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Perceptions of Water Competencies, Drowning Risk and Aquatic Participation among Older Adults

Teresa Stanley

Drowning Prevention Auckland and University of Auckland, teresa.stanley@dpanz.org.nz

Kevin Moran

University of Auckland and Drowning Prevention Auckland, k.moran@auckland.ac.nz

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Abstract

New Zealand has an aging population and, despite falling drowning tolls in all other age groups (WSNZ, 2019c), older adults have continued to drown in both increasing numbers and proportion. The reasons for this are not well understood since very little drowning research has focused on older people. A water safety survey ($N = 389$) seeking information on older adults' aquatic recreational practices and perceptions of safety was conducted at the end of the summer season, 2019. Most adults (86%, $n = 335$) reported some aquatic activity in the previous year, but those aged 65+ years (66%) were significantly less likely than younger age groups to engage in aquatic recreation. Respondents aged 65+ years were less likely (74%) to perceive they could swim more than five minutes non-stop. We discuss the implications of lower perceived swimming and floating competence and less frequent participation in aquatic activities on risk of drowning.

Keywords: water safety, drowning prevention, older adults, aquatic recreation, perceived and real water competencies

Introduction

In recent years, an increased incidence of drowning among older adults has been reported in many high-income countries (Peden et al., 2019; Hu & Baker, 2010; Michalaki et al., 2015). It is unknown if this is a consequence of any or all of the following factors: increased numbers of older adults (i.e., baby boomers); greater disposable income and leisure time resulting in increased exposure to drowning risk; changing health and medical conditions among older adults; greater length of time since undertaking any water safety education or skill development; over-estimation of competence, and/or underestimation of risk.

Aging populations are an increasing proportion of the whole population in many high-income countries. The population group aged over 65 years is projected to double the under-five year age group by 2050 (World Health Organisation, 2011), and, in New Zealand, increase to one quarter of the total population by 2050 (Ministry of Health, 2019; Wilson, 2018). While some research shows the impact of the aging population in the workforce (for example, Flower, et al., 2019), its impact on recreation has not been well investigated. Physical recreation is reasonably steady throughout adulthood before dropping off at 65 years (Sport England, 2019; Sport Australia, 2019). Recreational participation in, on, and around water remains popular for all ages, with swimming, fishing, kayaking, and boating the most popular aquatic activities (Sport New Zealand, 2015; Sport Australia, 2019; Sport England, 2019; Brown et al., 2013).

In New Zealand, swimming is the second most popular activity for all ages (Sport New Zealand, 2015; Sport New Zealand, 2018), and the most popular aquatic activity with almost one third (30%) of New Zealand adults

having swum in the previous 12 months (WSNZ, 2018a). One fifth (20%) participated in fishing, and almost a tenth (8%) in canoeing/kayaking. In addition, almost one half (42%) of adult New Zealanders either own or spend time on a recreational boat (Griffiths et al., 2018). Most aquatic activity (40%) occurred at a beach or by the sea and more than one quarter (29%) in or on the sea (Sport New Zealand, 2015). Fishing increased in popularity from 25 to 64 years, but swimming declined in popularity as people aged, whereas canoeing/kayaking rose in popularity during the ages 35–49 years.

Overall drowning rates have decreased in many high-income countries. Drowning has been increasing for older adults in countries such as Australia (Peden et al., 2018), the United States (Hu & Baker, 2010), Canada (Drowning Prevention Research Centre Canada, 2018), and the UK (National Water Safety Forum, 2018) despite reported aquatic recreation declining with age. In the ten years prior to and including 2014, more than one third of fatal drownings in Australia, Canada, and New Zealand were adults aged over 65 years (Peden et al., 2019).

In New Zealand for the five years up to and including 2018, the oldest adult age group (65+ years) was the second highest age group in drowning fatalities (16% of all drowning), surpassed only by the youth age group (15-24 years at 19%) (WSNZ, 2019a, 2019c). Furthermore, the 65+ age group saw the highest number of hospitalizations as a consequence of non-fatal drowning ever with an increase of 18% from 2017 and 37% on the 2013-2017 average (WSNZ, 2019c). As was the case for drowning fatalities of all ages, older male adults were more likely to drown than older females (WSNZ, 2018b). Males were more likely to drown in the ocean and from boating incidents when compared to females, and females were more likely to drown while bathing, in swimming pools, and due to unintentional immersion (WSNZ, 2018b).

Some evidence suggested an association between alcohol consumption and medical conditions with drowning among older adults. An Australian study covering 15 years from 2003 to June 2017 and 803 unintentional drowning deaths of 65+ years (Pearn et al., 2019) reported that although less than a quarter of older Australians who drowned after consuming alcohol, most (74%) were aged 65–74 years (Pearn et al., 2019), highlighting concern around the implication of the effect of alcohol on those taking prescribed medications. In New Zealand, alcohol was a factor in 16% of New Zealand drownings among those aged over 50 years (WSNZ, 2018b).

Medical conditions are likely to be linked to aging, and two thirds (64%) of older Australians who drowned in the 15 years to 2017 had a known pre-existing medical condition, and for another third (31%) it was unknown rather than not present (Pearn et al., 2019). Those with medical conditions were twice as likely to have been on some form of medication when they drowned

compared to those without pre-existing medical conditions. They were also more likely to have been affected by the medication, and more likely to have drowned from falling and while swimming or recreating (Peden et al., 2019; Mahony et al., 2017). In New Zealand, medical issues were considered a contributing factor in over one quarter (27%) of all drowning victims aged 50+ years from 2008–2017 (WSNZ, 2018b), almost three-quarters (72%) related to a cardiac event or heart disease. In 2018, two thirds (65%) of the 65+ year drownings were from accidentally being immersed in water (WSNZ, 2019c).

Little is known about what older adults know, think, and do to keep safe in, on, and around water during their aquatic recreation. Participants in a *Boating Participation* study reported safer attitudes and behaviors with increasing years (Griffiths et al., 2018). Awareness of safety messages or activities was higher for those aged 65+ years when compared with all ages (45% vs. 41%), and those aged 35-44 years were less likely to recall safety messages. Safety behavior was also more likely to improve with increased age for carrying lifejackets (87%), carrying a cell phone in a waterproof bag (55%), and carrying flares (27%) on board (Maritime New Zealand, 2018).

Females were consistently reported as being more risk averse, and males more confident in the water (Howland et al., 1996; Gulliver & Begg, 2005; Moran 2003; Moran & Stanley, 2013; Stanley & Moran, 2017); however, little is known about perceptions of drowning risk among older age groups. One study has reported that younger adults were less likely than older adults to agree that injuries in or on the water were preventable, and that they could personally do anything to improve their safety (Titchener et al., 2011). The WSNZ *Attitudes and Behaviour* research (WSNZ, 2018a) reports most age groups perceive other age groups to be at greater risk of drowning than themselves. Those aged over 65 years were most likely to perceive those aged 15-24 years at the highest risk of drowning, rather than acknowledging their own elevated risk (WSNZ, 2019b).

Previous studies focussing on adult assessment of personal water competency reported that although most adults perceived they could swim well, male parents were twice as likely as females to estimate they could swim more than 200m and were more likely to feel safe when swimming in open water (Stanley & Moran, 2017), and more male adults than females were confident of their ability to rescue (Stanley & Moran, 2018).

The aims of this study were to determine the nature and extent of aquatic recreation among older New Zealanders, explore their perceptions of their practical water competency, and their understanding and practice of water safety when engaged in aquatic recreation.

Method

Participants

Adult customers visiting six large DIY stores in Waikato and Auckland or attending the 2019 Auckland Boat Show were asked to complete an anonymous electronic survey about their aquatic recreation, perceptions of their water competencies, and risk of drowning. Participants were provided with a Participant Information Sheet (PIS) and were asked to give informed, verbal consent before voluntarily taking part in the survey. A total of 389 adults completed the survey, 172 at four city stores, 64 at two regional stores and 152 at the Auckland Boat Show. The research was granted ethical approval by The University of Auckland Human Participants Ethics Committee (UAHPEC) (Reference number 016725). Participants were invited to enter a draw for a NZ\$1000 voucher as appreciation of completion of the survey.

Survey Instrument

The questionnaire, designed to be completed in 5-10 minutes, consisted of 27 closed-ended and two open-ended questions based on previously validated studies (Moran, 2003, 2006, 2008; McCool et al., 2009; Moran & Stanley, 2013; Stanley & Moran, 2018).

The first six questions assessed socio-demographic characteristics including gender, age group (*20-44 years, 45-64 years, 65+ years*), self-identified ethnicity (*New Zealand European, Maori, Pasifika, Asian, Indian, and "other" ethnic groups*), length of residency (*<1 year, 1-4 years, 5-9 years, >10 years*), state of employment (*employed, unemployed, retired*), and whether or not they had a known medical condition that precluded participation in aquatic recreation. Participants were asked four questions to determine their participation in aquatic recreation. The first question asked whether or not they had participated in any recreation around water in the past year, the second asked what type of recreation they had engaged in (*for example, swimming in a pool, swimming in open water, surfing, stand up paddling (SUP), or canoe/kayak paddling, boating, fishing or "other"*). Two further questions sought information on how often they participated in aquatic activity during the summer months (*never, monthly, weekly, daily*), and whether or not it had increased recently, and if so, why.

Seven questions sought information on self-estimated swimming and floating competencies by asking participants whether they could swim or float, and, if so, how they would rate their swimming and floating competency using four response categories (*poor, fair, good, very good*), and how far and how long they estimated could swim non-stop or float without moving and without flotation aids (Moran, 2003; Stanley & Moran, 2018). In addition, information was sought on when they had last swam the distance (*last month, last year, last 5 years, last 10 years*), how easily they thought they could swim the distance estimated, or float the estimated time, in open water (*very easily, easily, with difficulty, with great difficulty*), if they swam for fitness (*never, occasionally,*

often, very often), and how often they had swum in open water during summer months (*daily, weekly, about once a month, less than once a month, never*).

To determine water safety attitudes, participants were asked a series of seven statements with *agree or disagree* response options (Moran, 2008, McCool et al., 2009). Perception of the risk of drowning was determined using a series of five scenarios (for example, being caught in a rip current at a surf beach) with a four-point response scale (*extreme risk, high risk, slight risk, no risk*) (Moran, 2008, Moran et al., 2012). Participants were asked about their confidence in open water on a four-point response scale (*very anxious, anxious, confident, very confident*).

The survey was uploaded onto Survey Gizmo, and was completed by participants on tablets, either self-completed by the individual, or led orally by the researcher, depending on the preference of the participant.

Data Analysis

All data were downloaded onto SPSS Statistics Version 25 (Armonk, NY, USA) for statistical analysis. Frequency and percentages were created to report categorical variables such as demographic data and perceptions of competence and risk. Chi-square of independence tests were used to determine the association between dependent variables (such as perceived swimming or floating competency) and independent variables (such as gender, age, and ethnicity). Where multiple responses were included (for example, swimming and floating competency), results were dichotomized for ease of interpretation with *poor* and *fair* grouped as *poor/fair*, and *good* and *very good* grouped as *good/very good*.

Previous studies have varied in their chronological definition of older and younger age groups (Pearn et al., 2019; Lee et al., 2019; Peden et al., 2018; Hu & Baker, 2010). For ease of testing statistical significance, this study identified younger adults as those aged less than 65 years and older adults as those aged 65 years and older.

Results

A total of 389 adults participated in the survey. Over one half (55%, $n = 213$) were male (female 45%, $n = 176$). Almost all participants (90%, $n = 351$) had lived in New Zealand for 10 years, very few (1%, $n = 4$) had lived in New Zealand for less than one year. Three-quarters (77%, $n = 300$) identified as European New Zealander, 7% ($n = 27$) as Maori, 4% ($n = 15$) as Indian, 3% ($n = 12$) as Pasifika, 3% ($n = 11$) as Asian, and 6% ($n = 24$) as “other”. In comparison with national demographics, females were slightly underrepresented and European New Zealanders overrepresented (females 51%; New Zealand European 70%) (Statistics New Zealand, 2020). Participants were categorized into three age brackets: 20–44 years 39% ($n = 153$), 45–64 years 43% ($n = 166$), and over 65 years 18% ($n = 70$). The mid-point of each

age bracket was used to determine a mean age of 49.55 years ($SD = 15.84$). Most participants (94%, $n = 366$) reported no known medical conditions that limited their aquatic participation, with no significant differences in medical conditions by age (20–44 years 95%, $n = 146$; 45–64 years 94%, $n = 156$; 65+ years 91%, $n = 64$). Most participants were employed, either full or part-time, (81%, $n = 313$), a small proportion were unemployed (6%, $n = 22$), and the remainder were retired (14%, $n = 54$). Over half (60%, $n = 42$) of retirees were aged over 65 years.

Aquatic Participation

When aquatic participation was analyzed by age, an expected decline in participation by older age groups was evident. Fewer participants aged over 65 years participated in aquatic recreation and were less likely to have swum in a pool, been boating, or fishing (Table 1). Adults 65+ years were also less likely than the two younger age groups to have increased their aquatic participation recently, most likely to report they seldom or never participated in summer aquatic activity or swam at beaches during the summer months, and more likely to report that they had last swam more than one year ago.

When age was dichotomised (<65 years and ≥ 65 years), significant differences in participation in aquatic recreation were found. Those aged 65 years and older were less likely to have taken part in aquatic recreation in the past 12 months (65+ years, 66%, $n = 46$; <65 years, 91%, $n = 289$) ($\chi^2 (1) = 29.727$, $p \leq 0.001$) or to have swum in a pool (65+ years, 49%, $n = 265$; <65 years, 67%, $n = 205$) ($\chi^2 (1) = 6.503$, $p = 0.011$). Although not statistically significant, descriptively fewer had been boating in the previous 12 months (65+ years, 57%, $n = 30$; <65 years, 70%, $n = 212$) ($\chi^2 (1) = 3.433$, $p = 0.064$). They were also more likely to report seldom or never having swum at a beach during summer months (65+ years, 43%, $n = 30$; <65 years, 27%, $n = 85$) ($\chi^2 (2) = 24.482$, $p \leq 0.001$) and more likely than younger adults ($\chi^2 (2) = 29.701$, $p \leq 0.001$) to report they last swam more than one year ago (65+ years, 71%, $n = 50$, <65 years 36%, $n = 115$).

Perceived Competence

Perceived swimming and floating competence varied considerably throughout adulthood (Table 2). Adults in the two younger age groups were more likely to report that they were *good/very good* swimmers. Respondents aged 65+ years were more likely to estimate that they could swim less than five minutes non-stop when compared with younger adult age groups (30% vs 20% and 22% respectively), and less likely to report they could float for more than one hour (17% vs 28% and 36% respectively).

Table 1
Aquatic Participation by Age

	20-44 Years		45-64 Years		65+ Years		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Aquatic participation in past 12 months								
Yes	137	89.5%	152	91.6%	46	65.7%	335	86.1%
No	16	10.5%	14	8.4%	24	34.3%	54	13.9%
What activity?								
Swimming in a pool	106	69.3%	99	59.6%	26	37.1%	231	59.4%
Swimming in open water	110	71.9%	114	68.7%	38	54.3%	262	67.4%
Boating	111	72.5%	101	60.8%	30	42.9%	242	62.2%
Fishing	105	68.6%	89	53.6%	30	42.9%	224	57.6%
Summer aquatic participation frequency								
Seldom/never	38	24.8%	47	28.3%	40	57.2%	125	32.1%
Occasionally (once per month)	65	42.5%	84	50.6%	18	25.7%	167	42.9%
Often (daily/weekly)	50	32.7%	35	21.1%	12	17.1%	97	24.9%
Summer beach swimming frequency								
Seldom/never	50	32.7%	72	43.4%	45	64.3%	167	42.9%
Occasionally (once per month)	46	30.1%	51	30.7%	10	14.3%	107	27.5%
Often (daily/weekly)	57	37.3%	43	25.9%	15	21.4%	115	29.6%
Has aquatic participation increased?								
Yes	78	51.0%	80	48.2%	20	28.6%	178	45.8%
No	75	49.0%	86	51.8%	50	71.4%	211	54.2%

Table 2
Self-Estimated Swimming and Floating Competency in Open Water by Age

	20-44 Years		45-64 Years		65+ Years		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Estimated swimming competency								
Good/Very good	111	72.5%	109	65.7%	32	45.7%	252	64.8%
Poor/Fair/Cannot swim	42	27.5%	57	34.3%	38	54.3%	137	35.2%
Estimated non-stop swim time								
Less than 5 minutes	31	20.3%	37	22.3%	21	30.0%	89	22.9%
5 minutes to 1 hour	83	54.2%	100	60.2%	45	64.3%	228	58.6%
More than 1 hour	39	25.5%	29	17.5%	4	5.7%	72	18.5%
Estimated swimming distance								
200 m or less	57	62.6%	67	67.0%	24	66.7%	158	65.0%
More than 200 m	40	37.3%	33	33.0%	12	33.3%	85	35.0%
Swum distance in open water								
In open water	103	67.3%	110	66.3%	36	51.4%	249	64.0%
Not in open water	50	32.7%	56	33.7%	34	48.6%	140	36.0%
Swimming competence to keep safe in open water								
Agree	112	73.2%	110	66.3%	43	61.4%	265	68.1%
Disagree	41	26.8%	56	33.7%	27	38.6%	124	31.9%
Estimated non-stop float time								
Less than 5 minutes	48	31.4%	30	18.1%	21	30.0%	99	25.4%
5 minutes to 1 hour	63	41.2%	77	46.4%	37	52.9%	117	30.1%
More than 1 hour	42	27.5%	59	35.5%	12	17.1%	113	29.0%
Floating confidence in open water								

Easily/ Very easily	74	48.4%	89	53.6%	25	35.7%	118	48.3%
With difficulty/ With great difficulty / Could not float	79	51.6%	77	46.4%	45	64.3%	201	51.7%
Safety confidence in open water	57	37.3%	57	34.3%	36	51.4%	150	38.6%
Anxious/Very anxious Confident/Very confident	96	62.7%	109	65.7%	34	48.6%	239	61.4%

Table 3*Perception of Risk of Drowning by Age*

	Extreme / High Risk			Slight / No Risk		
	20-44	45-64	65+	20-44	45-64	65+
	Years <i>n</i> (%)					
Swept off isolated rocks by a wave while fishing	128 (83.7%)	146 (88.0%)	67 (95.7%)	25 (16.3%)	20 (12.0%)	3 (4.3%)
Caught in a rip current at a surf beach	97 (63.4%)	123 (74.1%)	50 (71.4%)	56 (36.6%)	43 (25.9%)	20 (28.6%)
Engine failure in a dinghy 100m from the shore	48 (31.4%)	44 (26.5%)	20 (28.6%)	105 (68.6%)	122 (73.5%)	50 (71.4%)
Fell into deep water fully clothed while walking along a riverbank	79 (51.6%)	87 (52.4%)	34 (48.6%)	74 (48.4%)	79 (47.6%)	36 (51.4%)
Assisting a person in trouble in deep water at a swimming pool	66 (43.1%)	54 (32.5%)	25 (35.7%)	87 (56.9%)	112 (67.5%)	45 (64.3%)

Table 4*Water Safety Attitudes by Age*

		20-44 Years		45-64 Years		65+ Years		Total	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
The risk of drowning is always in the back of my mind when swimming in open water	Agree	113	73.9%	135	81.3%	52	74.3%	300	77.1%
	Disagree	40	26.1%	31	18.7%	18	25.7%	89	22.9%
My swimming competence means I don't need to wear a lifejacket in a boat	Agree	27	17.6%	13	7.8%	6	8.6%	46	11.8%
	Disagree	126	82.4%	153	92.2%	64	91.4%	343	88.2%
I often feel at risk swimming when conditions are rough	Agree	112	73.2%	126	75.9%	57	81.4%	295	75.8%
	Disagree	41	26.8%	40	24.1%	13	18.6%	94	24.2%
My swimming competence means I am capable of rescuing others in open water	Agree	86	73.2%	76	45.8%	31	44.3%	193	49.6%
	Disagree	67	26.8%	90	54.2%	39	55.7%	196	50.4%
My current swimming fitness will ensure my safety in open water	Agree	93	60.8%	84	50.6%	29	41.4%	206	53.0%
	Disagree	60	39.2%	82	49.4%	41	58.6%	183	47.0%
Others are at greater risk than me when swimming in open water	Agree	106	69.3%	101	60.8%	46	65.7%	253	65.0%
	Disagree	47	30.7%	65	39.2%	24	34.3%	136	35.0%

Adults in the 65+ year age group were less confident than the younger age groups about their safety in open water (51% vs 37% and 34% respectively). The older age group were also less confident about their ability to float in open water compared to younger adults (64% vs 52% and 46% respectively) and were less likely to have swum their estimated swimming distance in open water (51% vs 67% and 66% respectively).

Analysis of perceived competence by dichotomized age groups (<65 years and ≥ 65 years) showed significant differences. Significantly more adults aged younger than 65 years (70%, $n = 220$ vs 46%, $n = 32$) rated themselves as *good/very good* swimmers ($\chi^2 (1) = 11.629, p = 0.001$) and self-estimated longer floating competency (68%, $n = 163$ vs 52%, $n = 25$) appraising themselves as being able to float *very easily/easily* ($\chi^2 (1) = 4.424, p = 0.035$). Significantly fewer older adults (6%, $n = 4$ vs 22%, $n = 68$) estimated that they could swim more than one hour non-stop ($\chi^2 (2) = 8.732, p = 0.013$) or float for more than one hour (19%, $n = 12$ vs 36%, $n = 101$) ($\chi^2 (1) = 7.156, p = 0.028$). Furthermore, adults in the older age group were significantly less confident about their safety in open water (49%, $n = 34$ vs 64%, $n = 204$) ($\chi^2 (1) = 5.966, p = 0.015$).

Risk Perceptions

The oldest age group (65+ years) estimated a higher risk of drowning than the younger age groups (20-44 years and 45-64 years) if they were swept off isolated rocks while fishing (96% compared with 84% and 88% respectively). More adults in the two older age groups expressed greater risk of drowning if caught in a rip current (74% and 71% compared with 63% for the youngest age group). The other three risk scenarios (engine failure in a dinghy, falling in when clothed, and assisting a person in trouble) did not elicit differences in risk perception between younger and older participants.

The older age group (≥ 65 years) reported significantly higher risk estimation in only one of the five scenarios, that of being swept off isolated rocks while fishing ($\chi^2 (1) = 5.118, p = 0.024$) (<65 years, 86%, $n = 274$; 65+ years, 96%, $n = 67$). No statistical differences were evident for the other four risk perceptions.

Attitudes

When questioned on beliefs about their water safety, a range of attitudes, both safe and unsafe, were evident (Table 4). Most reported a heightened awareness of the risk of drowning associated with open water (74-81%) and increased risk in rough water (73-81%), but most considered others were at greater risk than themselves (66-69%). Table 4 also shows that the oldest age group reported more risk averse attitudes than the two younger age groups. They were less confident of the protective value of their swimming fitness (41% compared with 61% and 51% respectively), their rescue competency (44% compared with 73%

and 46% respectively), and greater risk awareness in rough water (81% compared with 73% and 76% respectively).

Significant differences were evident in only one attitude when analyzed by the dichotomised age groups. Older adults (65+ years) were less likely to have confidence in their swimming fitness to keep them safe ($\chi^2(1) = 4.553, p = 0.033$) (<65 years, 56%, $n = 177$; 65+ years, 41%, $n = 29$). No significant differences were found for any of the other six questions on attitude.

Discussion

This study reported on the influence of aging on participation in aquatic recreation and how perceptions of self-competence and the risk of drowning shaped their safety in, on, and around water. Inherent in the risk of drowning is the extent of exposure to that risk. Adults in this study reported similarly high levels of aquatic activity to findings of other New Zealand and overseas studies (Sport New Zealand, 2015; Sport New Zealand, 2018; Sport Australia, 2019; Sport England, 2019), and, as with active recreation in other countries (Sport England, 2019; Sport Australia, 2019), participation dropped off significantly in older age groups. Increased drowning numbers among older adults is not likely due to increased exposure to risk, so reasons for increased rates of drowning must lie elsewhere.

In addition to the lower frequency, participation in aquatic recreation was also less recent for older adults. Adults over 65 years were more likely to have last swum more than one year ago and unlikely to swim in pools or at beaches in the summer months which suggested that their capacity to accurately assess their current practical water competencies might be compromised. The lower frequency of participation and increased time between aquatic activity suggested a possible disparity between how older adults perceive their water competence, and their actual competence to cope with drowning risk. Accurate assessment of physical water competencies requires regular and current in-water practise of all practical water competencies if they are to provide some protection against the risks associated with aquatic recreation, especially in and around open water settings. Further research on perceived versus actual water competence for older adults is recommended.

Although most adults reported high perceived competency levels of swimming and floating similar to levels of adults in other studies (Stanley & Moran, 2017; Stanley & Moran, 2018), estimated levels of swimming and floating competency are significantly lower for older adults. Reliance on perceived competence in the prevention of drowning is a concern if perception does not match reality. Adults who may not have ever swum or floated for prolonged periods in deep, open water where most drownings occur, may not be able to accurately assess competence. Older adults who have less confidence

in their water competence may be protected from drowning if it results in safer behaviors.

Many older adult drownings occur, however, after accidental immersions where people may not have expected, or planned, to enter the water (WSNZ, 2018b). Floating, swimming, and other practical water competencies are required in the prevention of drowning (Stallman et al., 2017; Langendorfer et al., 2018). To prepare for unexpected entry into water, periodic in-water practice and testing of these competencies is recommended for older adults to ensure an accurate assessment of personal competency both in the pool and open water settings.

Surprisingly few participants in this study reported any known existing medical conditions that would potentially limit aquatic participation, and there were no significant increases reported within older age groups. Pre-existing medical conditions have shown to contribute considerably to older adult drowning internationally (Pearn et al., 2019; Lee et al., 2019), and New Zealand (WSNZ, 2018b). It is possible that participants in this study could be unaware of underlying medical conditions that may increase drowning risk, and it is recommended that older adults especially have regular health checks before partaking in aquatic recreation.

Older adults in this study did not report any significant heightened awareness of the risk of drowning than younger age groups. Previous studies reported younger adults as less likely to improve their safety because of an enhanced sensitivity to the risk of drowning (Titchener et al., 2011), while those aged over 65 years were least likely to acknowledge their own elevated drowning risk (WSNZ, 2018a). It was anticipated that older adults would report greater perception of personal risk than was apparent in this study so further investigation is required to determine whether increasing age results in enhanced risk awareness, or whether other factors, such as a perceived wealth of experience, create potentially dangerous misconceptions of risk perception. The low levels of risk perception among older adults in this study is unlikely to offer protection from drowning as reported in previous studies (Moran, et al., 2018).

In addition to the lack of significantly higher risk perception, older adults (65 years and over) in this study did not report safer attitudes about drowning risks in open water and in rough conditions, contradicting previous boating participation studies (Griffiths et al., 2018; Maritime New Zealand, 2018). Unsafe attitudes such as rescuing others, believing swimming competence was good enough not to wear a lifejacket on a boat, or thinking others are at greater risk were prevalent in all age groups including those over 65 years. These attitudes are unlikely to precipitate risk averse, safer behaviors that could prevent drowning (Moran et al., 2018).

Limitations

Results from this study provide new understanding about why older adults in New Zealand are at greater risk of drowning and why drowning statistics among older adults has increased. The results of this study should be treated with some caution in light of several methodological limitations. First, the data were obtained from a convenience sample of adult members of the public visiting selected DIY stores in Auckland and Waikato, and the Auckland Boat Show, identified because of their likely high older adult inclusion. Consequently, the sample population varied from the national population demographics with more NZ Europeans taking part in the study. In addition, participants at the Boat Show are likely to have more interest and participation in aquatic recreation which may not be reflective of the general population. Third, although often used in water safety research, self-reporting of swimming competence may not accurately report actual competence and can result in measurement error (Robertson, 1992; Mickalide, 1997; Watson et al., 2003). Finally, swimming and floating competencies were the only physical water competencies included in the study, and although risk perception and personal assessment of water competency was included, it is recommended further older adult studies consider the inclusion of other water competencies, both physical and cognitive (Stallman et al., 2017; Langendorfer et al., 2018).

Conclusion

This research study on New Zealand's older adults identified the nature and extent of their aquatic recreation participation, their perceptions of their own practical water competency, and their understanding and practice of water safety when engaged in aquatic recreation. The study's finding of lower exposure to risk attributable to lesser frequency and levels of participation of aquatic recreation when compared with adults of all ages does not readily explain their increased incidence of drowning in recent years.

Other findings that may have some explanatory power in relation to increased drowning among the aged population are a continuing lack of water safety practice even though aquatic activity is reduced; entrenched unsafe attitudes toward open water participation; an underestimation of the risks inherent in aquatic activity, and an overly optimistic perception of their capacity to cope with that risk. Further research involving practical assessment of older adults' actual and perceived water competencies and enquiry around risks and attitudes is recommended. To address these potentially life-threatening issues, targeted water safety programmes for older adults would benefit from risk and competency assessment activities preferably associated with simulated practical experiences. Further exacerbating the risk of drowning, older adults in the study rarely reported underlying medical conditions that might curtail their aquatic activity. It is recommended that regular health checks be a necessary precaution for the older person, especially prior to occasional seasonal aquatic recreation.

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