonstrating that not all youth are informed in the same way about water safety and drowning risk, the study has indicated to researchers, water safety educators, and teachers that water safety education needs to accommodate for, and capitalise on, differences in how youth learn in order to better address shortcomings in what they know. The study has provided feedback to those organisations engaged in drowning prevention and water safety promotion, because it has comprehensively identified the nature of what youth know, think and do about water safety. In particular, the findings on widespread, unfavourable surf and boat safety attitudes and behaviours challenge the efficacy of present public and school education programmes. By establishing strong evidence of potentially dangerous beliefs and practices among youth, this study might have made its most significant contribution to society by providing the stimulus for renewed investment in youth water safety education.

References

Accident Compensation Corporation [ACC]. (2005). *Drowning Prevention Strategy: Towards a water safe New Zealand 2005-2015*. July 2005, Wellington: ACC. Available on New Zealand Injury Prevention Strategy website: www.nzips.govt.nz

Adams, J. (1995). *Risk*. London: UCL Press.

Aiken, L.R. (2002). *Attitudes and related psychosocial constructs: Theories, assessment, and research*. Thousand Oaks, CA: Sage Publications Inc.

Ajzen, I., & Fishbein, M. (1977). Attitude-behaviour relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*, 888-918.

Alexander, C.S. (1989). Gender differences in adolescent health concerns and self-assessed health. *Journal of Early Adolescence, 9*, 467-479.

American Academy of Pediatrics. (1993a). Basic life support training in school. A policy statement by the Committee on School Health. *Pediatrics*, *91*(1), 158-159.

Andersson, R. (1999). Injury causation, injury prevention and safety promotion. In L. Laflamme, L. Svanström & L. Schelp (Eds.), *Safety promotion research* (pp. 15-42) Stockholm: Department of Public Health Science, Karolinska Institute.

Babbie, E. (1990). *Survey research methods* (2nd ed.). Belmont, Ca: Wadsworth.

Baker, S.P., & Dietz, P.E. (1979). Injury prevention. In *Healthy people: The Surgeon General's report on health promotion and disease prevention, background papers.* Washington, DC: Government printing Offices (no. 70-55071A).

Baker, S.P., O'Neil, B., Ginsburg, M.J., & Li, G. (1992). *The injury fact book*. New York: Oxford University Press.

Barss, P. (1995). Cautionary notes on teaching water safety skills. *Injury Prevention*, *1*, 218-219.

Bell, N.S., Amoroso, P.J., Yore, M.M., Senier, L., Williams, J.O., Smith, G.S., & Theriault, A. (2001). Alcohol and other risk factors among male active duty U.S. army soldiers. *Aviation, Space and Environmental Medicine*, *72*, 1086-1095.

Bennett, E., Quan, L., & Williams, K. (2002). *A strength-based approach to adolescent drowning prevention.* Book of Abstracts of the World Congress on Drowning, Amsterdam, 26-28 June 2002. Amsterdam: Stichting Foundation Drowning 2002.

Bennett, E., Williams, K., Gomez, T., Murrey, M., Basford R., & Bernthal, T. (1998). *Ideas for drowning prevention coalition projects targeting adolescent drowning*

prevention. Retrieved August 19, 2002 from: http://www.seattlechildrens.org/dp/Educators/Planning/DPprojects.htm

Bohner, G. (2002). *Attitudes and attitude change*. New York: Psychology Press.

Brenner, R.A., Moran, K., Stallman, R., Gilchrist, J., & McVan, J.T. (2005). Swimming ability, water safety education and drowning prevention. In J. Bierens (Ed.) *Handbook of drowning – prevention, rescue, treatment*, pp.112-116. Heidelberg: Springer-Verlag GmbH.

Brenner, R.A., Saluja, G., & Smith, G.S. (2003). Swimming lessons, swimming ability and the risk of drowning. *Injury Control and Safety promotion, 10*(4), 211-215.

Brenner, R.A. (2002). Childhood drowning is a global concern. *British Medical Journal*, *324*(7345), 1049-1050.

Brenner, R.A., Trumble, A.C., Smith, G. S., Kessler, E.P. & Overpeck, M.D. (2001). Where children drown, United States, 1995. *Pediatrics*, *108*(1), 85-89.

Brown, B.B. (1990). Peer groups and peer cultures. In S.S. Feldman & G.R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 171-196). Cambridge, MA: Harvard University Press.

Brustad, R.J. (1993). Who will go out and play? Parental and psychological influences on children's attraction to physical activity. *Pediatric Exercise Science, 5*, 210-223.

Brustad, R.J. (1996). Attraction to physical activity in urban school children: Parental socialisation and gender influences. *Research Quarterly for Exercise and Sport, 67*, 316-323.

Callmer, E., Eriksson, K.G., Sanderson, C., & Svanström, L. (1986). Stockholm cancer prevention programme. Evaluation group. Final Report. Stockholm: County Health Care.

Canadian Red Cross Society. (2000). *The facts about drowning in Canada*. Gloucester, ON: Canadian Red Cross Society.

Canadian Red Cross Society. (1998). *National Drowning Report: Visual Surveillance Report*. Gloucester, ON: Canadian Red Cross Society.

Centres for Disease Control and Prevention [CDC]. (2002a). *2001Youth Risk Behaviour Surveillance Survey.* Washington: CDC.

Centres for Disease Control and Prevention [CDC]. (2002b). *Water-related injuries in NCIPC Injury Fact book*, 2001-2002. Washington: CDC. Retrieved 25 August 2002 from http://www.cdc.gov/ncipc/fact_book/30_waterRelated_Injuries.htm

Centres for Disease Control and Prevention [CDC]. (2002c). *Drowning prevention*. Washington: CDC. Retrieved 14 March 2002 from http://www.cdc.gov/ncipc/factsheets/drown.htm

Centres for Disease Control and Prevention [CDC]. (2001). *Facts on adolescent injury.* Washington: CDC. Retrieved 25 August 2002 from http://www.cdc.gov/ncipc.htm

Centres for Disease Control and Prevention [CDC]. (1992). Behaviours related to unintentional and intentional injuries among high school students – United States, 1991. *Mortality and Morbidity Weekly Review*, *41*, 760, 721.

Centres for Disease Control and Prevention [CDC]. (1986). North Carolina drownings, 1980-1984. *Mortality and Morbidity Weekly Review*, *35*(40), 635-638.

Chalmers, D., McNoe, B., & Stephenson, S. (2004). *Drowning, near-drowning and other water-related injury: Literature review of national injury data*. A report to the Accident Compensation Corporation, May 2004. Wellington: ACC.

Child and Youth Mortality Review Committee. (2005). *Circumstances surrounding drowning in those under 25 in New Zealand (1980-2002).* A report to Water Safety New Zealand June 2005. Wellington: WSNZ.

Coleman, P., Munro, J., Nicholl, J., Harper, R., Kent, G., & Wild, D. (1996). *The effectiveness of interventions to prevent accidental injuries to young persons aged 15-24 years: A review of the evidence.* Sheffield: University of Sheffield, Medical Care Research Unit, Centre for Health and Related Research.

Crooks, T., & Flockton, L. (1999). *Health and Physical Education assessment results, 1998*. National Education Monitoring Report No. 11. Educational Assessment Research Unit, University of Otago. Wellington: Ministry of Education.

Cummings, P., & Quan, L. (1999). Trends in unintentional drowning: The role of alcohol and medical care. *Journal of the American Medical Association*, *281*(23), 2198-2202.

Dahlberg, L.L., Toal, S.B., & Behrens, C.B. (Eds.). (1998). *Measuring violence-related attitudes beliefs and behaviours amongst youth*. Washington: Centres for Disease Control and Prevention (CDC).

Department of Education. (1980). *Fitness for living through aquatics*. Wellington: Department of Education.

Department of Education. (1987). *Physical Education: A Guide for Success*. Wellington: Department of Education.

DiClemente, R.J., Hansen, W.B., & Ponton, L.E. (Eds.). (1996). *Handbook of adolescent health risk behaviour*. New York: Plenum Press.

Dukes, W. (1985). Dunedin water safety survey, 1984 – water test. *New Zealand. Journal of Sports Medicine*, *13*(4), 137-141.

Dukes, W. (1987). Dunedin water safety survey, 1984. Influence of age, sex and school on water test performance. *New Zealand Journal of Health, Physical Education and Recreation. 20*(1), 15-19.

Ennett, S.T., & Bauman, K.E. (1994). The contribution of influence and selection to adolescent peer group homogeneity: The case of adolescent cigarette smoking. *Journal of Personality and Social Psychology, 67*, 653-663.

European Resuscitation Council. (2000). Part 1: Introduction to the international guidelines 2000 for CPR and ECC. *Resuscitation, 46*(3), 3-15.

Evans, R.I., Dratt, L.M., Raines, B.E., & Rosenburg, S. (1988). Social influences on smoking initiation: Importance of distinguishing descriptive versus mediating process variables. *Journal of Applied Social Psychology, 18*, 925-943.

Fife, D., & Goldoft, M. (1994). Swimming capabilities and swimming exposures of New Jersey children. *Journal of Safety Research*, *25*, 159-165.

Fink, A. (1995). *How to ask survey questions*. Thousand Oaks, CA: Sage Publications.

Fowler, F.J. (1988). *Survey research methods*. Newbury Park, CA: Sage Publications.

Gagliardi, M., Neighbors, M., Spears, C., Byrd, S., & Snarr, J. (1994). Emergencies in the school setting: Are public school teachers adequately trained to respond? *Prehospital Disaster Medicine*, *9*, 222-225.

Gilchrist, J., Sacks, J.J., & Branche, C.M. (2000). Self-reported swimming ability in U.S. adults, 1994. *Public Health Reports*, *115*, 110-111.

Gittler, J., Quigley-Rick, M., & Saks, M.J. (1990). *Adolescent health care decision-making: The law and public policy.* Washington, DC: Carnegie Council on Adolescent Development.

Glanz, K. & Rimmer, B.K. (1995). *Theory at a glance: A guide for health promotion.* Washington: US Department of Health and Human Services.

Glover, E.D., Lane, S.L., & Wang, M.Q. (1995). Relationship of alcohol consumption and recreational boating in Beaufort County, North Carolina*. Journal of Drug Education*, *25*(2), 149-157.

Graham, J., & Gaffan, E.A. (1997). Fear of water in children and adults: etiology and familial effects. *Behaviour Research and Therapy, 35*(2), 91-108.

Gulliver, P., & Begg, D. (2005). Usual water-related behaviour and 'near-drowning' incidents in young adults. *Australian and New Zealand Journal of Public Health, 29*(3), 238-243.

Hale, A.R., & Glendon, A.I. (1987). *Individual behaviour in the control of danger*. Amsterdam: Elsevier.

Harbourview Injury Prevention and Research Centre. (2001a). *Systematic Reviews of Childhood Injury Prevention Interventions*: *Drowning*. Retrieved 21 August 2002 from http://depts.washington.edu/hiprc/childinjury/

Harborview Injury Prevention and Research Centre. (2001b). *Drowning interventions: Swimming lessons.* Retrieved 10 August 2002 from http://depts.washington.edu/hiprc/childinjury/topic/drowning/swim lessons.html

Harborview Injury Prevention and Research Centre. (2000). *Drowning: Scope of the problem.* Retrieved 13 June 2001 from http://depts.washington.edu/hiprc/childinjury/topic/drowning/

Hillary Commission. (1997a). Participation in sport and physical activity by New Zealand adults. *Sports Facts (Issue 1).* Wellington: Hillary Commission.

Hillary Commission. (1997b). Sport and physical activity – how and where adults play. *Sports Facts (Issue 2).* Wellington: Hillary Commission.

Hillary Commission. (1998). *Young People and Sport.* Wellington: Hillary Commission.

Hillary Commission. (1999). *Push Play facts*. Wellington: Hillary Commission.

Hodne, C.J. (1995). Medical decision-making. In M.W. O'Hara & R.C. Reiter (Eds.), *Psychological aspects of women's reproductive health*. (pp. 267-290). New York: Springer.

Howland J., Hingson, R., Mangione, T.W., Bell, N., & Bak, S. (1996). Why are most drowning victims men? Sex differences in aquatic skills and behaviours. *American Journal of Public Health*, *86*, 93-96.

Howland, J., Smith, G.S., Mangione, T., Hingson, R., DeJong, W., & Bell, N. (1993). Missing the boat on drinking and boating. *Journal of the American Medical Association, 270*(1), 91-92.

Howland J., & Hingson, R. (1988). Alcohol as a risk factor for drownings: A review of the literature. *Accident Analysis Review*, *20*, 19.

Injury Prevention Research Centre. (2001). *Results from the alcohol and boating survey*. *Fact Sheet No. 37.* Auckland: University of Auckland, Department of Community Health.

Injury Prevention Research Unit. (2003). *Drowning-related deaths in New Zealand 1989-1998*. *IPRU Fact Sheet, 28*. Dunedin: IPRU, University of Otago.

Jenkins, J.E. (1996). The influence of peer affiliation and student activities on adolescent drug involvement. *Adolescence, 31*, 297-307.

Jones, M. (2003). *Investigation into the coronial files of rock fishing fatalities that have occurred in New South Wales between 1992 and 2000*. Paper presented at the 1st Asia-Pacific Injury Prevention Conference and 6th National Injury Prevention and Control Conference, Perth WA, March 16-18th 2003.

Lafferty, C., Larsen, P., & Galletly, D. (2003). Resuscitation teaching in New Zealand schools. *New Zealand Medical Journal, 116*(1181), 582.

Laflamme, L., Svanström, L., & Schelp, L. (Eds.). (1999). *Safety Promotion Research.* Stockholm: Karolinska Institute.

Langley, J.D., Warner, M., Smith, G., & Wright, C. (2000). *Drowning related deaths in New Zealand 1980-1994*. Dunedin: University of Otago, Injury Prevention Research Unit.

Langley, J.D., & Smeijers, J. (1997). Injury mortality among children and teenagers in New Zealand compared with the United States. *Injury Prevention*, *3*, 195-199.

Larsen, P., Pearson, J., & Galletly, D. (2004). Knowledge and attitudes towards cardiopulmonary resuscitation in the community. *New Zealand Medical Journal, 117*(1193), 868.

Lencek, L., & Bosker, G. (1999). *The beach. The history of paradise on earth*. London: Pimlico.

Lester, C., Weston, C., Donnelly, P., Assar, D., & Morgan, M. (1994). The need for wider dissemination of CPR skills: Are schools the answer? *Resuscitation*, *28*, 233-237.

Lester, C., Donnelly, P., Weston, C., & Morgan, M. (1996). Teaching schoolchildren cardiopulmonary resuscitation. *Resuscitation*, *31*, 33-38.

Levy, D.T., Mallone, S., Miller, T.R., Smith, G.S., Spicer, R.S., Romano, E.O., & Fisher, D.A. (2004). Alcohol involvement in burn, submersion, spinal cord, and brain injuries. *Medical Science Monitor, 10*(1), 17-24.

Lewis, R.M., Fulstow, R., & Smith, G.B. (1997). The teaching of cardiopulmonary resuscitation in schools in Hampshire. *Resuscitation*, *35*, 27-31.

Liebert, R.M., & Liebert, L.L. (1995). *Science and behaviour: An introduction to methods of psychological research* (4th ed.). Englewood Cliffs, FL: Prentice Hall.

Liller, K.D., Kent, E.B., Arcari, C., & McDermott, R.J. (1993). Risk factors for drowning and near-drowning among children in Hillsborough County, Florida. *Public Health Reports, 108*(3), 346-353.

Lindberg, P., & Steensberg, J. (2000). Epidemiology of unintentional drowning and near-drowning in Denmark in 1995. *Injury Prevention, 6*(1), 29-31.

Litwin, M.S. (1995). *How to measure survey reliability and validity*. London: Sage Publications.

Logan, P., Sacks, J.J., Branche, C.M., Ryan, G.W., & Bender, P. (1999). Alcohol-influenced recreational boat operation in the United States, 1994. *American Journal of Preventive Medicine*, *16*(4), 278-282.

Mackie, I.J. (1999). Patterns of drowning in Australia, 1992-1997. *Medical Journal of Australia*, *171*, 587-590.

Mael, F.R. (1995). Staying afloat: Within-group swimming proficiency for whites and blacks. *Journal of Applied Psychology*, *80*(4), 479-490.

Massey University Human Ethics Committee. (2002). Code of ethical conduct for research, teaching and evaluations. Retrieved September 15, 2002 from: http://humanethics.massey.ac.nz/code.htm

Maxwell, K.A. (2002). Friends: The role of peer influence across adolescent risk behaviours. *Journal of Youth and Adolescence*, *31*(4), 267-277.

McGuire, W.J. (1985). Attitudes and attitude change. In G. Lindzey & E. Aronson (Eds.), *Handbook of social psychology (3rd ed., vol. 2)*. New York: Random House.

Michalsen, A. (2003). Risk assessment and perception. *Injury Control and Safety Promotion. 10*(4), 201-214.

Mitchell, R., & Haddrill, K. (2003). *Perceptions of water safety of individuals from CALD backgrounds and tourists to New South Wales*. Poster presentation at the 1st Asia-Pacific Injury Prevention Conference and 6th National Injury Prevention and Control Conference, Perth WA, March 16-18th2003.

Millstein, S.G., & Halpern-Felsher, B.L. (2002). Perceptions of risk and vulnerability. *Journal of Adolescent Health*, *31S*, 10-27.

Ministry of Education. (1999). *Health and Physical Education in the New Zealand Curriculum.* Wellington: Ministry of Education.

Mohlberg, P.J., Hopkins, R.S., Paulson, J., & Gunn, R.A. (1993). Fatal incident risk factors in recreational boating in Ohio. *Public Health Reports*, *108*(3), 340-346.

Moran, K. (2003). *New Zealand Youth water safety survey*. Wellington: WSNZ.

Moran, K. (2002). *The provision of aquatics education for primary school-age pupils in the greater Auckland region*. Monograph/Research Series Report no.1, published by the Research Committee, May 2002. Auckland: Auckland College of Education.

Moran, K. (1999a). *The shaping of aquatics education in New Zealand schools: An historical study of curriculum policy and practice*. Unpublished master's thesis, Massey University. Palmerston North, New Zealand.

Moran, K. (1999b). Aquatics education in New Zealand: a longitudinal study of curriculum practice. *Journal of Physical Education New Zealand*. *31*(4), 2-6.

Moran, K. (1996). *Surf Survival*. Wellington: Surf Life Saving New Zealand.

Mosston, M., & Ashworth, S. (2002). *Teaching Physical Education* (5th ed.). Columbus, OH: Merrill publishing.

Mundt, J.C., Ross, L.E., & Harrington, H.L. (1992). A modeling analysis of young drivers' judgments of accidental risk due to alcohol use and other driving conditions. *Journal of Studies on Alcohol, 53*(3), 239-248.

New South Wales Water Safety Taskforce. (2001). *NSW Water Safety Framework 2001-2003*, Concord West, NSW: NSW Water safety Taskforce.

Norton, R., & Lam, L. (1999). *Young males and risk taking project*. Report to the Injury Prevention Policy Unit, Health Promotion Branch, NSW Health, September 1999. Sydney: University of Sydney, Injury Prevention Policy Unit.

Ntoumanis, N. (2001). *A step-by-step guide to SPSS for sport and exercise studies*. London: Routledge.

O'Flaherty, J.E., & Pirie, P.L. (1997). Prevention of pediatric drowning and near drowning: A survey on members of the American Academy of Pediatrics. *Pediatrics*, *99*, 169-174.

Orlowski, J.P. (1987). Adolescent drownings: Swimming, boating, diving and scuba incidents. *Pediatric Annals*, *17*(2), 125-132.

Orlowski, J.P. (1989). Drowning, near-drowning and ice-water drowning. *Journal of the American Medical Association*, *260*, 390-391.

Ozanne-Smith, J., & Wriggleworth, E. (2002). *Childhood drowning prevention*. Paper presented at the inaugural World Congress on Drowning, Amsterdam, 26-28 June 2002.

Ozanne-Smith, J., Wriggleworth, E., & Staines, C. (2003). *Drowning trends in Australia: The role of swimming instruction.* Paper presented at the 1st Asia-Pacific Injury Prevention Conference and 6th National Injury Prevention and Control Conference, Perth WA, March 16-18th2003.

Parsons, J.T., Siegel, A.W., & Cousins, J.H. (1997). Late adolescent risk-taking: Effects of perceived benefits and perceived risks on behavioural intentions and behaviour change. *Journal of Adolescence, 20*, 381-392.

Pearson, K. (1979). *Surfing subcultures of Australia and New Zealand.* Brisbane: University of Queensland Press.

Pless, I.B. (1997). The challenge of drowning prevention. *Injury Prevention*, *3* (4), 237-238

Poulton, R., Menzies, R.G., Craske, M.G., Langley, J.D., & Silva, P.A., (1999). Water trauma and swimming experiences up to age nine and fear of water at age eighteen: A longitudinal study. *Behaviour Research and Therapy*, *37*, 39-48.

Quan, L. (1999). Near-drowning. *Pediatrics in Review, 20*(8), 255-259.

Quan, L., & Cummings, P. (2003). Characteristics of drowning by different age groups. *Injury Prevention, 9*(2), 163-6.

Quan, L., Bennett, E., Cummings, P., Trusty, M.N., & Treser, C.D. (1998). Are life vests worn? A multi-regional observational study of personal flotation device use in small boats. *Injury Prevention*, *4*, 203-205.

Quan, L., Bennett, E., & Williams, K. (2002). *PFD's: The missing link to open water drowning prevention*. Book of Abstracts of the World Congress on Drowning, Amsterdam, 26-28 June 2002. Amsterdam: Stichting Foundation Drowning 2002.

Reder, S., & Quan, L. (2003). Cardiopulmonary resuscitation training in Washington state public high schools. *Resuscitation, 56*(3), 283-288.

Reeder, A. I., Stanton, W.R., Langley, J.D., & Chalmers, D.J. (1991). Adolescents' sporting and leisure time physical activities during their 15th year. *Canadian Journal of Sports Science*, *16*(4), 308-315.

Roberts, H., Smith, S., & Bryce, C. (1993). Prevention is better . . . *Sociology of Health and Illness, 15*, 447-463.

Robertson, L.S. (1992). The validity of self-reported behavioural risk factors. *Journal of Trauma, 32*, 58-59.

Robertson, L.S. (1983). *Injuries: Causes, control strategies, and public policy*. Lexington, MA: Lexington Books.

Rokeach, M. (1986). *Beliefs, attitudes and values: A theory of organisation and change.* San Francisco: Jossey-Boss.

Royal Life Saving Society Australia. (2003). *The New South Wales drowning report 2002*. Drummoyne, NSW: RLSSA NSW Branch.

Royal Life Saving Society Australia. (2002). *The national drowning report 2001*. Drummoyne, NSW: RLSSA.

Royal Life Saving Society New Zealand. (1985). *Swimming and lifesaving*. Christchurch, New Zealand: RLSSNZ.

Royal Society for the Prevention of Accidents [RoSPA]. (2002). *Drowning Statistics in the UK 2000*. Birmingham: RoSPA.

Savin-Williams, R.C. & Berndt, T.J. (1990). Friendship and peer relations. In S.S. Feldman & G.R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 277-307). Cambridge, MA: Harvard University Press.

Schootman, M., Fuortes, L.J., Zwerling, C., & Albanese, M.A. (1996). Safety behaviour among Iowa junior high and high school students. *American Journal of Public Health*, *83*(11), 1628-1630.

Schuman, S.H., Rowe, J.R., Glazer, H.M., & Redding, J.S. (1977). Risk of drowning: An iceberg phenomenon. *Journal of the American College of Emergency Physicians*, *6*, 139-143.

Sleet, D.A & Gielen, A.C. (2004). Developing injury interventions: the role of behavioural science. In R. McClure, M. Stevenson & S. McEvoy (Eds.) *The scientific basis of injury prevention and control,* (pp.214-232). Melbourne: IP Communications.

Smith, G.S., Keyl, P., Hadley, J.A., Bartley, C.L., Foss, R.D., Tolbert, W.G., & McKnight, J. (2001). Drinking and recreational boating fatalities: A population-based case control study. *Journal of the American Medical Association, 286*(23), 2974-2980.

Smith, G.S., & Howland, J. (1999). Declines in drowning: Exploring the epidemiology of favourable trends. *Journal of the American Medical Association, 281*(23), 2245-2247.

Smith, G.S., & Brenner, R. (1995). The changing risks of drowning for adolescents in the U.S. and effective control strategies. *Adolescent Medicine: The State of the Art Reviews, 6*(2), 153-169.

Smith, G.S. (1995). Drowning prevention in children: The need for new strategies. *Injury Prevention, 1*, 216-219.

Sobal, J., Klein, H., Graham, D., & Black, J. (1988). Health concerns of high school students and teachers' beliefs about student health. *Pediatrics, 81*(2), 218-223.

Sport and Recreation Council [SPARC]. (2002). *How do we participate in sport and active leisure?* Retrieved 21 January 2003 from http://www.pushplay.org.nz

Stenning, R.B. & Dukes, W. (1987). Dunedin water safety survey, 1984 - test of water safety knowledge. *New Zealand Journal of Health, Physical Education and Recreation. 20*(1), 12-14.

Strunin, L. (1991). Adolescents' perceptions of risk for HIV infection: Implications for future research. *Social Science & Medicine, 32*(2), 221-228.

Surf Life Saving Australia. (2003). *Service Profile.* Bondi Beach, NSW: Surf life Saving Australia.

Surf Life Saving New Zealand. (2003). *Annual Report*. Wellington: Surf life Saving New Zealand.

Surf Life Saving New Zealand. (2000). *Rescue Statistics – trend analysis of incidents type*. Retrieved 15 September 2000 from https:// www.slsnz.org.nz

Surf Life Saving New Zealand. (1994). *1993/1994 Surf incident analysis: Identifying high-risk groups*. Wellington: Surf life Saving New Zealand.

Surf life Saving Association New Zealand. (1996). *Rock fishing report: The socio-economic, hazard awareness and cultural specificity of rock fishers at Piha, Karekare and Muriwai*. A research project commissioned by WSNZ and SLSA NZ. Wellington: WSNZ/SLSANZ.

Svanström, L. (1987). Methods of evaluation of child accident prevention programmes. In R. Berfenstam, H. Jackson & B. Eriksson (Eds.) *The healthy community. Child safety as part of health promotion activities*. Folksam College, Stockholm: Vetenskap & Forsskning.

Taylor, W.C., Baranowski, T., & Sallis, J.F. (1994). Family determinants of childhood physical activity: A social-cognitive model. In R.K. Dishman (Ed.) *Advances in Exercise Adherence* (pp. 319-342). Champaign, IL: Human Kinetics.

United States Coastguard (2003). *Boating statistics – 2001.* U.S. Department of Transportation Report no.1-41. Washington: U.S. Department of Transportation.

University of Auckland. (2001). *Youth 2000: A profile of their health and wellbeing.* Auckland: University of Auckland, Adolescent Health Research Group.

Water Safety New Zealand. (2005). *Mission Statement*. Retrieved 20 June 2005 from http://www.watersafety.org.nz

Water Safety New Zealand. (2003). *Too many Maori drowning*. Media release, 18 November. Wellington: WSNZ.

Water Safety New Zealand. (2002a). *Drowning*. Retrieved 23 January 2003 from http://www.watersafety.org.nz

Water Safety New Zealand. (2002b). *Riversafe*. Retrieved 16 April 2003 from http://www.riversafe.org.nz/facts/index.html

Water Safety New Zealand. (2002c). *Assessing student swimming and aquatic skills.* A report prepared for the Ministry of Education and Water Safety New Zealand, November, 2001. Wellington: WSNZ.

Water Safety New Zealand. (1999). *Water safety – profile.* Wellington: Water Safety New Zealand.

Water Safety New Zealand. (1996). *Lotto Swimsafe: Manual for instruction*. Wellington: Water Safety New Zealand.

Waxweiler, R.J., Harel Y., & O'Carroll, P.W. (1993). Measuring adolescent behaviours related to unintentional injuries. *Public Health Reports, 108*(Suppl. 1), 4-11.

Welk, G.J., Wood, K., & Morss, G. (2003). Parental influences on physical activity in children: An exploration of potential mechanisms. *Pediatric Exercise Science, 15*(1), 19-33.

Whipp, P. (2001). *Teaching swimming: Issues beyond drowning*. Retrieved January 20, 2003 from: http://www.aare.edu.au/01pap/whi01680.htm

Wintemute, G.J., Kraus, J.F., Teret, S.P., & Wright, M. (1987). Drowning in childhood and adolescence: A population-based study. *American Journal of Public Health, 77*(7), 830-832.

World Congress on Drowning. (2002a). *The global burden of drowning*. Amsterdam: World Congress on Drowning. Retrieved 24 November 2002 from http://www.drowning.nl/csi/drowning.nsf/index/home/$file/tf1 epidemiology topic3.htm

World Congress on Drowning. (2002b). *Review of literature on available strategies for drowning prevention.* Amsterdam: World Congress on Drowning. Retrieved 18 July 2003 from http://www.drowning.nl/csi/drowning.nsf/index/home/$file/tf1 epidemiology topic6.htm

World Congress on Drowning. (2001). Risk factors for drowning and near-drowning injuries. Amsterdam: World Congress on Drowning. Retrieved 18 July 2001 from http://www.drowning.nl/csi/drowning.nsf/index/home/$file/tf1 epidemiology topic5.htm

World Health Organisation. (2003). Facts about injuries: Drowning. Retrieved November, 4, 2003 from http://www.who.int/violence injury prevention

World Health Organisation. (1998). Safety and safety promotion: Conceptual and operational aspects. WHO Collaborating Centre on Safety Promotion and Injury Prevention, Quebec and Community Safety Promotion, Karolinska Institute, Stockholm. Geneva: WHO.

Wright, M., Rivara, F.P., & Ferse, D. (1995). Evaluation of the Think First head and spinal injury program. *Injury Prevention, 1*, 81-85.

Zuckerman, G.B., & Conway, E.E. (2000). Drowning and near drowning: A pediatric epidemic. *Pediatric Annals, 29*(6), 360-65.

Appendix 1.

Survey Questionnaire
and
Ethics Protocols

Code:							(Office use only)

1 Are You?

- ○ Female
- ○ Male

2 How would you best describe yourself? (Tick **one** circle only)

- ○ European
- ○ Maori
- ○ Pacific Peoples
- ○ Asian
- ○ Other (Please describe)

_____

3 How old are you? ___years____months

4 How long have you lived in New Zealand?

- ○ Less than 1 year
- ○ Between 1-2 years
- ○ Between 3-4 years
- ○ Between 5-7 years
- ○ Between 8-10 years
- ○ More than 10 years

5 Have you been taught to swim?

- ○ **No** (go to question 6)
- ○ **Yes**, tick **one** circle which **best** describes who taught you
  - ○ Primary school (inc. Intermediate)
  - ○ Secondary school
  - ○ Parents/family members/whanau
  - ○ Paid swimming lessons
  - ○ Club/group
  - ○ Friend(s)
  - ○ Self-taught

6 Have you been taught water safety **at school**?

- ○ **No** (go to Question 7)
- ○ **Yes**, tick the safety topics you have been taught

No	**Yes**
☐	☐ Pool safety
☐	☐ Surf safety
☐	☐ River safety
☐	☐ Boat safety
☐	☐ Underwater safety
	☐ Other (Please describe)

_____

7 From the following list, rank your **3** most important sources of water safety knowledge, with **1** being the most important.

- ☐ Friends
- ☐ Family/whanau
- ☐ School
- ☐ Groups/clubs/organisations
- ☐ Media (TV/newspapers/magazines)
- ☐ Other (please describe)

_____

8 Do you own, or have use of, any of the following:

No	**Yes**
☐	☐ Surfboard
☐	☐ Boogie board
☐	☐ Sailboard/canoe/wave ski
☐	☐ Small boat/sailing dinghy
☐	☐ Large motor boat/yacht
☐	☐ Fishing gear
☐	☐ Snorkelling gear
	☐ Other (Please describe)

_____

9 **In the past year** have you been **swimming** in?

	Never	Not Often (1-9 times)	Quite Often (10-19 times)	Very Often (20 times +)
• Home swimming pool	○	○	○	○
• Public pool (including school pool)	○	○	○	○
• Patrolled surf beach	○	○	○	○
• Surf beach without patrol	○	○	○	○
• Flat water beach	○	○	○	○
• Lake, pond, water hole	○	○	○	○
• River, creek, drain	○	○	○	○
• Other (please describe) _____	○	○	○	○

10 Who did you go with?

	Never	Sometimes	Mostly	Always
• Friends	○	○	○	○
• Parents/Family/Whanau	○	○	○	○
• On my own	○	○	○	○
• School class/group (eg PE lesson/camp)	○	○	○	○
• Organised group (eg church, scouts/guides)	○	○	○	○
• Club member (eg swim/surf club)	○	○	○	○

11 When you went swimming, did you?

	Never	Sometimes	Mostly	Always
• Swim in everyday clothing	○	○	○	○
• Swim on your own	○	○	○	○
• Dive headfirst without knowing the depth	○	○	○	○
• Swim without supervision	○	○	○	○
• Swim after drinking alcohol/taking drugs	○	○	○	○
• Swim where you weren't supposed to	○	○	○	○
• Swim when cold/tired	○	○	○	○
• Swim outside the patrol flags	○	○	○	○
• Dive headfirst into shallow water	○	○	○	○
• Ignore water safety directions/advice	○	○	○	○

12 **In the past year**, have you done any of the following activities?

	Never	Not Often (1-4 times)	Quite often (5-9 times)	Very often (10 times +)
• Boating/sailing (in a small craft)	○	○	○	○
• Yachting/boating (on a large craft)	○	○	○	○
• Paddling (a canoe/wave ski/waka)	○	○	○	○
• Fishing (from a boat)	○	○	○	○
• Fishing (from the land)	○	○	○	○
• Netting/Shellfishing	○	○	○	○
• Surfing (Surfboard/Boogie board)	○	○	○	○
• River rafting, tubing	○	○	○	○
• Windsurfing/Jet skiing/Water skiing	○	○	○	○
• Underwater (Snorkelling/Scuba)	○	○	○	○
• Other (please describe) _____	○	○	○	○

13 Who did you go with?

	Never	Sometimes	Mostly	Always
• Friends	○	○	○	○
• Parents/Family/Whanau	○	○	○	○
• On my own	○	○	○	○
• School class/group (eg PE lesson/camp)	○	○	○	○
• Organised group (eg church, scouts/guides)	○	○	○	○
• Club member (eg swim/surf club)	○	○	○	○

14 When you did water activities, did you:

	Never	Sometimes	Mostly	Always
• Wear a lifejacket in a boat/canoe etc	○	○	○	○
• Drink alcohol/take drugs	○	○	○	○
• Have adult supervision	○	○	○	○
• Tell an adult beforehand	○	○	○	○
• Do the activity on your own	○	○	○	○
• Check the weather/water conditions first	○	○	○	○

15 Have you been with **your friends** when **they** have:

	Yes	**No**	Never been with friends in this situation
• Not worn lifejackets in a boat	○	○	○
• Swum without adult supervision	○	○	○
• Swum outside the flags	○	○	○
• Encouraged you or others to take risks in/on the water	○	○	○
• Mixed alcohol/drugs and water activity	○	○	○
• Ignored water safety advice and directions	○	○	○
• Swum where they weren't supposed to	○	○	○
• Dived into the shallow water headfirst	○	○	○

16 Has anyone in your family/whanau ever

	No	**Yes**
• given you water safety advice	○	○
• paid for you to have swimming lessons	○	○
• done any first aid training	○	○
• supervised you or other family members when in or near water	○	○
• experienced a life-threatening water incident	○	○
• discussed water safety issues as a family	○	○
• stopped you doing water activity because of safety concerns	○	○
• encouraged you to improve your swimming ability/fitness	○	○

17 If the standard length of a swimming pool is 25 metres, how many pool lengths can you swim **without touching the bottom or stopping**?

- ○ None, I cannot swim
- ○ Less than 1 length (less than 25 metres)
- ○ Between 1-2 lengths (up to 50 metres)
- ○ Between 3-4 lengths (up to 100 metres)
- ○ Between 5-8 lengths (up to 200 metres)
- ○ Between 9-16 lengths (up to 400 metres)
- ○ More than 16 lengths (more than 400 metres)

18 Do you know how to **rescue** someone needing help in deep water?

- ○ **No** (go to question 19)
- ○ **Yes,** tick **one** circle that best describes if you could do a rescue in deep water
  - ○ Maybe, but I would be at great risk
  - ○ Probably, I am a confident swimmer with rescue skills
  - ○ Definitely, I have excellent swimming and rescue skills

19 Do you know how to perform CPR (cardiopulmonary resuscitation)?

- ○ **No** (go to question 20)
- ○ **Yes,** tick **one** circle that best describes if you would be able to perform CPR on a victim at the scene of a drowning?
  - ○ Maybe, but I don't have a good understanding of CPR skills
  - ○ Probably, I have a good understanding of CPR skills
  - ○ Definitely, I have CPR qualifications

20 How would you rate the risk to **your life** in the following situations?

	Extreme Risk	High Risk	Slight Risk	No Risk
• Tipped upside down in a canoe 100 metres from the shore of a lake	•	•	•	•
• Caught in a rip current at a surf beach	•	•	•	•
• Chased inflatable toy into deep water at a local swimming pool	•	•	•	•
• Fell into deep water fully clothed whilst walking along a river bank	•	•	•	•
• Swept off isolated rocks by a wave whilst fishing	•	•	•	•

21 **In your life**, have you ever been **really afraid** that you might drown?

- ○ **No** (go to Question 23)
- ○ **Yes,** how did you get out of difficulty
  - ○ Got myself out of difficulty
  - ○ Friends/family came to my help
  - ○ Rescued by strangers
  - ○ Rescued by lifeguards
  - ○ Other, please describe _____

22 How you have been affected?

- ○ I am now too afraid to take part in any water activity
- ○ I can take part but I am very cautious
- ○ Not affected, I take part confidently in water activities

23 Tick **one** circle that best reflects your opinion on the following statements:

	Strongly Agree	Agree	Disagree	Strongly Disagree
• Safety rules in public swimming pools spoil your fun	○	○	○	○
• Swimming outside the flags is okay if the surf looks safe	○	○	○	○
• You don't need to wear a lifejacket on a small boat when close to shore	○	○	○	○
• Drinking alcohol on a small boat or yacht is okay provided that the skipper stays sober	○	○	○	○
• You should avoid crossing a river on your own	○	○	○	○
• Homeowners shouldn't have to fence their swimming pools	○	○	○	○
• Swimming alone is risky even if you are a good swimmer	○	○	○	○
• Lifeguards on surf beaches shouldn't be able to tell you where to swim	○	○	○	○
• Swimming in ordinary clothes at the beach is okay if you don't have swimming togs	○	○	○	○
• Wearing a lifejacket in a small boat is unnecessary if you are a good swimmer	○	○	○	○
• Having a beer whilst fishing from a small boat is okay on a calm day	○	○	○	○
• Swimming in the surf after the surf patrol is finished is okay if other people are in the water	○	○	○	○
• Diving headfirst into shallow water is only risky when you don't know how to dive properly	○	○	○	○
• Swimming in clothes at the beach is alright as long as you don't go out of your depth	○	○	○	○

24 Imagine that you have been asked to organise a fishing trip in the blue & white boat pictured below for a day with some friends.

a) Write a list of the **essential safety items** you would need to take with you
b) As skipper, list what safety preparation you would do **before** setting out

c) As skipper, list what rules would you set down **before** getting into the boat

a) Essential safety items

b) Preparation **before** setting out

c) Rules you would set **before** getting onto the boat

25 Imagine that it's a hot sunny day and a group of you decide to go to the beach in the picture below. You arrange to meet at the car park at the far end of the beach; it is roughly 10 minutes walk along the beach to the patrol area. When everyone arrives at the car park, you all go over to the beach in order to make some decisions about what you will do for the day.

Using the picture, complete the following,

a) What **possible dangers** would you consider in your discussions on the beach?

b) What **personal decisions** would you make about going in the water?

c) Put a **cross (X)** on the picture to show where you would set up your gear on the beach and a **circle (O)** where you would go in the water

a) Possible dangers to consider

b) Personal decisions

Please make sure that you return the questionnaire to the survey instructor

Many thanks for taking part in the survey

Appendix 2.

Tables of Significance Tests

Summary of Tables of Significance Tests

The tables reported below relate to tests of significance undertaken to ascertain differences among the dependent variables reported in Chapters 3-6 by the independent variables of gender, socio-economic status via the decile rating of the school attended, and ethnicity. The tables are numbered sequentially according to the chapter in which they appear in Part Two of the study. Significant differences are referred to in the results and reported in full in Appendix 2 below. They include:

Part 2 Results	*Gender*	Decile Rating	Ethnicity	Appendix 2 Page Nos.
Chapter 3 Aquatic recreation and behaviours				*18-28*
3.1 Swimming activity	**3.1**	**3.2-3.3**	**3.4-3.5**	***18-20***
3.2 Swimming behaviours	**3.6**	**3.7-4.8**	**3.9-3.10**	***20-22***
3.3 Aquatic recreation activity	**3.11**	**3.12-3.13**	**3.14-3.15**	***23-25***
3.4 Aquatic recreation behaviours	**3.16**	**3.17-3.18**	**3.19-3.21**	***26-28***
Chapter 4 Water safety knowledge				*29-36*
4.1 Swim ability	**4.1**	**4.2, 4.3**	**4.2, 4.4**	***29-30***
4.2 Rescue ability	**4.5**	**4.5, 4.6**	**4.5, 4.7**	***30-31***
4.3 CPR ability	**4.8**	**4.8, 4.9**	**4.8, 4.10**	***31-32***
4.4 Small boat safety knowledge	**4.11**	**4.12, 4.13**	**4.14, 4.15**	***33-34***
4.5 Surf safety knowledge	**4.16**	**4.17, 4.18**	**4.19, 4.20**	***35-36***
Chapter 5 Water safety perceptions and attitudes				*37-41*
5.1 Drowning risk perception	**5.1**	**5.2, 5.3**	**5.4, 5.5**	***37-38***
5.2 Water safety attitudes	**5.6**	**5.7- 5.9**	**5.7, 5.10, 5.11**	***39-41***
Chapter 6 Socio-cultural influences				*42-48*
6.1 Student perceptions	**6.1**	**6.1**	**6.1**	***42***
6.2 Peer influences	**6.2**	**6.3**	**6.4**	***42-43***
6.3 Familial influences	**6.5**	**6.6, 6.7**	**6.8, 6.9**	***44-46***
6.4 Schooling influences	**6.10**	**6.10**	**6.10- 6.12**	***46-47***
6.5 Previous experience	**6.13**	**6.13**	**6.13, 6.14**	***48***

Chapter 3. Drowning Risk Exposure and Behaviour

3.1 Swimming Activity

Table 3.1 Differences in Use of Swimming Locations by Gender

Location		*M* rank	**8.5**	**U**
Home pool	Female	1153.52	550013.5*	
	Male	1055.00		
Patrolled surf beach	Female	1136.14	567939.0*	
	Male	1071.00		
Flat water beach	Female	1147.10	556640.0*	
	Male	1061.35		
River, creek	Female	1077.32	578716.5*	
	Male	1122.79		
Total swimming activity	Female	1126.75	577621.5	
	Male	1079.27		

*$p < .05$

Table 3.2 Differences in Use of Swimming Locations by Decile Groups

Activity	Decile group	*M* rank	χ^2	**8.6**	**df**
Home pool	Low (1-3 decile)	1010.80	23.622*		2
	Mid (4-7 decile)	1107.03			
	High (8-10 decile)	1158.84			
Public pool	Low (1-3 decile)	998.95	25.939*		2
	Mid (4-7 decile)	1148.69			
	High (8-10 decile)	1138.45			
Patrolled surf beach	Low (1-3 decile)	999.75	25.728*		2
	Mid (4-7 decile)	1158.94			
	High (8-10 decile)	1130.93			
Non-patrolled surf beach	Low (1-3 decile)	1046.67	12.133*		2
	Mid (4-7 decile)	1164.13			
	High (8-10 decile)	1095.77			
Flat-water beach	Low (1-3 decile)	1012.83	21.674*		2
	Mid (4-7 decile)	1163.53			
	High (8-10 decile)	1118.98			
Lake, pond, waterhole	Low (1-3 decile)	987.82	39.333*		2
	Mid (4-7 decile)	1196.70			
	High (8-10 decile)	1113.24			
River, creek	Low (1-3 decile)	994.69	31.926*		2
	Mid (4-7 decile)	1165.88			
	High (8-10 decile)	1129.61			
Total swimming activity	Low (1-3 decile)	936.48	61.142*		2
	Mid (4-7 decile)	1190.24			
	High (8-10 decile)	1152.23			

*$p < .05$

Table 3.3 Differences in Total Swimming Activity between Decile Groups

Decile group	*M* rank	**8.6.1** **U**
Low-decile v Mid-decile	559.84 707.34	153934.5*
Low-decile v High-decile	692.14 844.22	237283.5*
Mid-decile v High-decile	801.89 776.01	287993.0

*$p < .05$

Table 3.4 Differences in Use of Swimming Locations by Ethnicity

Swimming location	Ethnicity	*M* rank	χ^2	*df*
Home pool	European/Pakeha	1161.30	92.847*	3
	Maori	1001.46		
	Pasifika	977.70		
	Asian	786.72		
Public pool	European/Pakeha	1088.87	16.040*	3
	Maori	1126.84		
	Pasifika	1055.14		
	Asian	933.73		
Patrolled surf beach	European/Pakeha	1145.58	132.225*	3
	Maori	1137.40		
	Pasifika	928.35		
	Asian	669.85		
Non-patrolled surf beach	European/Pakeha	1136.53	164.944*	3
	Maori	1187.26		
	Pasifika	946.39		
	Asian	612.52		
Flat water beach	European/Pakeha	1107.75	49.179*	3
	Maori	1121.00		
	Pasifika	1067.32		
	Asian	810.43		
Lake, pond, waterhole	European/Pakeha	1126.40	149.962*	3
	Maori	1208.58		
	Pasifika	901.13		
	Asian	681.22		
River, creek	European/Pakeha	1115.91	74.469*	3
	Maori	1167.09		
	Pasifika	874.70		
	Asian	857.32		
Total swimming activity	European/Pakeha	1162.95	214.548*	3
	Maori	1173.14		
	Pasifika	882.74		
	Asian	531.68		

*$p < .05$

Table 3.5 Differences in Total Swimming Activity between Ethnic Groups

Ethnic group	*M* rank	**8.6.2 U**
European/Pakeha v	871.44	269734.5
Maori	878.13	
European/Pakeha v	7989.74	100777.0*
Pasifika	596.50	
European/Pakeha v	832.777	57887.5*
Asian	384.51	
Maori v	333.63	29993.0*
Pasifika	249.52	
Maori v	368.39	116692.0*
Asian	1184.53	
Pasifika v	241.771	13625.0*
Asian	169.64	

*$p < .05$

3.2 Swim Behaviours

Table 3.6 Differences in Individual Swimming Behaviours by Gender

Swimming Behaviour		*M* rank	**8.7 U**
Swim on your own	Female	1035.24	535332.5*
	Male	1159.84	
Dive without checking	Female	1001.87	500927.0*
	Male	1189.22	
Swim unsupervised	Female	1008.48	507742.5*
	Male	1183.40	
Swim after alcohol	Female	1057.87	558671.0*
	Male	1139.91	
Swim in prohibited place	Female	1017.21	516746.0*
	Male	1175.71	
Swim when cold/tired	Female	1065.57	566604.0*
	Male	1133.14	
Swim outside patrol area	Female	1008.51	507777.0*
	Male	1183.37	
Dive in headfirst	Female	1028.16	528039.0*
	Male	1166.07	
Ignore safety directions	Female	1013.75	513179.0*
	Male	1178.76	

*$p < .05$

Table 3.7 Differences in Individual Swim Behaviours by Decile Groups

Swimming Behaviour	Decile group	*M* rank	χ^2	*df*
Swim in clothes	Low-decile	1169.71	18.737*	2
	Mid-decile	1103.74		
	High-decile	1054.01		
Dive without checking	Low-decile	1148.60	7.947*	2
	Mid-decile	1098.61		
	High-decile	1071.73		
Ignore safety directions	Low-decile	1150.78	7.186*	2
	Mid-decile	1076.64		
	High-decile	1085.23		

*$p < .05$

Table 3.8 Differences in Combined At-risk Swimming Behaviours between Decile Group

Decile groups	*M* rank	**8.7.1 U**
Low-decile v	648.65	191428.0
Mid-decile	619.51	
Low-decile v	819.20	271719.0*
High-decile	758.61	
Mid-decile v	800.84	288665.0
High-decile	776.73	

*$p < .05$

Table 3.9. Differences in Individual Swim Behaviours by Ethnicity

Swimming Behaviour	Ethnicity	*M* rank	χ^2	*df*
Swim in clothes	European/Pakeha	1020.36	58.682*	3
	Maori	1198.40		
	Pasifika	1231.27		
	Asian	1063.61		
Swim on your own	European/Pakeha	1047.47	12.863*	3
	Maori	1103.06		
	Pasifika	1174.61		
	Asian	1131.39		
Dive without checking	European/Pakeha	1046.49	30.400*	3
	Maori	1187.92		
	Pasifika	1141.62		
	Asian	1003.18		
Swim unsupervised	European/Pakeha	1068.50	51.009*	3
	Maori	1200.72		
	Pasifika	1130.21		
	Asian	846.21		
Swim after alcohol	European/Pakeha	1076.05	24.769*	3
	Maori	1160.29		
	Pasifika	1031.18		
	Asian	974.84		

Swim in prohibited places	European/Pakeha	1060.93	61.303*	3
	Maori	1221.21		
	Pasifika	1128.13		
	Asian	857.06		
Swim when cold/tired	European/Pakeha	1105.64	30.443*	3
	Maori	1076.84		
	Pasifika	1103.70		
	Asian	875.16		
Swim outside patrol area	European/Pakeha	1116.18	78.543*	3
	Maori	1163.78		
	Pasifika	959.48		
	Asian	778.11		
Dive headfirst into shallow water	European/Pakeha	1058.13	13.038*	3
	Maori	1139.19		
	Pasifika	1117.12		
	Asian	1047.79		
Ignore safety directions	European/Pakeha	1044.70	36.939*	3
	Maori	1197.05		
	Pasifika	1160.92		
	Asian	977.67		

*p <..05

Table 3.10 Differences in At-Risk Swimming Behaviours between Ethnic Groups

Ethnic group	*M* rank	**8.7.2 U**
European/Pakeha v Maori	829.73 1015.71	213878.5*
European/Pakeha v Pasifika	759.17 856.24	119393.5*
European/Pakeha v Asian	797.30 615.08	105384.5*
Maori v Pasifika	313.94 288.71	37986.0
Maori v Asian	349.25 222.24	24460.0*
Pasifika v Asian	240.78 170.57	13815.5*

*p < .05

3.3 Aquatic Recreation

Table 3.11 Differences in Aquatic Recreation Activities by Gender

s		*M* rank	**8.8** **U**
Small craft boating	Female	1053.56	554223.0*
	Male	1143.71	
Fishing from boat	Female	1013.07	512475.5*
	Male	1013.07	
Fishing from land	Female	956.05	453693.0*
	Male	1229.56	
Netting/shellfishing	Female	1034.13	534197.5*
	Male	1160.81	
Underwater activity	Female	1060.41	561289.0*****
	Male	1137.68	
Total aquatic recreation	Female	1022.23	521923.5*
	Male	1171.29	

*$p < .05$

Table 3.12 Differences in Aquatic Recreation Activities by Decile Rating

Aquatic recreation activity	Decile group	*M* rank	χ^2 **8.9**	**df**
Small craft boating	Low (1-3 decile)	974.72	49.924*	2
	Mid (4-7 decile)	1095.14		
	High (8-10 decile)	1191.25		
Large Craft boating	Low (1-3 decile)	957.28	78.084*	2
	Mid (4-7 decile)	1075.30		
	High (8-10 decile)	1216.52		
Paddle craft	Low (1-3 decile)	984.11	33.564*	2
	Mid (4-7 decile)	1149.64		
	High (8-10 decile)	1147.80		
Fishing from land	Low (1-3 decile)	1158.59	9.267*	2
	Mid (4-7 decile)	1096.98		
	High (8-10 decile)	1066.12		
Netting/shellfishing	Low (1-3 decile)	1146.75	7.946*	2
	Mid (4-7 decile)	1085.23		
	High (8-10 decile)	1082.10		
Surfing/bodyboarding	Low (1-3 decile)	972.81	42.787*	2
	Mid (4-7 decile)	1118.57		
	High (8-10 decile)	1176.58		
River activity	Low (1-3 decile)	1005.38	31.772*	2
	Mid (4-7 decile)	1169.27		
	High (8-10 decile)	1120.10		
Water sports	Low (1-3 decile)	974.74	59.720*	2
	Mid (4-7 decile)	1099.08		
	High (8-10 decile)	1188.56		
Total aquatic recreation	Low (1-3 decile)	973.12	39.654*	2
	Mid (4-7 decile)	1116.45		
	High (8-10 decile)	1177.82		

*$p < .05$

Table 3.13 Differences in Total Aquatic Recreation between Decile Groups

Decile groups	*M* rank	**8.9.1** **U**
Low decile v Medium decile	591.72 675.82	174018.5*
Low decile v High decile	696.90 841.02	240280*
Medium decile v High decile	759.64 804.80	280687.0

*$p < .05$

Table 3.14 Differences in Aquatic Recreation Activities by Ethnicity

Aquatic recreation activity	Ethnicity	*M* rank	χ^2	*df*
Small-craft boating	European/Pakeha	1178.48	125.893*	3
	Maori	1002.87		
	Pasifika	859.88		
	Asian	788.93		
Large-craft boating	European/Pakeha	1183.78	129.842*	3
	Maori	939.08		
	Pasifika	914.94		
	Asian	825.68		
Paddle craft	European/Pakeha	1151.27	102.754*	3
	Maori	1084.21		
	Pasifika	928.39		
	Asian	737.63		
Fishing from boat	European/Pakeha	1126.24	60.867*	3
	Maori	1083.55		
	Pasifika	1045.03		
	Asian	786.15		
Fishing from land	European/Pakeha	1052.76	15.567*	3
	Maori	1163.67		
	Pasifika	1133.86		
	Asian	1017.88		
Netting/shellfishing	European/Pakeha	1040.50	59.101*	3
	Maori	1186.65		
	Pasifika	1215.88		
	Asian	971.07		
Surfing/bodyboarding	European/Pakeha	1170.35	161.133*	3
	Maori	1101.00		
	Pasifika	833.14		
	Asian	674.88		
River activity	European/Pakeha	1133.22	57.123*	3
	Maori	1064.96		
	Pasifika	912.23		
	Asian	908.94		

Water sports	European/Pakeha	1169.27	115.795*	3
	Maori	983.83		
	Pasifika	886.63		
	Asian	859.85		
Underwater activity	European/Pakeha	1089.40	57.693*	3
	Maori	1186.33		
	Pasifika	1041.12		
	Asian	826.92		
Total aquatic recreation	European/Pakeha	1174.78	162.623*	3
	Maori	1082.68		
	Pasifika	897.83		
	Asian	618.13		

*$p < .05$

Table 3.15 Differences in Total Aquatic Recreation between Ethnic Groups

Ethnic group	*M* rank	**8.9.2 U**
European/Pakeha v Maori	890.77 814.38	248018.5*
European/Pakeha v Pasifika	798.27 599.58	101405.0*
European/Pakeha v Asian	825.74 430.20	67300.0*
Maori v Pasifika	323.45 269.78	34125.0*
Maori v Asian	351.85 217.12	23406.0*
Pasifika v Asian	233.46 177.81	15307.5*

*$p < .05$

3.4 Aquatic Recreation Behaviours

Table 3.16 Differences in Aquatic Recreational Activity Behaviour by Gender

Aquatic recreation behaviour		*M* rank	**8.10 U**
Did not wear lifejacket	Female	1155.42	548062.5*
	Male	1054.03	
Used alcohol/drugs	Female	1035.84	535957.5*
	Male	1159.31	
No adult supervision	Female	1165.28	537894.5*
	Male	1045.35	
Did not tell adult beforehand	Female	1189.78	512631.7*
	Male	1023.77	
Did the activity on your own	Female	1015.09	514564.5*
	Male	1177.58	

*$p < .05$

Table 3.17 Differences in Total Aquatic Recreation Behaviour by Decile Group

Decile groups	*M* rank	**8.10.1 U**
Low decile v	636.75	198920.0
Mid decile	631.28	
Low decile v	777.51	291066.0
High decile	786.70	
Mid decile v	776.80	291620.0
High decile	793.11	

*$p < .05$

Table 3.18 Differences in Individual Aquatic Recreational Behaviour by Decile Group

Aquatic recreation behaviour	Decile group	*M* rank	χ^2	*df*
No adult supervision	Low (1-3 decile)	1156.45	7.938*	2
	Mid (4-7 decile)	1064.41		
	High (8-10 decile)	1089.74		
Did the activity on your own	Low (1-3 decile)	1172.71	13.792*	2
	Mid (4-7 decile)	1078.89		
	High (8-10 decile)	1068.92		

*$p < .05$

Table 3.19 Differences in Individual Aquatic Recreation Behaviours by Ethnicity

Aquatic recreation behaviour	Ethnicity	*M* rank	χ^2	*df*
Did not wear lifejacket	European/Pakeha	1118.73	21.002*	3
	Maori	975.24		
	Pasifika	1003.86		
	Asian	1089.22		
No adult supervision	European/Pakeha	1062.25	24.132*	3
	Maori	1007.11		
	Pasifika	1193.64		
	Asian	1205.58		
Did not tell adult beforehand	European/Pakeha	1115.32	18.950*	3
	Maori	978.27		
	Pasifika	1015.40		
	Asian	1093.99		
Did the activity on your own	European/Pakeha	1038.91	23.495*	3
	Maori	1119.02		
	Pasifika	1224.63		
	Asian	1106.03		
Did not check weather/water conditions	European/Pakeha	1063.50	15.303*	3
	Maori	1044.30		
	Pasifika	1085.98		
	Asian	1230.79		

*$p < .05$

Table 3.20 Differences in Aquatic Recreation Supervision Behaviours between Ethnic Groups

Ethnicity	*Adult supervision*		*Tell adult first*		*Do activity alone*	
	M *rank*	U	M *rank*	U	M *rank*	U
European v	883.93	257176.0	899.59	236206.5*	857.62	251227.5*
Maori	836.94		785.29		923.71	
European v	759.20	119440.0*	781.32	124094.0	754.24	112795.5*
Pasifika	883.93		710.80		888.58	
European v	759.11	119324.0*	774.40	136046.5	767.05	129949.0
Asian	863.26		763.92		811.68	
Maori v	288.39	34467.0*	302.88	40348.0	295.21	37233.0
Pasifika	339.54		310.72		325.99	
Maori v	288.78	34623.0*	297.10	38003.0	307.10	41574.5
Asian	341.43		325.02		305.32	
Pasifika v	203.08	20519.0	198.88	19662.0	215.06	19062.0
Asian	207.89		212.05		196.03	

*$p < .05$

Table 3.21 Differences in Aquatic Recreation Safety Rules Behaviour by Ethnicity

Ethnicity	*Wear lifejacket* M *rank*	U	*Check conditions* *M* rank	*U*	*Alcohol/drugs* *M* rank	*U*
European v	901.00	234325.0*	876.78	266762.0	859.86	254229.0
Maori	780.66		860.55		916.32	
European v	782.47	122554.0	769.91	133786.0	768.84	132344.5
Pasifika	703.25		785.69		792.75	
European v	775.26	134897.5	756.81	116234.0*	770.45	134497.0
Asian	758.34		878.26		789.60	
Maori v	304.42	40972.5	301.80	39908.0	308.42	40224.5
Pasifika	307.65		312.87		299.68	
Maori v	297.17	38028.0	288.95	34694.0*	309.85	40456.0
Asian	324.90		341.08		299.89	
Pasifika v	197.95	19471.0	192.42	18344.0	205.59	20994.0
Asian	212.98		218.45		205.41	

*$p < .05$

Chapter 4 – Water safety knowledge - What students know

4.1 Swimming Ability

Table 4.1 Differences in Swimming Ability by Gender

Swimming ability	Gender	N	*M* rank	U
Cannot swim	Female	46	45.00	989.00*
	Male	43	45.00	
< 25 m	Female	110	100.50	4950.00*
	Male	90	100.50	
25-50 m	Female	287	281.00	39319.00*
	Male	274	281.00	
50-100 m	Female	173	171.50	14618.50*
	Male	169	171.50	
100-200 m	Female	143	152.50	11511.50*
	Male	161	152.50	
200-400 m	Female	125	144.50	10187.00*
	Male	163	144.50	
> 400 m	Female	147	209.00	19845.00*
	Male	270	209.00	

*$p < .05$

Table 4.2 Differences in Swimming Ability by School Decile Rating and Ethnicity

Ability	Group	*N*	*M* rank	χ^2	df
Decile group	Low decile	630	931.75	59.026*	2
	Mid decile	637	1070.04		
	High decile	935	1237.31		
Ethnicity	European/Pakeha	1139	1194.74	164.518*	3
	Maori	406	1031.56		
	Pasifika	204	789.69		
	Asian	206	731.69		

*$p < .05$

Table 4.3 Differences in Swimming Ability between Decile Groups

Decile groups	*M* rank	**8.10.2 U**
Low decile v	593.80	175327.5*
Mid decile	673.76	
Low decile v	653.45	212910.0*
High decile	870.29	
Mid decile v	715.28	252427.5*
High decile	835.02	

*$p < .05$

Table 4.4 Differences in swimming ability between ethnic groups

Ethnicity	*M* rank	**8.10.3 U**
European/Pakeha v	908.03	224908.0*
Maori	757.46	
European/Pakeha v	810.38	85284.5*
Pasifika	520.07	
European/Pakeha v	816.33	79903.5*
Asian	491.28	
Maori v	327.82	32351.0*
Pasifika	261.08	
Maori v	335.28	30132.0*
Asian	249.77	
Pasifika v	213.54	19372.0
Asian	197.54	

*$p < .05$

4.2 Rescue Ability

Table 4.5 Differences in Rescue Ability by Gender, Decile Grouping and Ethnicity

Rescue ability	Observed *N*	Expected *N*	χ^2	*df*
Female	672	674.4	.058	1
Male	769	766.3		
Low-decile	366	412.3	21.562*	2
Mid-decile	429	416.9		
High-decile	646	611.9		
European/Pakeha	956	876.6	92.010*	3
Maori	266	265.8		
Pasifika	105	133.6		
Asian	85	134.9		

*$p < .05$

Table 4.6 Differences in Rescue Ability between Decile Groups

Decile groups	*M* rank	U
Low decile v	604.53	182091.0*
Mid decile	663.14	
Low decile v	731.60	262140.0*
High decile	817.64	
Mid decile v	778.35	292604.0
High decile	792.05	

*$p < .05$

Table 4.7 Differences in Rescue Ability between Ethnic Groups

Ethnicity	*M* rank	U
European/Pakeha v	908.03	224908.0*
Maori	757.46	
European/Pakeha v	810.38	85184.5*
Pasifika	520.07	
European/Pakeha v	816.33	79903.5*
Asian	491.38	
Maori v	327.82	32351.0*
Pasifika	261.08	
Maori v	335.28	30132.0*
Asian	249.77	
Pasifika v	213.54	19372.0
Asian	197.54	

*$p < .05$

4.3 CPR Knowledge

Table 4.8 Differences in CPR Knowledge by Gender, Decile Grouping and Ethnicity

CPR Knowledge	Observed *N*	Expected *N*	χ^2	*df*
Female	620	589.5	6.940*	1
Male	639	669.5		
Low-decile	330	360.2	8.497*	2
Mid-decile	372	364.2		
High-decile	557	534.6		
European/Pakeha	852	765.9	80.036*	3
Maori	223	232.2		
Pasifika	84	116.7		
Asian	76	117.8		

*$p < .05$

Table 4.9 Differences in CPR Knowledge between Decile Groups

Decile groups	*M* rank	**8.10.4 U**
Low decile v	614.83	188580.0
Mid decile	652.96	
Low decile v	749.38	273345.0*
High decile	805.65	
Mid decile v	781.01	294303.0
High decile	790.24	

*$p < .05$

Table 4.10 Differences in CPR Knowledge between Ethnic Groups

Ethnicity	*M* rank	**8.10.5 U**
European/Pakeha v	890.67	248159.5*
Maori	814.73	
European/Pakeha v	794.90	105912.0*
Pasifika	621.68	
European/Pakeha v	800.54	101043.0*
Asian	594.00	
Maori v	319.52	35718.0*
Pasifika	277.59	
Maori v	325.07	34277.0*
Asian	269.89	
Pasifika v	209.91	20112.0
Asian	210.13	

*$p < .05$

4.4 Knowledge of Boat Safety

Table 4.11 Differences in Knowledge of Safety Items, Safety Preparation and Onboard Rules by Gender.

Boat safety knowledge	*Gender*	*M* rank	U
Knowledge of safety items	Female	1238.61	21.662*
	Male	980.78	
Knowledge of safety preparation	Female	1161.85	53.521*
	Male	1048.36	
Knowledge of safety rules	Female	1199.13	99.873*
	Male	1015.54	
Total boat safety knowledge	Female	1222.93	87.216*
	Male	994.59	

*$p < .05$

Table 4.12 Differences in Knowledge of Safety Items, Safety Preparation and Onboard Rules by Socio-Economic Status via School Decile Rating.

Boat safety knowledge	*Decile rating*	*M* rank	χ^2	*df*
Knowledge of safety items	Low-decile	988.75	37.681*	2
	Mid-decile	1094.33		
	High-decile	1182.35		
Knowledge of safety preparation	Low-decile	999.55	47.139*	2
	Mid-decile	1053.41		
	High-decile	1202.96		
Knowledge of safety rules	Low-decile	997.52	30.779*	2
	Mid-decile	1100.62		
	High-decile	1172.16		
Total boat safety knowledge	Low-decile	967.88	53.898*	2
	Mid-decile	1081.90		
	High-decile	1204.88		

*$p < .05$

Table 4.13 Differences in Boat Safety Knowledge between Socio-Economic groups

Decile groups	*M* rank	**8.10.6 U**
Low decile v	601.46	180153.50*
Mid decile	666.18	
Low decile v	681.93	230848.00*
High decile	851.10	
Mid decile v	734.72	264811.00*
High decile	821.78	

*$p < .05$

Table 4.14 Differences in Boat Knowledge of Safety Items, Safety Preparation and Onboard Rules by Ethnicity.

Boat safety knowledge	*Ethnicity*	*M* rank	χ^2	*df*
Knowledge of safety items	European	1181.77	159.195*	3
	Maori	998.25		
	Pasifika	993.95		
	Asian	643.91		
Knowledge of safety preparation	European	1190.52	140.452*	3
	Maori	935.92		
	Pasifika	952.18		
	Asian	751.25		
Knowledge of safety rules	European	1160.66	87.680*	3
	Maori	998.56		
	Pasifika	993.12		
	Asian	781.31		
Total boat safety knowledge	European	1204.43	181.871*	3
	Maori	944.41		
	Pasifika	942.18		
	Asian	654.01		

*$p < .05$

Table 4.15 Differences in Boat Safety Knowledge between Ethnic Groups.

Ethnicity	*M* rank	U
European/Pakeha v	923.09	204740.0*
Maori	707.79	
European/Pakeha v	797.66	102214.5*
Pasifika	603.55	
European/Pakeha v	823.67	70068.0*
Asian	443.64	
Maori v	305.64	41354.5
Pasifika	305.22	
Maori v	337.98	29038.0*
Asian	244.46	
Pasifika v	238.41	14298.5*
Asian	172.91	

*$p < .05$

4.5 Knowledge of Surf Safety

Table 4.16 Differences in Surf Safety Knowledge of Safety Items, Safety Preparation and On-board Rules by Gender.

Surf safety knowledge	*Gender*	*M* rank	U
Knowledge of safety items	Female Male	1166.79 1044.01	536332.0*
Knowledge of safety preparation	Female Male	1227.763 990.34	473481.0*
Knowledge of safety rules	Female Male	1198.53 1016.07	503613.0*
Total surf safety knowledge	Female Male	1233.36 985.41	467706.0*

*$p < .05$

Table 4.17 Differences in Surf Knowledge of Hazards, Safety Precautions and Safe Locations by Socio-Economic Status via School Decile Rating.

Surf safety knowledge	*Decile rating*	*M* rank	χ^2	*df*
Knowledge of surf hazards	Low-decile Mid-decile High-decile	970.59 1076.18 1206.96	57.896*	2
Knowledge of surf safety precautions	Low-decile Mid-decile High-decile	968.16 1087.79 1200.69	55.052*	2
Knowledge of surf safety location	Low-decile Mid-decile High-decile	1055.92 1118.60 1120.56	5.814	2
Total surf safety knowledge	Low-decile Mid-decile High-decile	969.20 1095.65 1194.63	48.084*	2

*$p < .05$

Table 4.18 Differences in Surf Knowledge between Socio-Economic groups

Decile groups	*M* rank	U
Low decile v Mid decile	597.54 670.06	177686.0*
Low decile v High decile	687.15 847.58	234142.5*
Mid decile v High decile	744.59 815.05	271099.0*

*$p < .05$

Table 4.19 Differences in Surf Knowledge of Hazards, Safety Precautions and Safe Locations by Ethnicity.

Surf safety knowledge	*Ethnicity*	*M* rank	χ^2	*df*
Knowledge of surf hazards	European	1199.95	158.818*	3
	Maori	933.50		
	Pasifika	939.36		
	Asian	726.88		
Knowledge of surf safety precautions	European	1199.23	152.306*	3
	Maori	912.13		
	Pasifika	907.58		
	Asian	785.68		
Knowledge of surf safety location	European	1166.92	114.680*	3
	Maori	1010.17		
	Pasifika	921.32		
	Asian	788.85		
Total surf safety knowledge	European	1221.78	208.733*	3
	Maori	906.50		
	Pasifika	987.00		
	Asian	690.40		

*$p < .05$

Table 4.20 Differences in Surf Safety Knowledge between Ethnic Groups

Ethnicity	*M* rank	U
European/Pakeha v	933.44	190892.0*
Maori	673.68	
European/Pakeha v	805.69	91464.0*
Pasifika	550.85	
European/Pakeha v	822.65	71436.5*
Asian	450.28	
Maori v	309.99	39588.0
Pasifika	296.56	
Maori v	329.83	32348.0*
Asian	260.53	
Pasifika v	224.59	17117.0*
Asian	186.59	

*$p < .05$

Chapter 5. Drowning risk perceptions and water safety attitudes

5.1 Risk Perceptions

Table 5.1 Differences in Drowning Risk Perception by Gender

Risk scenario	Gender	*M* rank	U
Fallen out of a canoe 100m from shore of a lake	Female	995.22	494072.0*
	Male	1195.08	
Caught in a rip current at an un-patrolled surf beach	Female	975.74	473987.0*
	Male	1212.23	
Fallen into deep water from a river bank fully clothed	Female	1024.53	524294.0*
	Male	1169.27	
Swept off isolated rocks by a wave whilst fishing	Female	1010.86	510197.0*
	Male	1181.31	
Risk Total	Female	977.68	475996.0*
	Male	1210.51	

*$p < .05$

Table 5.2 Differences in Drowning Risk Perception by Socio-economic Status via School Decile Rating

Risk scenario	Decile group	*M* rank	χ^2	*df*
Fallen out of a canoe 100m from shore of a lake	Low decile	1041.36	25.677*	2
	Mid decile	1051.69		
	High decile	1175.96		
Caught in a rip current at an un-patrolled surf beach	Low decile	1050.76	23.047*	2
	Mid decile	1046.69		
	High decile	1173.03		
Chased inflatable toy into deep end of public pool	Low decile	1031.35	41.441*	2
	Mid decile	1055.63		
	High decile	1180.02		
Fallen into deep water from a river bank fully clothed	Low decile	1064.94	22.665*	2
	Mid decile	1035.12		
	High decile	1171.35		
Risk Total	Low decile	1033.45	25.848*	2
	Mid decile	1052.39		
	High decile	1180.81		

*$p < .05$

Table 5.3 Differences in Drowning Risk Perception between Decile Groups

Decile groups	*M* rank	U
Low decile v	627.93	196830.0
Mid decile	640.00	
Low decile v	721.02	255476.0*
High decile	824.76	

Mid decile v	731.39	262690.5*
High decile	824.05	

*$p < .05$

Table 5.4 Differences in Drowning Risk Perception by Ethnicity

Risk scenario	Ethnicity	*M* rank	χ^2	*df*
Fallen out of a canoe 100m from shore of a lake	European/Pakeha	1142.72	78.059*	3
	Maori	1090.26		
	Pasifika	871.21		
	Asian	837.91		
Caught in a rip current at an un-patrolled surf beach	European/Pakeha	1113.82	22.492*	3
	Maori	1068.67		
	Pasifika	914.39		
	Asian	1025.58		
Chased inflatable toy into deep end of public pool	European/Pakeha	1155.62	156.609*	3
	Maori	1088.89		
	Pasifika	817.79		
	Asian	809.71		
Fallen into deep water from a river bank fully clothed	European/Pakeha	1111.54	19.659*	3
	Maori	1082.03		
	Pasifika	970.69		
	Asian	958.32		
Swept off isolated rocks by a wave whilst fishing	European/Pakeha	1054.94	10.660*	3
	Maori	1119.32		
	Pasifika	1049.02		
	Asian	1175.16		
Risk Total	European/Pakeha	1127.60	53.190*	3
	Maori	1114.84		
	Pasifika	849.23		
	Asian	909.53		

*$p < .05$

Table 5.5 Differences in Drowning Risk Perception between Ethnic Groups

Ethnicity	*M* rank	U
European/Pakeha v Maori	875.07 866.17	269043.0
European/Pakeha v Pasifika	798.95 595.10	100490.0*
European/Pakeha v Asian	793.58 639.25	110363.5*
Maori v Pasifika	330.42 255.91	31296.0*
Maori v Asian	325.26 269.53	34201.5*
Pasifika v Asian	203.22 207.75	20547.5

*$p < .05$

5.2. Water safety attitudes

Table 5.6 Differences in Water Safety Attitudes by Gender

Water safety attitudes	Gender	*M* rank	*U*
Opinion on pool rules spoiling fun	Female	1295.83	399553.0*
	Male	927.00	
Opinion on swimming outside flags at a patrolled surf beach	Female	1222.27	475174.0*
	Male	991.63	
Opinion on wearing lifejackets close to shore	Female	1186.46	511982.5*
	Male	1023.09	
Opinion on alcohol in a small craft but not for the skipper	Female	1203.09	494889.5*
	Male	1008.48	
Opinion on river crossing alone	Female	1040.26	540484.0*
	Male	1151.55	
Opinion on the need home pool fencing	Female	1212.53	485185.5*
	Male	1000.19	
Opinion on swimming alone	Female	1056.08	556745.0*
	Male	1137.65	
Opinion on lifeguard powers	Female	1229.25	467996.5*
	Male	985.50	
Opinion on swimming in clothes at beach	Female	1134.63	565261.5*
	Male	1068.63	
Opinion on lifejacket use for good swimmer	Female	1167.60	531370.0*
	Male	1039.66	
Opinion on drinking a beer when fishing from a small craft	Female	1256.13	440359.5*
	Male	961.88	
Opinion on swimming after hours at a surf beach	Female	1173.58	525224.5*
	Male	1034.41	
Opinion on diving headfirst into shallow water	Female	1190.40	508944.0*
	Male	1020.49	
Opinion on wearing clothes out of depth	Female	1142.50	558231.0*
	Male	1062.62	
Total Score	Female	1287.42	408197.0*
	Male	934.39	

*$p < .05$

Table 5.7 Differences in Total Water Safety Attitudes Score by Decile Rating and Ethnicity

Attitude Total Score of 14 items	*M* rank	χ^2	*df*
Low-decile	1041.61		
Mid-decile	1119.31	7.635*	2
High-decile	1125.59		
European/Pakeha	1089.69		
Maori	981.86	25.517*	3
Pasifika	1012.88		
Asian	1234.29		

*$p < .05$

Table 5.8 Differences in Water Safety Attitudes between Decile Groups

Decile groups	*M* rank	**8.10.7 U**
Low decile v	609.37	185178.0
Mid decile	654.38	
Low decile v	745.74	270821.5*
High decile	806.35	
Mid decile v	782.93	295233.0
High decile	787.24	

*$p < .05$

Table 5.9 Differences in Individual Water Safety Attitudes by Decile Rating

Water safety attitudes	Decile group	*M* Rank	χ^2	*df*
Opinion on pool rules spoiling fun	Low decile	1023.26	14.386*	2
	Mid decile	1135.41		
	High decile	1126.32		
Opinion on the need home pool fencing	Low decile	1047.93	6.485*	2
	Mid decile	1122.96		
	High decile	1118.20		
Opinion on lifeguard powers	Low decile	1043.79	9.309*	2
	Mid decile	1101.78		
	High decile	1135.37		
Opinion on lifejacket use for good swimmer	Low decile	1056.76	7.278*	2
	Mid decile	1090.34		
	High decile	1134.43		
Opinion on diving headfirst into shallow water	Low decile	1038.48	13.418*	2
	Mid decile	1087.43		
	High decile	1149.93		
Total Score	Low decile	1040.61	7.635*	2
	Mid decile	1119.31		
	High decile	1125.59		

*$p < .05$

Table 5.10 Differences in Individual Water Safety Attitudes between ethnic groups

Ethnicity	*M* rank	U
European/Pakeha v	891.58	242552.5*
Maori	802.88	
European/Pakeha v	778.50	126344.0*
Pasifika	721.83	
European/Pakeha v	757.60	118463.5*
Asian	865.43	
Maori v	301.82	40123.5
Pasifika	309.82	
Maori v	282.16	32183.5*
Asian	351.27	
Pasifika v	186.23	17080.5*
Asian	224.58	

*$p < .05$

Table 5.11 Differences in Water Safety Attitudes by Ethnicity

Water safety attitudes	Ethnicity	*M* Rank	χ^2	*df*
Opinion on pool rules spoiling fun	European/Pakeha	1124.20	39.439*	3
	Maori	960.92		
	Pasifika	929.83		
	Asian	1133.59		
Opinion on swimming outside flags at a patrolled surf beach	European/Pakeha	1061.18	15.236*	3
	Maori	1047.43		
	Pasifika	1079.69		
	Asian	1224.60		
Opinion on wearing lifejackets close to shore	European/Pakeha	1079.55	13.118*	3
	Maori	1025.09		
	Pasifika	1033.46		
	Asian	1194.95		
Opinion on alcohol in a small craft but not for the skipper	European/Pakeha	1040.63	42.633*	3
	Maori	1035.15		
	Pasifika	1150.33		
	Asian	1312.08		
Opinion on lifeguard powers	European/Pakeha	1109.81	20.683*	3
	Maori	1004.60		
	Pasifika	958.02		
	Asian	1113.41		
Opinion on swimming in clothes at beach	European/Pakeha	1119.01	21.236*	3
	Maori	1016.12		
	Pasifika	959.25		
	Asian	1029.91		
Opinion on lifejacket use for good swimmer	European/Pakeha	1106.84	12.021*	3
	Maori	1004.92		
	Pasifika	1042.34		
	Asian	1048.58		
Opinion on drinking a beer when fishing from a small craft	European/Pakeha	1033.53	33.799*	3
	Maori	1084.92		
	Pasifika	1130.31		
	Asian	1280.35		
Opinion on swimming after hours at a surf beach	European/Pakeha	1043.19	38.083*	3
	Maori	1031.31		
	Pasifika	1209.52		
	Asian	1244.40		
Opinion on diving headfirst into shallow water	European/Pakeha	1131.43	31.322*	3
	Maori	975.49		
	Pasifika	995.34		
	Asian	998.95		
Opinion on wearing clothes out of depth	European/Pakeha	1117.25	17.792*	3
	Maori	1015.56		
	Pasifika	998.17		
	Asian	1009.38		
Total Score	European/Pakeha	1089.69	25.517*	3
	Maori	981.86		
	Pasifika	1012.88		
	Asian	1234.29		

*$p < .05$

Chapter 6. Socio-cultural influences

6.1 Student perceptions

Table 6.1 Differences in the Most Important Influences on Water Safety by Gender, School Decile Rating and Ethnicity.

Influences on Water Safety	Friends *M* rank	X^2	Family *M* rank	X^2	School *M* rank	X^2	Group, club, *M* rank	X^2
Female	515.44		992.19		948.28		397.61	
Male	849.44	265.45*	883.30	35.41*	809.57	51.71*	358.60	6.81*
Low-Decile	613.25		900.57		943.50		408.67	
Med-Decile	646.14	2.20	908.97	11.99*	862.58	13.52*	391.35	11.10*
High-Decile	615.10		986.60		844.23		351.38	
European	608.97		972.33		833.21		347.78	
Maori	606.39	0.23	809.65	39.71*	957.76	23.41*	448.08	27.36*
Pasifika	618.25		811.85		902.78		432.74	
Asian	598.03		919.76		779.20		392.58	

*$p < .05$

6.2 Peer influence

Table 6.2 Differences in the Observation of Friend's At-Risk Behaviours by Gender

Observed friend's at-risk behaviour	Gender	Observed *N*	Expected *N*	χ^2	*df*
Friend not worn lifejackets in a boat	Female	478	532.6	30.479*	1
	Male	703	648.4		
Friend swum without adult supervision	Female	775	810.1	16.177*	1
	Male	953	917.9		
Friend swum outside surf patrol flags	Female	577	650.5	49.414*	1
	Male	808	734.5		
Friend encouraged risk in/on the water	Female	242	382.0	163.611*	1
	Male	575	435.0		
Friend used alcohol/drugs	Female	218	258.6	17.506*	1
	Male	311	270.4		
Friend ignored water safety advice	Female	242	387.0	172.824*	1
	Male	576	431.0		
Friend swum in prohibited places	Female	392	508.1	106.215*	1
	Male	687	570.9		
Friend dived headfirst into shallow water	Female	166	272.3	109.472*	1
	Male	414	307.7		

*$p < .05$

Table 6.3 Differences in Observation of Friends At-Risk Behaviour by School Decile Rating

Observed friend's at-risk behaviour	Decile group	*M* rank	χ^2	*df*
Friend encouraged risk in/on the water	Low decile	1124.56	7.929*	2
	Mid decile	1048.11		
	High decile	1122.14		

*$p < .05$

Table 6.4 Differences in Observation of Friends At-Risk Behaviour by Ethnicity

Observed friend's at-risk behaviour	Ethnicity	*M* rank	χ^2	*df*
Friends not worn lifejackets in a boat	European/Pakeha	907.39	62.505*	3
	Maori	867.62		
	Pasifika	835.36		
	Asian	624.50		
Friends swum without adult supervision	European/Pakeha	1058.47	92.419*	3
	Maori	1074.31		
	Pasifika	984.45		
	Asian	778.21		
Friends swum outside surf patrol flags	European/Pakeha	1025.70	59.872*	3
	Maori	1033.34		
	Pasifika	930.60		
	Asian	749.96		
Friends encouraged risk	European/Pakeha	962.04	19.574*	3
	Maori	1031.48		
	Pasifika	1037.88		
	Asian	857.50		
Friends used alcohol/drugs	European/Pakeha	897.85	19.999*	3
	Maori	965.55		
	Pasifika	886.73		
	Asian	792.61		
Friends ignored water safety advice	European/Pakeha	968.06	36.103*	3
	Maori	1060.73		
	Pasifika	1135.90		
	Asian	878.19		
Friends swum in prohibited places	European/Pakeha	993.93	34.286*	3
	Maori	1070.76		
	Pasifika	1070.18		
	Asian	820.75		
Friends dived in headfirst	European	1248	6.863	3
	Maori	382		
	Pasifika	186		
	Asian	175		

*$p < .05$

6.3. Familial Influence

Table 6.5 Differences in Family Influences on Water Safety by Gender

Familial influences on water safety	Gender	Observed *N*	Expected *N*	χ^2	*df*
Given you water safety advice	Female	918	878.8	23.956*	2
	Male	959	998.2		
Paid for swimming lessons	Female	622	562.8	27.199*	2
	Male	580	639.2		
Had first aid training	Female	563	517.8	16.198*	2
	Male	543	588.2		
Supervised your water activity	Female	924	855.4	62.765*	2
	Male	903	971.9		
Discussed water safety issues as a family	Female	352	321.2	9.256*	2
	Male	334	364.8		
Stopped your aquatic activity	Female	488	445.7	14.560*	2
	Male	464	506.3		
Encouraged you to improve your swimming ability	Female	568	538.9	7.445*	2
	Male	583	512.1		

*$p < .05$

Table 6.6. Differences in Family Influences on Water Safety by Socio-economic Status via School Decile Rating

Familial influences on water safety	Decile group	*M* rank	χ^2	*df*
Given you water safety advice	Low decile	1056.62	12.159*	2
	Mid decile	1110.97		
	High decile	1125.29		
Paid for swimming lessons	Low decile	839.84	255.789*	2
	Mid decile	1082.21		
	High decile	1290.95		
Had first aid training	Low decile	1025.76	17.754*	2
	Mid decile	1149.22		
	High decile	1120.02		
Supervised your water activity	Low decile	1034.41	23.223*	2
	Mid decile	1125.60		
	High decile	1130.28		
Discussed water safety issues as a family	Low decile	1076.47	4.001	2
	Mid decile	1132.90		
	High decile	1096.98		
Stopped your aquatic activity	Low decile	1048.49	8.728*	2
	Mid decile	1112.19		
	High decile	1129.94		
Encouraged you to improve your swimming ability	Low decile	992.82	37.013*	2
	Mid decile	1118.08		
	High decile	1163.44		

*$p < .05$

Table 6.7 Differences in Overall Family Influence by Decile Group

Decile groups	*M* rank	U
Low decile v	564.68	156985.0*
Mid decile	702.56	
Low decile v	649.78	210598.5*
High decile	872.76	
Mid decile v	751.22	275322.5*
High decile	810.54	

*$p < .05$

Table 6.8 Differences in Family Influences on Water Safety by Ethnicity

Familial influences on water safety	Ethnicity	*M* rank	χ^2	*df*
Given you water safety advice	European/Pakeha	1105.39	28.859*	3
	Maori	1076.95		
	Pasifika	983.09		
	Asian	996.00		
Paid for swimming lessons	European/Pakeha	1215.51	266.515*	3
	Maori	817.73		
	Pasifika	738.13		
	Asian	1033.73		
Had first aid training	European/Pakeha	1119.64	28.204*	3
	Maori	1055.11		
	Pasifika	995.81		
	Asian	933.84		
Supervised your water activity	European/Pakeha	1128.89	92.210*	3
	Maori	1065.90		
	Pasifika	990.75		
	Asian	857.43		
Discussed water safety issues as a family	European/Pakeha	1110.75	5.442	3
	Maori	1067.21		
	Pasifika	1134.95		
	Asian	1056.53		
Stopped your aquatic activity	European/Pakeha	1116.12	22.869*	3
	Maori	1023.32		
	Pasifika	1065.03		
	Asian	950.83		
Encouraged you to improve your swimming ability	European/Pakeha	1142.07	54.073*	3
	Maori	1105.39		
	Pasifika	1076.95		
	Asian	983.09		

*$p < .05$

Table 6.9 Differences in Overall Family Influence between Ethnic Groups

Ethnicity	*M* rank	**8.10.8 U**
European/Pakeha v	922.97	204908.5*
Maori	708.20	
European/Pakeha v	804.29	93339.0*
Pasifika	560.04	
European/Pakeha v	805.78	94018.5*
Asian	559.90	
Maori v	314.01	37956.0
Pasifika	288.56	
Maori v	316.37	37809.5
Asian	287.04	
Pasifika v	207.47	20610.5
Asian	203.55	

*$p < .05$

6.4. Education and schooling

Table 6.10 Differences in Teaching of Water Safety Education by Gender, Socio-Economic Status and Ethnicity

Not taught water safety	Observed *N*	Expected *N*	χ^2	*df*
Female	150	184.9	15.129*	1
Male	245	210.1		
Low-decile	167	113.0	44.810*	2
Mid-decile	99	114.3		
High-decile	129	167.7		
European/Pakeha	169	239.7	125.991*	3
Maori	66	72.7		
Pasifika	61	36.5		
Asian	85	36.9		

*$p < .05$

6.11 Differences in Water Safety Topics Taught by Ethnicity

Water safety topics taught	Ethnicity	*M* rank	χ^2	*df*
Pool safety	European/Pakeha	914.37	17.264*	3
	Maori	911.44		
	Pasifika	887.41		
	Asian	831.69		
Surf safety	European/Pakeha	955.63	59.099*	3
	Maori	864.82		
	Pasifika	740.32		
	Asian	715.05		
River safety	European/Pakeha	917.48	11.181*	3
	Maori	900.47		
	Pasifika	801.36		
	Asian	781.78		
Boat safety	European/Pakeha	901.34	1.897	3
	Maori	910.22		
	Pasifika	941.50		
	Asian	877.74		
Underwater safety	European/Pakeha	989.38	9.834*	3
	Maori	947.10		
	Pasifika	963.73		
	Asian	858.04		

*$p < .05$

Table 6.12 Differences in Water Safety Education between Ethnic Groups

Ethnicity	*M* rank	**8.10.9 U**
European/Pakeha v Maori	758.57 744.94	195311.0
European/Pakeha v Pasifika	665.86 584.49	72286.5*
European/Pakeha v Asian	658.93 520.97	55656.0*
Maori v Pasifika	249.46 224.27	21774.5
Maori v Asian	242.74 198.02	16579.0*
Pasifika v Asian	138.20 125.76	7836.5

*$p < .05$

6.5. Previous Experience

Table 6.13 Differences in Experience of Life-threatening Incident by Gender, Decile Grouping and Ethnicity

Life-threatening aquatic experience	Observed *N*	Expected *N*	χ^2	*df*
Female	417	379.3	11.177*	1
Male	393	430.7		
Low-decile	233	231.7	2.702	2
Mid-decile	246	234.3		
High-decile	331	343.9		
European/Pakeha	490	492.8	7.245	3
Maori	140	149.4		
Pasifika	90	75.1		
Asian	70	75.8		

*$p < .05$

Table 6.14 Differences in Impact of Life-threatening Incident on Participation between Ethnic Groups

Ethnic group	*M* rank	U
European/Pakeha v	318.12	33017.5
Maori	306.34	
European/Pakeha v	289.94	17913.0*
Pasifika	244.53	
European/Pakeha v	289.85	12567.0*
Asian	215.03	
Maori v	122.25	5355.0*
Pasifika	105.00	
Maori v	113.54	3775.0*
Asian	89.43	
Pasifika v	83.30	2898.0
Asian	76.90	

*$p < .05$