

**UNDER THE INFLUENCE. IDENTIFYING
DETERMINANTS OF YOUNG ADULTS'
INVOLVEMENT IN ALCOHOL-INFLUENCED
AQUATIC ACTIVITY TO IMPROVE
DROWNING PREVENTION EFFORTS**

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Abstract

BACKGROUND: Young adults are an at-risk group for experiencing an alcohol-related drowning incident. Investigations and drowning prevention efforts have aimed to address young adults' prevalence in alcohol-related drownings and contribute to understanding their level of risk. Some explanations have concluded young adults' need for autonomy and independence coincides with their exposure to alcohol and social norm pressures. However, gaps in knowledge remain, specifically young adults': behaviours, knowledge and attitudes towards alcohol-influenced aquatic activity and the associated risks; and, their awareness and perceptions of alcohol-themed drowning prevention campaigns. **METHODS:** This PhD, completed with publications, aimed to address these gaps through four interlinked projects: (i) a systematic review of alcohol education programs to determine evidence-based quality criteria necessary for inclusion in programs to successfully change young adults' alcohol-related behaviours, knowledge and attitudes; (ii) a program audit of alcohol-themed drowning prevention campaigns to establish current prevention efforts in high-income countries and areas for improvement; (iii) a survey among young adults from Australia and the United Kingdom to establish their knowledge, attitudes and predictors of intentions and involvement in alcohol-influenced aquatic activities; and, (iv) interviews to deepen understanding of young adults' knowledge, attitudes and behaviours relating to alcohol-influenced aquatic activity, their awareness of alcohol-themed drowning prevention campaigns and their suggestions for improvement. Six publications resulted from this research. **RESULTS:** Friends influenced frequency of young adults' involvement in alcohol-influenced aquatic activity, but involvement was dependent on the characteristics of the peer group, self-

confidence and risk disassociation. Attitudes were neutral towards alcohol-influenced aquatic activity, but when participants perceived personal control over the risks it was deemed more acceptable. Alcohol-related safety strategies from other contexts (e.g., driving) were applied to aquatic settings, but specific water safety knowledge/education was low. Stronger swimmers, Australian young adults and those who had received alcohol-specific water safety education displayed more knowledge of alcohol and its effects in aquatic contexts. Participants lacked awareness of alcohol-themed drowning prevention campaigns, and used campaign logos and names to interpret key messages. Little information was available on the alcohol-themed drowning prevention campaigns identified in the program audit and only two had evidence of evaluation, limiting progress of future prevention efforts. Ten quality criteria identified from evidence-based literature were considered to be necessary for inclusion in alcohol education programs. Programs included in the systematic review which incorporated these criteria were more likely to report success in influencing behaviour changes among the participants.

CONCLUSIONS: To decrease the incidence of alcohol-related drowning among young adults, the findings of the projects included within this thesis result in the following recommendations. For enhanced likelihood of successful outcomes, alcohol-themed drowning prevention campaigns should align campaign design, implementation and evaluation with best-practice literature. The identified influencers on young adults' involvement in alcohol-influenced aquatic activity, such as their peers, should be incorporated into prevention efforts and appropriate information provided to encourage informed decision making. Alcohol education programs (e.g., drink driving education) should include information about alcohol use in aquatic settings to clarify the risks associated with transferring safety strategies between drinking contexts, and appropriate information should be provided about alcohol consumption in aquatic settings.

Acknowledgements

This PhD is the result of 15 years' experience in working, researching, volunteering and/or competing within the lifesaving and drowning prevention field. Such experience has enabled me to meet many inspirational people who have nurtured my interest in this topic and supported me to create a thesis over the last few years that I am proud of, and which I truly hope will benefit the drowning prevention community.

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And finally, to all those who have asked if I have finished my PhD. To them, and myself, I say:

I’ve done it!

Statement of Authorship

I, Hannah Louise Mitchell Calverley, certify that all components of this research project are works entirely of my own effort, except where otherwise acknowledged. I also certify that this research is original work and contains no material that has been published elsewhere unless explicitly stated nor been previously submitted for any other award.

This PhD research was conducted under the supervision of Dr Lauren A. Petrass and Associate Professor Jennifer D. Blitvich.

..... 07/12/2020

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Dr Lauren A. Petrass (Principal Supervisor)

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Thesis Publications

This PhD was completed by publication, and outcomes from this research include three accepted/published peer-reviewed journal articles. A further three submitted manuscripts are currently under review. The most recent versions of the publications are presented in this thesis. For consistency with page numbers, spelling, referencing and presentation style in this thesis, all publications are presented in the same format and, where copyright permissions allow, published versions in the corresponding journal style are provided in the stated Appendix. The publication details are as follows:

Publication 1: Systematic Review

Publication Status: Published February 2021.

Reference: Calverley, H. L. M., Petrass, L. A., & Blitvich, J. D. (2021). A systematic review of alcohol education programs for young people: Do these programs change behaviour? *Health Education Research*, 36(1), 87-99.

<https://doi.org/10.1093/her/cyaa049>.

Publication 2: Program Audit

Publication Status: Published March 2020.

Reference: Calverley, H., Petrass, L., & Blitvich, J. (2020). Alcohol-focused drowning prevention campaigns: What do we know and what should we do now? *International Journal of Aquatic Research and Education*, 2(2). <https://doi.org/10.25035/ijare.12.02.07>.

Publication 3: Mixed Methods

Publication Status: Published October 2020.

Reference: Calverley, H. L. M., Petrass, L. A., & Blitvich, J. D. (2020). Alcohol consumption in aquatic settings: A mixed-method study exploring young adults' attitudes and knowledge. *Drugs: Education, Prevention and Policy*.

<https://doi.org/10.1080/09687637.2020.1832962>.

Publication 4: Survey

Publication Status: Submitted to International Journal of Aquatic Research and Education November 2020. Currently under review.

Title: Predicting young adults' intentions and involvement in alcohol-influenced aquatic activity.

Publication 5: Interviews

Publication Status: Published in Early View December 2020.

Reference: Calverley, H. L. M., Petrass, L. A., & Blitvich, J. D. (2020). "They don't think it will ever happen to them": Exploring factors affecting participation in alcohol-influenced aquatic activity among young Australian adults. *Health Promotion Journal of Australia*. <https://doi.org/10.1002/hpja.451>.

Publication 6: Interviews

Publication Status: Published in Early View December 2020.

Reference: Calverley, H. L. M., Petrass, L. A., & Blitvich, J. D. (2020). Respecting alcohol, respecting the water: Young adult perspectives on how to reduce alcohol-influenced drownings in Australia. *Health Promotion Journal of Australia*. <https://doi.org/10.1002/hpja.449>.

Statement of Ethics

Approval

Full ethical approval was granted from the Human Research Ethics Committee at Federation University Australia for the two projects within this PhD which required ethical approval. Details of this approval are as follows:

Survey

Approval Number: B18-049

Approval documents: Provided in Appendix F

Interviews

Approval Number: B19-027

Approval documents: Provided in Appendix J

Abbreviations

Abbreviation	Term
AUD	Australian Dollar
ATSI	Aboriginal and Torres Strait Islander
BAC	Blood Alcohol Concentration
CINAHL	Cumulative Index of Nursing and Allied Health Literature
HIC(s)	High Income Country(ies)
HIV	Human Immunodeficiency Virus
ITT	Intention-to-Treat
LMIC(s)	Low- and Middle-Income Country(ies)
Mdn	Median
NA	Not Applicable
PBC	Perceived Behavioural Control
PhD	Doctor of Philosophy
PM	Post-Mortem
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RLSSA/UK	Royal Life Saving Society Australia/ United Kingdom
RNLI	Royal National Lifeboat Institute
RoSPA	Royal Society for the Prevention of Accidents
RTP	Research Training Program
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
TPB	Theory of Planned Behaviour
TRIPP	Translating Research into Injury Prevention Practice
TV	Television
UK	United Kingdom
USA	United States of America
WHO	World Health Organization

CHAPTER ONE

Introduction

The World Health Organization (WHO) has identified drowning as a global health issue, with approximately 372,000 people drowning worldwide each year (WHO, 2014a). Those under 25 years old account for over half of all drowning deaths (WHO, 2014a). More specifically, drowning is a top 10 cause of death for this age group in every region of the world, and a top five cause of death in high-income countries (HICs). These data highlight the importance of the implementation of interventions designed to prevent drowning among adolescents and young adults.

Worldwide, alcohol has been identified as a risk factor for drowning amongst several age groups over 15 years old, with particular emphasis on young adults aged 15-24 years (Clemens et al., 2016; Howland et al., 1998; Moran, 2011; Sinkinson, 2014; Watt et al., 2012). High blood alcohol concentrations (BAC; referring to the amount of alcohol within the blood, e.g., 0.05% BAC indicates 0.05 grams of alcohol per 100 millilitres of blood) in drowning victims have been recorded frequently, with alcohol identified in 30-70% of all drowning deaths globally (Driscoll et al., 2004b; Quan, 2014b; Vincenten & Gerdmongkolgan, 2014). Consequently, researchers and drowning prevention practitioners, particularly in HICs, have called for an increased emphasis on interventions designed to reduce the consumption of alcohol in aquatic environments (Ahlm et al., 2013; Australian Water Safety Council, 2016; Peden et al., 2017; Royal Life Saving Society - Australia [RLSSA], 2020; The National Water Safety Forum Strategy Working Group, 2015).

The physical effects of alcohol that exacerbate the risk of drowning include: impairment of the central nervous system which impacts on coordination and vision; increased heat loss leading to hypothermia; and, decreased cognitive processing which may lead to exposure to risky situations (Driscoll et al., 2003; Peden et al., 2017; Plueckhahn, 1984; Wintemute et al., 1990). Whilst the physical effects of alcohol and how these translate to aquatic environments are well documented, human behavioural factors such as attitudes, behaviours and influencers relating to alcohol consumption in aquatic settings remain unknown.

Systematic reviews and analyses of coroner's reports and drowning statistics make up the majority of research within this area (e.g., Ahlm et al., 2013; Hamilton et al., 2018; Peden et al., 2017; Warner et al., 2000), reporting the risk factors associated with alcohol use in aquatic settings based predominantly on numerical information (e.g., Gulliver & Begg, 2005; Howland et al., 1990). Some experimental studies have investigated young adults' alcohol use in aquatic contexts. Using qualitative methods, Sinkinson (2014) identified that young adults perceive the combination of alcohol and aquatic activities as fun, and Abercromby et al. (2020) suggested an emergence of an 'aquatic alcogenic environment' (i.e., normalised alcohol use) among young adults resulting from cultural norms, peer behaviour and social influences. Through their quantitative work, Hamilton and Schmidt (2014) reported that the norms of significant others play an important role in influencing young males to swim after consuming alcohol, and Watt et al. (2012) stated just over 25% of young beach attenders had swum at a beach within 2 hours of consuming alcohol during the preceding 12 months. Enkel et al. (2018) and Ridge and Nimmo (2018) identified that school leavers were knowledgeable of risks associated with alcohol-influenced aquatic activity, and were aware of an alcohol-themed drowning prevention campaign.

Despite the progress that has been made within this area, further research is required to identify factors that contribute towards an individual being vulnerable to an alcohol-related drowning incident, and how these factors can be targeted through prevention. As Connor (2004) described, there are many factors which could affect an individual's risk of injury, such as environmental exposure, inherited characteristics and lifestyle choices. Abercromby et al. (2020), Enkel et al. (2018) and Ridge and Nimmo (2018) made some advances through documenting the social influence and impact of alcohol advertisements on young adults, however additional mixed-method research is required to explore these influencers and how young adults' risk of alcohol-related drowning is affected, to create targeted prevention efforts.

Drowning prevention campaigns within the United Kingdom (UK) and Australia have portrayed a '*don't drink and drown*' message in an attempt to increase awareness of the dangers involved with consuming alcohol when undertaking water-based activities (RLSSA, 2018a; Royal Life Saving Society - UK [RLSS UK], 2018). However, there is little information available within peer-reviewed or grey literature that: (i) describes the process and theories that underpinned the development of such campaigns; and, (ii) provides evidence of evaluations that have been undertaken to measure effectiveness. Consequently, the impact of these campaigns on decreasing alcohol-related drowning incidents remains unknown.

The absence of understanding relating to young adults' consumption of alcohol in aquatic contexts, and the lack of contextual understanding of prevention campaigns, led to the design of this PhD and the projects within it. Its focus on young adults' knowledge, attitudes, behaviours and influencers to participate in alcohol-influenced aquatic activity (defined throughout this PhD thesis as activities in and on the water following/during the consumption of alcohol, and while alcohol effects could be influential on the individual)

provides new information that will assist those charged with the development of drowning prevention campaigns and education programs in HICs. This PhD is particularly well placed to assist drowning prevention practitioners in HICs, as it focused on young adults in the UK and Australia. It provides detailed insight into young adults' attitudes, knowledge, behaviours and influencers towards alcohol-influenced aquatic activity, and determined whether these traits/characteristics vary between two HICs. Additionally, this PhD offers a set of recommendations for further research, as well as recommendations for practitioners for the design and implementation of campaigns that specifically address young adults and their alcohol consumption in aquatic contexts.

It is important to note at this stage that the PhD candidate has been involved in drowning prevention and water safety research and practice in both a volunteer and professional capacity for over 15 years. Alongside this PhD, examples include: water safety research conducted for both Masters and Honours (BA Hons) projects; employment as a pool lifeguard; employment as a research assistant at Life Saving Victoria, Australia; volunteer RLSS UK Youth Ambassador; and, volunteer lifesaving sport coach and competitor. Accordingly, this prior knowledge and experience contributed to developing the focus of this PhD. This experience has shaped the candidates' understanding and view towards alcohol-influenced aquatic activity, which is that it is a risky activity and should be discouraged. Limitations associated with this perception were recognised and strategies were used to minimise any bias in the research process, which are discussed in this thesis (particularly Chapter 4, Section Two).

CHAPTER TWO

Statement of Purpose, Project Aims and Justifications

High-income countries (HICs) and low- and middle-income countries (LMICs) both identify young adults as at-risk of experiencing an alcohol-related drowning incident. However, disparities in how the aquatic setting is used, cultural and economic differences, availability of information and resources, and differing requirements and priorities of drowning prevention organisations and governments, led this PhD to focus on HICs. Accordingly, the purpose of this PhD was to determine factors that contribute towards young adults' alcohol consumption in aquatic settings, and make recommendations to improve alcohol-focused drowning prevention campaigns.

Specifically, this PhD aimed to address the following research questions:

1. What does current evidence tell us about the effectiveness of alcohol education campaigns?
2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?
3. How have aquatic-focused alcohol education campaigns targeted behaviour change among at-risk groups?
4. What factors influence young adults' involvement in alcohol-influenced aquatic activity in Australia and the United Kingdom?

5. To what extent have young people in Australia developed their knowledge, perceptions, attitudes and behaviours regarding alcohol-influenced aquatic activity?

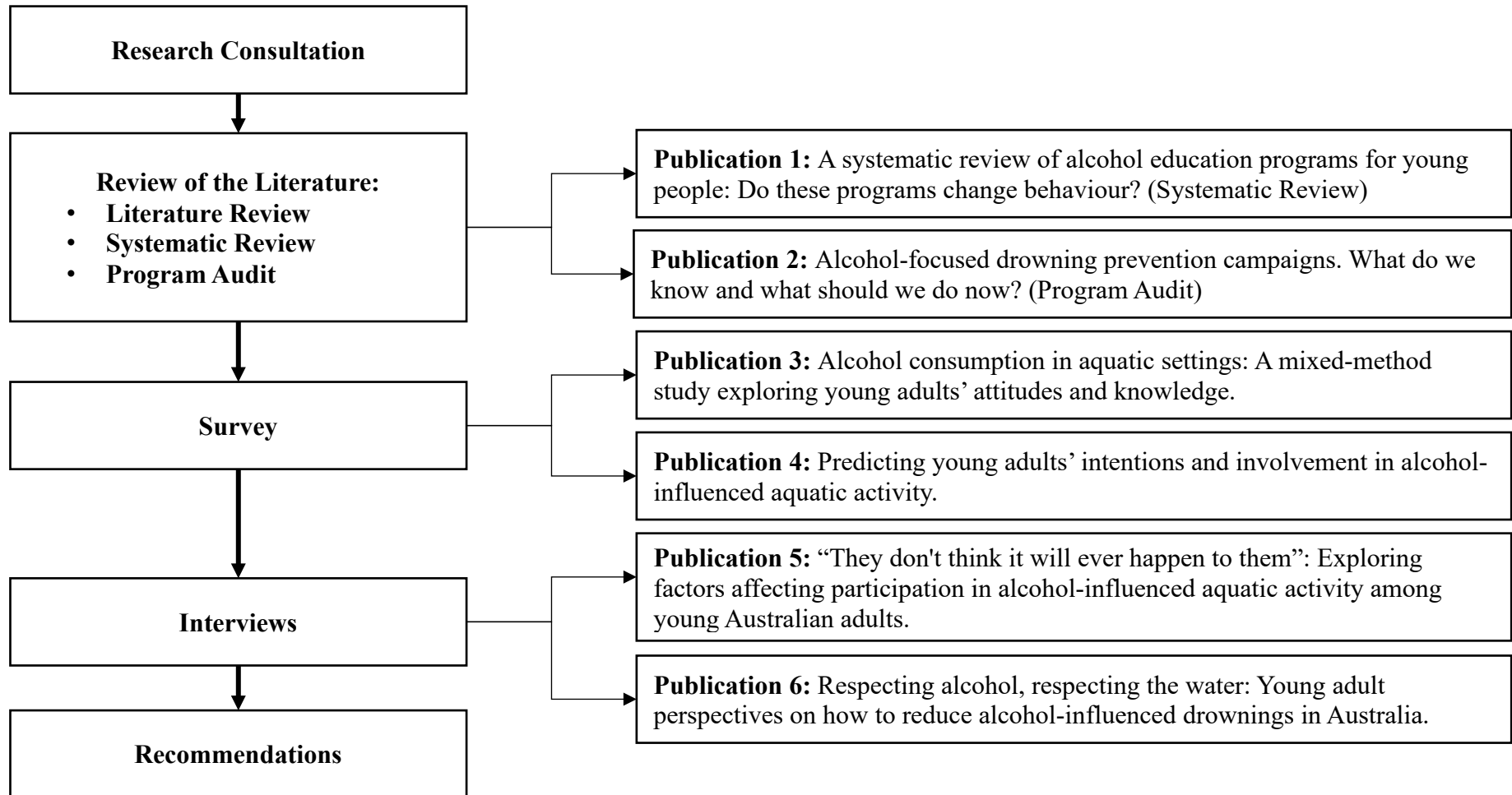
A mixed-method design was adopted with the PhD consisting of four projects that interlinked, facilitating a sequential approach to meet the intended research purpose and answer the research questions. Specifically, a systematic review of youth-focused alcohol education and a program audit of alcohol-focused drowning prevention campaigns facilitated a comprehensive understanding of the requirements for effective youth alcohol education programs, and where HICs' alcohol-focused drowning prevention efforts can be improved. A quantitative project enabled results to be collected from young adults in two countries (UK and Australia). Young adults from Australia and the UK were utilised in this project as both are HICs, island nations, record similar rates of alcohol-related drownings among those aged 15-24 years, and have developed and implemented alcohol-focused drowning prevention campaigns (RLSSA, 2019, 2020; The National Water Safety Forum, 2019). Further, very little evidence is available in either nation, but particularly the UK, which depicts why young adults feature heavily in alcohol-related drownings. The quantitative outcomes were then clarified and expanded through qualitative inquiry with a smaller Australian sample, to elicit more detail and understanding of young adults' alcohol use in aquatic settings. As very little drowning prevention research with a focus on alcohol use has adopted a mixed methods approach, the findings and application of these results to the field will be substantial.

To assist in understanding the layout of this thesis document, Figure 1 illustrates the format of this PhD, and the alignment of each project and associated publications within the overall structure. This chapter chronologically explains brief methodological detail for each project within the PhD to add to the information provided in the methods

chapter (Chapter Four) and corresponding publications presented in this thesis. This initial chapter also provides the aims, purpose and justification for each project.

Figure 1

PhD framework, projects and publications.



Research Consultation

During the initial months of the PhD, a consultation seminar was convened by the researcher at the 2017 World Conference on Drowning Prevention, in Vancouver, Canada. This session was used to discuss the value of the proposed research and gain assurance of the relevance for the field. An outline of early plans was presented and the seven drowning prevention experts and practitioners in attendance acted as critical peers, providing recommendations for study inclusions/exclusions as well as insight into potential problems. All were English-speaking, with extensive knowledge and experience in the area. See Table 1 for panel information.

Following the seminar and on peer advice, amendments were made to the project plan to better align with the practitioner requirements and to enhance applicability to industry. Examples of modifications included: the addition of a program audit of alcohol-focused drowning prevention campaigns, to inform the qualitative (interview) discussion assessing young adults' perspectives of these campaigns; the assessment of a broad level of knowledge to ensure the PhD was not just a comparison study; and, the investigation of the influencers on behaviour, to highlight why young adults participate in alcohol-influenced aquatic activity and to inform the focus of future campaigns.

Table 1*Research consultation panel information.*

Name and Position	Affiliation	Areas of Expertise
Keith McElroy, Retired	University of Ballarat	<ul style="list-style-type: none"> • Water safety and drowning prevention • Former National Technical Director, RLSSA • Retired Director Aquatic Research Centre, University of Ballarat
Dr Kevin Moran, PhD Principal Lecturer	The University of Auckland	<ul style="list-style-type: none"> • Water safety and drowning prevention • Injury risk perception • Surf lifesaving
Lee Heard, Charity Director	RLSS UK	<ul style="list-style-type: none"> • Water safety and drowning prevention • Volunteer management
Mike Dunn, Operations Director	RLSS UK	<ul style="list-style-type: none"> • Water safety and drowning prevention • Member Drowning Prevention Commission
Richard Franklin, PhD Associate Professor	James Cook University	<ul style="list-style-type: none"> • Water safety and drowning prevention • Bystander altruism • First aid and resuscitation • Alcohol • Vulnerable populations
Dr Robert Stallman, PhD Retired	Norwegian School of Sport Science	<ul style="list-style-type: none"> • Water safety and drowning prevention • Norwegian Life Saving Society
Teresa Stanley, Research and Development Manager	WaterSafe Auckland	<ul style="list-style-type: none"> • Aquatic injury prevention • Early childhood

Systematic Review

The purpose of the systematic review was to gain a comprehensive, contextual understanding of effective methods to use in alcohol education for young people, aged 15-24 years old, to develop desirable alcohol-related behaviours, knowledge and

attitudes. This study addressed PhD research questions 1 and 2, and the specific aims of this project were to:

- Determine whether participation in alcohol education programs resulted in significant, positive alcohol-related behaviour change for young people (aged 15-24 years), which may reduce their risk of alcohol-related harm.
- Rate the quality of the alcohol education programs reviewed and ascertain the key program components that were utilised within successful educational programs.

A systematic review was selected as this process supported a detailed and rigorous review of the literature, enabling the identification of validated findings, and shortcomings in research protocols through critical assessment of the robustness of data (Mallett et al., 2012). This review facilitated an understanding of the quality of alcohol education programs for young people aged 15-24 years, and established the components required for programs to be effective in changing alcohol-related behaviours. Despite extensive literature searching, no peer-reviewed alcohol-focused drowning prevention programs were identified. Accordingly, the review findings provide an evidence-base for transfer, for the development and implementation of future alcohol-focused drowning prevention programs. Transferring review recommendations from one context to another can be difficult, as often the results come from context-specific interventions (Booth et al., 2019). However, the inclusion criteria developed for the current systematic review were not context specific and consequently, covered alcohol-related programs across a range of settings, providing information suitable to be contextualised to aquatic settings. The systematic review is presented in Chapter Three, Section Two.

Program Audit

The purpose of the program audit was to gauge the impact of alcohol-focused drowning prevention efforts within HICs, from the earliest records until March 2019, and highlight areas for improvement for practitioners. Peer-reviewed and grey literature was systematically analysed to identify all relevant information. The program audit addressed PhD research question 3, and aimed to:

- Identify all available information about alcohol-themed drowning prevention campaigns in HICs.
- Identify and assess the information provided to the targeted groups to maximise the likelihood of success.
- Identify whether campaigns had undergone evaluation for effectiveness.

This program audit approach was selected to develop an understanding of how previous campaigns have targeted alcohol-related aquatic behaviours in at-risk groups, and whether there was evidence of campaign impact and/or evaluation. The initial design for the program audit was to apply a quantifiable scoring system (developed in the systematic review) to rate the quality of the identified alcohol-themed drowning prevention campaigns. However, details regarding campaign development, implementation and evaluation were not available on request or accessible in peer-reviewed or grey literature, and therefore it was not possible to implement the quality scoring system. Accordingly, this review synthesised available program information and informed an evidenced-based discussion relating to how an absence of information impacts the drowning prevention community and subsequent prevention efforts. The program audit is presented in Chapter Three, Section Three.

Survey

This project utilised a quantitative survey, which addressed PhD research questions 2, 4 and 5, with the survey created specifically for this PhD. The survey was developed following an extensive review of injury prevention, drowning prevention, harm reduction and alcohol-focused literature, which identified that peer-reviewed information relating to young adults' attitudes, knowledge and influences towards their involvement in alcohol-influenced aquatic activity is lacking. The survey questions were developed alongside the Theory of Planned Behaviour (TPB, Ajzen, 1985), which provided this project a theoretical underpinning, and aligned with prior research which successfully used this theory to predict young adults' alcohol-related behaviours (e.g., Ajzen et al., 2011; Hamilton & Schmidt, 2014). Young adults, aged 18-24 years old, who had received most of their education in the UK or Australia were the focus of the survey. It investigated their attitudes, knowledge, behaviours, subjective norms, intentions, perceived behavioural control (PBC) and influencers towards participation in alcohol-influenced aquatic activities. The survey aimed to:

- Establish young adults' level of knowledge about alcohol consumption, both generally and in an aquatic context.
- Investigate factors impacting young adults' attitudes towards participation in alcohol-influenced aquatic activity.
- Determine the predictors of young adults' intention to participate in alcohol-influenced aquatic activities.
- Determine the predictors of young adults' self-reported participation in alcohol-influenced aquatic activities.

The survey approach allowed the researcher to quantify several influential factors impacting young adults and determine significant predictors of their participation in

alcohol-influenced aquatic activity. The online survey enabled the collection of information on a variety of topics from a large sample in the UK and Australia, in a cost and time-efficient manner (de Leeuw, 2012), important considerations given the small amount of published research in the field. An online approach was selected as completing a survey online in the absence of a researcher has been suggested to lessen the chances of socially desirable answers—implying the participant is more honest with their responses (de Leeuw, 2012). To increase the number of respondents, paper copies of the survey were also used to gather data in person (Nulty, 2008).

While the limitations of online surveys are well known, for example, missed or misinterpreted questions cannot be followed up by the researcher; and those who choose to complete an online survey might have different views from those who do not (Roberts & Allen, 2015), the benefits of using a survey approach to achieve the aims of this project were considered to outweigh the limitations. Precautionary measures were taken to overcome some potential limitations, such as: incentives to attract and encourage participants to fully complete the survey; a progress bar throughout the online survey to encourage completion; and, the ability to save responses and continue at a later date (further details relating to these features are provided in Chapter Four, Section One). The manuscripts resulting from this survey project are presented in Chapter Five.

Ethical Considerations for the Survey

Due to the nature of the survey questions, that is, referring to participation in alcohol-influenced aquatic activity and influencers on this behaviour, it was possible that participants may have been reminded of a previous incident that they, or someone they know, experienced. Accordingly, the potential to cause some psychological distress was recognised. The Plain Language Information Statement (Appendix H) therefore provided

participants with the telephone number and details of counselling services they could utilise: Lifeline in Australia and the Samaritans in the UK.

Further, as the survey enquired about alcohol use when the participants were potentially under the age of 18 years old (the legal age of drinking in the UK and Australia), it is acknowledged they may have been embarrassed or unwilling to share these details, or under/over-reported their alcohol use for social acceptance amongst their peers. To counter this, participants were informed that their responses were anonymous and would be de-identified, and were advised to complete the survey independently. The survey focused on personal alcohol usage in specific circumstances, and in case this resulted in feelings of concern about their own usage, they were directed towards the counsellors previously stated, or their doctor. Finally, on the last page of the survey, participants were provided with debrief information (Appendix H) that directed them to appropriate webpages detailing the dangers of combining alcohol and aquatic activity, to ensure they were aware of the risks involved.

Interviews

The final aspect of this PhD addressed research questions 2, 4 and 5, and comprised one-to-one and small group interviews with young adults aged 18-24 years old who had received most of their education within Australia. Initially it was intended to conduct small focus groups, but participants volunteered with peers in group sizes of two to four. Accordingly, it was considered that conducting small group interviews with each naturally occurring peer group would facilitate deeper discussion and more honest responses than would have been possible if using constructed groups to discuss this potentially sensitive subject (Kitzinger, 1995).

The development of the semi-structured interview schedule was guided by the results from the survey, previous drowning prevention research and Australian national drowning reports (further details provided in Chapter Four, Section Two). The questions were designed to delve more deeply than was possible in the survey, to gather richer information from the young adult participants about: influences on their involvement in alcohol-influenced aquatic activity; their awareness of alcohol-themed drowning prevention campaigns; and, their perceptions of safety strategies when participating in alcohol-influenced aquatic activity. Specifically, this project with Australian young adults aimed to:

- Ascertain their perceptions of alcohol use in aquatic contexts.
- Determine the influencers on their alcohol-related behaviours in aquatic contexts.
- Review their awareness and understanding of current Australian alcohol-focused drowning prevention campaigns.
- Determine what they perceived to be the most effective approaches for preventing alcohol use in aquatic settings among their age group.
- Identify the strategies known to, and used by, these young adults for personal safety in aquatic contexts if consuming alcohol.

The use of a qualitative approach permitted the researcher to develop a more nuanced understanding of young adults' participation in alcohol-influenced aquatic activity, particularly to understand their corresponding attitudes; information that could not be captured as fully in quantitative analysis (Gill et al., 2008). Qualitative details of factors influencing young Australian adults' involvement in alcohol-influenced aquatic activity has only been detailed once in peer-reviewed literature (Abercromby et al., 2020), and research has lacked detailed qualitative analysis of young adults' perspectives of

alcohol themed drowning prevention campaigns (Enkel et al., 2018; Ridge & Nimmo, 2018). Hence, this approach is a significant addition to drowning prevention knowledge.

The semi-structured approach enabled flexibility within discussions (Longhurst, 2010; Wilson, 2012), and meant the interviews could be dictated by the participants' responses. Further, the combination of one-to-one and small group interviews allowed the researcher to capture those participants who might not have wished to participate in a group setting for personal reasons or privacy concerns, thereby increasing the diversity of the sample.

A drawback of this qualitative approach is that shy individuals were likely to have a more limited contribution to discussion when others dominated, meaning the representativeness of some data could be questioned (Peek & Fothergill, 2009; Smithson, 2000; Wilson, 2012). Likewise, as the researcher was present in the discussions, participants may have censored themselves to align with what they perceived as the socially desirable response, which may not have truly reflected their attitudes (Peek & Fothergill, 2009). A further limitation of this methodological approach is that as these discussions were conducted in person, the participant sample pool was limited to those accessible to the researcher. Therefore, the conclusions from this research may not be transferable to a wider demographic.

Despite these limitations, the use of interviews in this project was preferred, as very little qualitative work has been conducted with Australian young adults concerning their participation in alcohol-influenced aquatic activities. The detailed insight was novel and provided a significant contribution to knowledge. The manuscripts resulting from this project are presented in Chapter Six.

Ethical Considerations for the Interviews

The primary ethical concern for conducting the interviews was discussing participant prior behaviours that may have resulted in a negative impact on themselves, or someone they know, which could cause distress. Before commencing the discussion, participants were provided with the plain language information statement (Appendix L) which included information about support and counselling services available to them. Participants were made aware of their right to withdraw from the project at any time without consequence, and it was reinforced that if they felt uncomfortable about any questions, they could choose to not answer or participate in that discussion.

To help participants feel comfortable and willing to share honest experiences and responses, they were offered the opportunity to sign up to a small group interview with their peers. For those unwilling to discuss their behaviours in a group setting due to, for example, being shy (Peek & Fothergill, 2009), one-to-one interviews were offered. Such interviews also catered for those participants who wished to discuss their responses more deeply than was perhaps possible in the group setting.

CHAPTER THREE

Reviews of the Literature

Chapter Outline

This chapter is divided into three sections. Section One is a literature review of the injury prevention, drowning, and alcohol-specific drowning prevention literature, which contextualises the topic of this PhD, and provides justification as to why this area of focus was selected. Section Two is a systematic review (Publication One) of alcohol education for young people, which critiques the identified programs and determines the components common to programs which successfully motivate desirable alcohol consumption behaviours. Finally, Section Three is a program audit (Publication Two) of alcohol-themed drowning prevention campaigns, which aimed to determine their effectiveness and ability to encourage positive behaviour changes among the targeted groups.

SECTION ONE

Literature Review

Injuries in Context

In the 11th edition of the international classification of diseases (World Health Organization [WHO], 2018d), the WHO describes ‘injury’ as the resulting physiological effect of the body’s interaction with energy that exceeds the body’s tolerance. This encompasses a lack of vital elements necessary for the body to function (e.g., oxygen), along with other more complex exceptions and inclusions (WHO, 2018d). As ‘injury’ encompasses a multitude of resultant health problems, the approaches for injury prevention are variable and differ in contextual aspects.

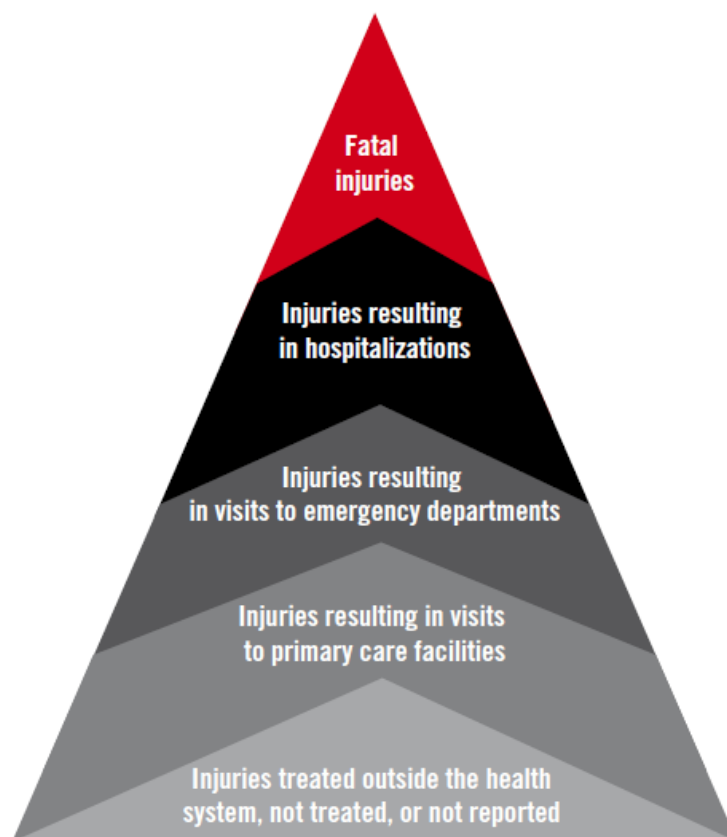
Every year, approximately five million people die worldwide as a result of injury, equivalent to 9% of all deaths (WHO, 2014b). Non-fatal injury is more prevalent than fatal injury and is projected to contribute 6% of all years lived with disability (WHO, 2014b). Aside from fatal and non-fatal, there is no single comprehensive method for injury classification; however, the following categories are common: severity; mechanism; nature of injury; intent; setting and/or activity (McEvoy, 2004). The most basic injury classification is dependent on intent, that is, whether the injury is sustained intentionally or unintentionally (Cohen et al., 2003). Intentional injury results from deliberate harm to an individual (i.e., violence), for example, a homicide or to suicide. Unintentional injury is not intentional or deliberate, for example, a fall (Cohen et al., 2003). Unintentional injury is more common than intentional injury, and typically does not result in a fatal outcome (Cohen et al., 2003). Different approaches are used in injury

research and for intentional and unintentional injury prevention efforts, and because of this, the focus of this literature review will specifically relate to unintentional injury.

The Injury Pyramid (Figure 2) is often used to depict the frequency of injury outcomes based on severity (Driscoll et al., 2004a; WHO, 2014b). Figure 2 highlights that among all global injury, the most common occurrences are non-fatal outcomes and injuries not resulting in hospitalisation.

Figure 2

*The Injury Pyramid.*¹



¹ Reprinted with permission from “Injuries and violence. The facts”, by World Health Organization, 2014, The Injury Pyramid, p. 6., Copyright (2020) by World Health Organization. Accessed 27/04/2020 from https://apps.who.int/iris/bitstream/handle/10665/149798/9789241508018_eng.pdf. See Appendix A for Copyright permission information.

Risk factors for injuries differ considerably and depend on several variables and personal factors, including age, gender, region of the world and income status (Driscoll et al., 2004a; WHO, 2014b). More injury-related fatalities occur in low- and middle-income countries (LMICs) compared to high-income countries (HICs), as well as among those from lower economic backgrounds and living in rural areas, regardless of country of residence (Scuffham, 2008; WHO, 2014b). Such differences in injury rate are likely to be the result of larger populations in LMICs, and also because prevention efforts (in HICs and LMICs) are less focused on poorer areas, therefore, conditions are not as safe as those in more advantaged regions (WHO, 2014b). Often LMICs lack infrastructure, and the government and financial structures necessary for the prevention of injury are undeveloped and inadequate, resulting in sparse availability of health facilities and emergency resources (Linnan et al., 2014). As a result, injury prevention approaches in HICs and LMICs are typically quite different. Hence, the focus of this literature review is on HICs only, except in background information, where global statistics, and comparisons between HICs and LMICs are made.

Alongside socioeconomic status, gender and age are also noteworthy contributors to differences in injury risk. Males are at greater risk of injury than females, and this is consistent across HICs and LMICs (Driscoll et al., 2004a; WHO, 2014b). The report on global injury and violence (WHO, 2014b) also identified that young people and those in their 'prime working years' are the age groups most at risk of injury, with three of the top five causes of death among those aged 15-29 years old being injury related: indicating an overrepresentation of this age group in global injury statistics. These top three injuries were road traffic incidents, suicide and homicide.

When specifically considering injuries causing death in young people up to 29 years old worldwide, drowning is the second most prevalent unintentional, fatal injury

(WHO, 2014b), behind only road traffic incidents. In fact, drowning is one of the top 10 causes of death in young people aged 1 month to 24 years, in every region of the world (WHO, 2014a). Despite this prominence of drowning in youth mortality data, there is still a lack in research quality and quantity that empirically investigates and reports on drowning in young adults up to 24 years old. This is alongside an absence of detail on the epidemiological factors contributing to these fatalities (Branche & van Beeck, 2014), particularly when compared to the extensive body of research on road traffic incidents. Accordingly, this research will focus on drowning prevention among young adults aged 15-24 years old.

Preventing Injury

Historically, the advancement of society has exposed humans to an increasing range of potential injuries, and approaches have been established to counteract these risks and enable individuals to live more safely (Pearn et al., 2004). Our understanding of injuries has evolved and now encompasses the idea that injuries are avoidable, and in actuality can be explained and prevented in their entirety (Gielen & Sleet, 2006), assisted through the application of models and theories to prevention efforts (Sleet & Gielen, 2004).

Models and theories support efforts for the successful prevention of injuries, as they help in highlighting possible causes of injuries, and assist to “identify mechanisms of change, determine why programs succeed or fail, and perhaps most importantly guide us to build better prevention programs” (Sleet & Gielen, 2004, p. 216). Further, it is suggested that a lack of program success in changing injury-causing behaviours can be attributed, in part, to not understanding the causes of the behaviour and lacking an application of a health behaviour theory (Sleet & Gielen, 2004). As a result, there have

been calls to adapt knowledge from the behavioural science and health promotion fields to apply to injury prevention efforts (Liller & Sleet, 2004).

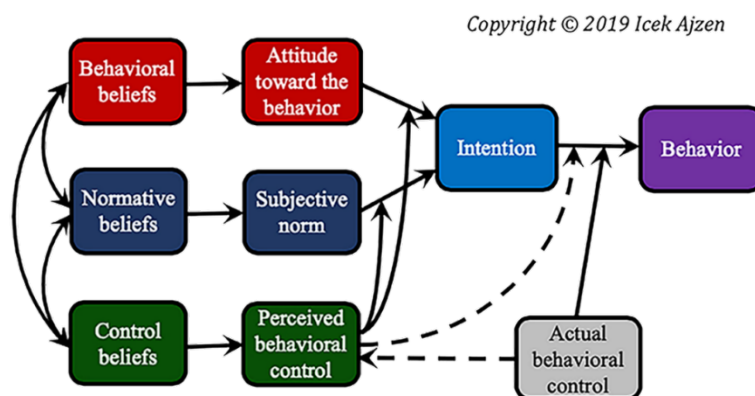
The number of health promotion and health education models that have been developed is extensive, each model providing differences in its approach to identifying the vital components of behaviour, through explanatory theory (guiding the process of defining/identifying the issue) and/or implementation or change theory (guiding the development and evaluation of interventions; Gielen et al., 2008). Within the injury prevention field, a range of health promotion and health education models have been implemented and adapted, as discussed by Trifiletti et al. (2005), who found the PRECEDE-PROCEED planning model, the Health Belief Model and the Theory of Reasoned Action/ Theory of Planned Behaviour (TPB) to be the most commonly used. While several models were reviewed and considered in the planning stages of this PhD (e.g., the Health Belief Model, the PRECEDE-PROCEED planning model, the Transtheoretical Model of Behaviour Change and the Public Health Model), for relevance and brevity this section will provide background and detail of only those applied to this PhD. Models that were reviewed and not applied were predominantly excluded because: their focus did not align with the aims of this PhD; previous research has questioned the predictive capabilities of the model (e.g., the Health Belief Model; Armitage & Conner, 2000; Orji et al., 2012); and, due to the nature and capacity of the research within this PhD, some models could not be used in their entirety (e.g., for intervention design, delivery and evaluation) and this could have limited the strength of the PhD outcomes.

The TPB (previously the Theory of Reasoned Action prior to the addition of the perceived behavioural control [PBC] concept), is one of the theories that was utilised within the quantitative project of this PhD (see Figure 3). It has been used to explain injury-related behaviours, such as breaking vehicle speed limits while driving a car

(Conner et al., 2007), binge drinking among young adults (French & Cooke, 2012), and alcohol and tobacco use (Mcmillan & Conner, 2003).

Figure 3

The Theory of Planned Behaviour.



Note. From Icek Ajzen. *Theory of Planned Behavior with Background Factors*, by I. Ajzen, 2019 (<https://people.umass.edu/ajzen/tpb.background.html>).

The TPB states that behaviour is determined by an individual's intention to perform the behaviour, which is underpinned by their attitudes, subjective norms and PBC (Ajzen, 1985). The attitude concept relates to the beliefs the individual holds about the behaviour and their evaluation of the behavioural outcomes, be those positive or negative (Ajzen, 2005), encompassing their affective attitudes (based on feelings) and cognitive attitudes (based on perceptions and information; Ajzen, 1989). Subjective norms involve the perception of the normative beliefs of people and groups important to the individual, for example, family, friends and co-workers (Ajzen, 2005), and refers to both injunctive norms and descriptive norms. Perceiving significant others to: (i) approve or disapprove of the behaviour (injunctive norms), and/or (ii) participate or not participate in the behaviour (descriptive norms), is likely to affect the individual's intention to

participate in the behaviour, and their actual participation (Ajzen, 2005; White et al., 2009). Finally, PBC relates to the level of control the individual feels they have over performing the behaviour (Ajzen, 2005). Perceived behavioural control is influenced not only by personal experiences, but also an individual's observations of others doing the behaviour and their perception of factors enhancing or limiting the difficulty of participation, for example, resources and opportunities (Ajzen, 1991, 2005). These influences on PBC allow the individual to judge and interpret their own ability to control the behaviour (Ajzen, 2005). Attitudes, subjective norms and PBC independently influence intention, and are also interlinked, meaning they can influence each other and jointly affect intention to participate in the behaviour (Ajzen, 2005).

The success and extent of the TPB's application in research investigating alcohol consumption (e.g., Cooke et al., 2016), and its limited but informative use within drowning prevention research, investigating: beliefs and willingness to drive through flood water (Hamilton et al., 2016a); males' intentions to drink alcohol and swim (Hamilton & Schmidt, 2014); and, intentions and behaviours relating to swimming between beach flags (Hamilton et al., 2016b; White & Hyde, 2010), influenced the decision to use this theory in the quantitative project of this PhD.

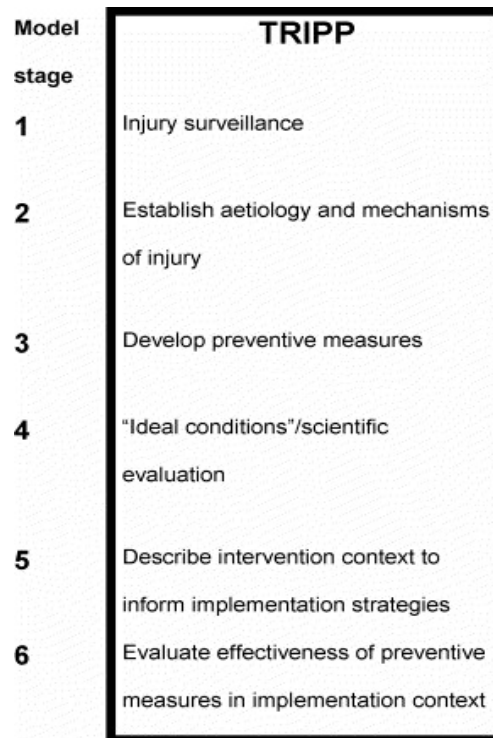
The use of the TPB within the drowning prevention field has been promoted following its successful use in a qualitative study by Giles et al. (2009) to establish lifejacket use in Tuktoyaktuk, Northern Canada. The community-based initiative employed observational methods, archival research and interviews with 20 participants (aged from teenagers to their 60s and recruited through snowballing), using the TPB to establish lifejacket use and non-use. Themes were established that aligned with the three initial TPB components, that is, PBC, subjective norms and attitudes. The main results suggested that lifejackets were not accessible to the community, drownings were

presumed to be a result of factors other than not wearing a lifejacket, and community leaders did not promote lifejacket use, deeming their usage unnecessary (Giles et al., 2009). As a result of this insight, Giles et al. (2009) recommended the TPB to be used more frequently in drowning prevention programs and campaigns, to effectively correct misconceptions and dangerous behaviours.

In addition to the TPB, the Translating Research into Injury Prevention Practice (TRIPP) framework (Finch, 2006) was also applied within the design of the current PhD. This framework (Figure 4) provides a series of steps to assist in the development of an evidence-based prevention program to reduce injuries. It emphasises that injury prevention research needs to move away from purely describing the problem, and that context must be considered for successful program implementation (Finch, 2006). While this model was designed for sports injury prevention (Finch, 2006), focussing on how to implement cost effective measures in a real-world setting (Emery & Pasanen, 2019), its consideration of the contextual factors involved with program implementation supports the recommendations from drowning prevention researchers for a more contextual focus to understanding behaviour in aquatic settings (Clemens et al., 2016; Peden et al., 2018b). Accordingly, the TRIPP framework was used to refine the focus of this PhD, aligning with the overall purpose to provide a more detailed understanding of the factors influencing young adults' involvement in alcohol-influenced aquatic activities. With this approach, an understanding of decision making processes for risk-taking actions was facilitated, and the acquisition of detailed profiles of those at risk was supported (Reijnen et al., 2018), contributing to fill a research gap within the drowning prevention field.

Figure 4

The Translating Research into Injury Prevention Practice framework.



Note. Reprinted from “A new framework for research leading to sports injury prevention,” by C. Finch, 2006, *Journal of Science and Medicine in Sport*, 9(1-2), p. 4 (<https://doi.org/10.1016/j.jsams.2006.02.009>). Copyright (2020), with permission from Elsevier. See Appendix B for Copyright information.

Aligning injury prevention research with health promotion and education models supports the comprehensive investigation of injury-causing behaviour, and provides accurate information, both of which assist in the development of effective prevention efforts (Sleet & Gielen, 2004). As drowning is established as a prominent injury worldwide (WHO, 2014a), the implementation of effective drowning prevention campaigns is required. It is imperative that health promotion and health education models are utilised to investigate behaviours associated with drowning. Accordingly, the TPB and the TRIPP model were crucial in the design, implementation and recommendations of

projects within this PhD. Further details justifying the use of these models and other theoretical approaches within this PhD are provided in Chapter Four.

Drowning

Drowning Definition and Process

As was the case with the term ‘injury’, drowning is also categorised as intentional (a deliberate measure to ensure the drowning, that is, to suicide or homicide; Quan, 2014a), or unintentional (where there was no intent for a drowning incident to occur e.g., the individual came into difficulty whilst recreationally enjoying the water, or by accidentally entering the water; Peden & McGee, 2003; Woo et al., 2015). This PhD focuses on unintentional drowning; therefore, any unspecified reference to ‘drowning’ throughout this thesis refers to unintentional drowning.

A consensus process among experts in the drowning prevention field developed the current, preferred definition of drowning as “...the process of experiencing respiratory impairment from submersion/immersion in liquid” (van Beeck & Branche, 2014, p. 85). A drowning continuum (Layon & Modell, 2009; Pascual-Gómez, 2014) demonstrated the phases through which an individual progresses in a drowning event. This continuum indicates that initially, the individual experiences a loss of control of their swimming, breathing or floating which, if not rectified, causes them to become distressed. During this distress phase, the individual becomes psychologically and physically anxious, voluntarily holds their breath and becomes unable to maintain floating and breathing. If the distress phase is not resolved, the individual will start to breathe, inhaling the liquid in which they are submerged, and this is when the drowning process begins (Layon & Modell, 2009; Pascual-Gómez, 2014). The process is described as follows:

“The drowning process is a continuum beginning when the patient’s airway is below the surface of the liquid, usually water. This induces a cascade of reflexes and pathophysiological changes, which, if uninterrupted, may lead to death, primarily due to tissue hypoxia. A patient can be rescued at any time during the process and given appropriate resuscitative measures in which case, the process is interrupted.” (van Beeck et al., 2006, p. 46)

Terminology to describe drowning in the literature has been varied and sometimes inaccurate, with misconceptions occurring particularly when describing fatal and non-fatal drownings (Hawkins et al., 2017). Previous reports have identified that media and medical journals have referred to patients experiencing either ‘active’ or ‘passive’ drowning, as well as ‘dry drowning’ or ‘secondary drowning’ (Szpilman et al., 2018; van Beeck et al., 2005). With specific focus on the latter term, experts within the field have surmised, based on evidence, that “people do not unexpectedly die of drowning days or weeks later with no preceding symptoms” (Szpilman et al., 2002, p. 532). Likewise, there is dispute within the drowning prevention community regarding the term ‘near drowning’ (Schmidt et al., 2019), due to a lack of uniformity in interpretation of what a ‘near-drowning’ incident would involve, and hence there is consensus for the cessation of the use of this term in drowning literature (Mégarbane et al., 2018; Schmidt et al., 2019). These terms are not medically accepted for diagnoses and instead incidents should be referred to as fatal or non-fatal drownings and as a mild, moderate or severe process (Hawkins et al., 2017; Szpilman et al., 2018). These drowning classifications are encompassed under the most recent drowning definition described in the previous paragraph, and the use of this preferred terminology is stated to facilitate more accurate and meticulous data collection and interpretation, and a better understanding of drowning

rates worldwide to assist in targeted and accurate prevention efforts (Szpilman et al., 2018).

Accurate data collection and effective recording is vitally important to establish commonalities and consistencies in drowning data and to highlight areas where prevention strategies need to be focused (Martyn, 2014). The WHO (2014a) drowning prevention report stated that limitations are present within current drowning data in all regions of the world, primarily because of variability in the way the deaths are classified. The lack of empirical, steadfast definitions is an issue when outlining the specifics of a drowning death within HICs (Peden et al., 2016a), and as a result some deaths may be misreported. For LMICs, there is a major difficulty with inconsistencies in data reporting and recording (Tyler et al., 2017), making it challenging to comprehend the extent of drowning. This inefficiency in reporting causes of death and lack of clear definitions has contributed to a global underestimation of drowning rates (Peden & McGee, 2003).

Drowning as a Worldwide Problem

Unintentional drowning is consistently identified as one of the world's leading causes of unintentional injury and death for all age groups. The WHO (2014a, 2018a) identified drowning as the third most prevalent cause of unintentional injury death worldwide, and deemed it a global issue, for people from all backgrounds, cultures and nationalities (WHO, 2014a).

Risk factors for drowning are situational and vary between locations, individuals, contexts and countries. Approximately 91% of the world's drownings occur in LMICs (WHO, 2014a), particularly in Africa, the Western Pacific Region and South East Asia (Peden & McGee, 2003). These drownings are likely to be the result of: a lack of barriers or safe water crossings, increased occupational exposure to waterways and inadequate

supervision (Tyler et al., 2017); low water safety knowledge and an absence of rescue equipment and skills in LMICs (WHO, 2014a); and, better healthcare and laws and legislation surrounding water use within HICs (Linnan et al., 2014). As a result, LMICs account for 3.4 times the drowning rates of HICs (WHO, 2014a).

Despite LMICs reporting significantly higher rates of drowning than HICs, reporting systems in LMICs are not as robust as those in HICs, resulting in inaccuracies in the reported drowning statistics and likely underestimation of the scale of the problem (Smith & Barss, 1991). Healthcare in LMICs can be scarce, difficult to access and expensive, thus registering the death of a drowned victim and using such facilities is likely to be irregular (Mecrow & Nusrat, 2014; Smith & Barss, 1991). Evaluation of drowning prevention strategies implemented in LMICs would therefore be unable to accurately gauge their true impact due to this shortcoming in data recording (Streatfield et al., 2014). Developing a research agenda in LMICs could also prove difficult, as drowning is a neglected health issue in poorer nations (Hyder et al., 2008). Because of the differences in risk factors, requirements for preventative efforts, and lack of standardised drowning recording procedures between HICs and LMICs, this PhD's focus is limited to HICs.

Globally, some age groups are regularly overrepresented in the drowning figures. The WHO Global Burden of Disease Project (2017a) reported on health, injury and mortality data from all areas of the world, according to cause, gender, age, country and region. The associated 2002 document (the most current Global Burden of Disease report) identified drowning as a top 10 cause of death for those aged 15-29 years, and as a leading injury-related cause of death worldwide for young people aged 5-15 years (Peden et al., 2002). More recently, the WHO (2014a) stated that in every region of the world,

drowning is in the top 10 causes of death for those aged between 1 month and 24 years, with over half of all drowning deaths worldwide amongst those aged 25 years and under.

Children aged 1-9 years are considered to be most at risk of drowning worldwide (WHO, 2014a), with risk factors predominantly associated with poor supervision (Linnan et al., 2014) and a lack of aquatic barriers (WHO, 2014a). Young adults aged 15-24 years are the next at-risk age group (WHO & UNICEF, 2008), with drowning a top five cause of death for this age group in HICs (WHO, 2014a). Risk factors specific to those aged 15-24 years relate to their behaviour, and likelihood of experimentation and involving themselves in dangerous and adventuresome activities (WHO & UNICEF, 2008). While drowning has been identified as a neglected but prominent public health issue, it is noteworthy that within some settings (e.g., drowning in 0-4 year olds in Australia; RLSSA, 2020) the drowning statistics are gradually improving (Bierens, 2014), likely a result of focused prevention efforts targeting this age group. This highlights the importance of developing well designed, implemented and evaluated interventions which focus on those aged 15-24 years old, to achieve similar reductions for this at-risk group.

Drowning Trends in the United Kingdom

The WHO (2014a) reported that in 2010, the overall UK drowning rate was 0.8 per 100,000: 1.2 and 0.4 per 100,000 for males and females, respectively. The most current UK Annual Fatal Incident Report (available through the UK Water Incident Database) figures show that in 2019, for known causes, 223 people drowned in the UK from unintentional or natural causes (The National Water Safety Forum, 2019). Approximately 29% (n = 62) were under 30 years of age, and for almost 44% (n = 27) of those cases (involving an individual under 30 years old) there was a known presence of alcohol and/or drugs (The National Water Safety Forum, 2019). Males were overrepresented in the drowning statistics (ratio of 182 males: 40 females), the majority

of drownings occurred in July, and the most common activity prior to the drowning incident was walking or running, followed by swimming (The National Water Safety Forum, 2019).

The UK drowning prevention strategy 2016-2026 was developed with an aim to improve knowledge of the behavioural and attitudinal factors in drownings, and by doing so, develop an evidence-base and improved data set from the UK to better inform national prevention efforts (The National Water Safety Forum Strategy Working Group, 2015). Statistics from the years preceding the strategy indicated that, on average, 400 people drowned in the UK each year. This rate was higher than recorded home fire or road cycling deaths (The National Water Safety Forum Strategy Working Group, 2015). The strategy indicated the following drowning related trends: drowning rates increased from teenage years and throughout the 20s; individuals were most often male; and, two thirds of drownings occurred inland. The drowning prevention strategy also highlighted risk factors associated with age groups prominent in drowning statistics, identifying that: young children's safety is reliant on parental supervision, including continuous monitoring when children are in, on and around water; teenagers participate in risk-taking and thrill-seeking behaviours placing them at increased drowning risk; middle-aged adults are at risk due to increased participation related to higher income and more leisure time; and, the elderly are likely to have underlying medical conditions that could be exacerbated through aquatic activity. Based on the drowning rates reported in 2019, it appears some promising reductions have occurred across most age groups since the publication of the UK drowning prevention strategy in 2016. But, on closer inspection, the extent of these reductions is inconsistent, ranging from a 100% reduction in drownings among those aged 0-4 years and 90+ years, to a 73% increase in drownings

recorded among 50-54 years olds, and a 30% increase for those aged 20-24 years (The National Water Safety Forum, 2016, 2019).

Many UK citizens actually drown overseas, and whilst the situational and circumstantial factors vary among these overseas incidents, the drowning risk factors are similar to those reported in the drowning prevention strategy for UK-based drownings. Navarra and Connolly (2014) reported data published by the Royal Society for the Prevention of Accidents (RoSPA) that indicated between the years 2000 and 2005, 475 individuals from the UK drowned while on an international holiday. Among these, over half were male; most drownings occurred between July and August; and, alcohol was a risk factor, particularly among males aged 18-30 years (RoSPA, 2019).

Despite statistics highlighting young adults are at-risk of drowning (The National Water Safety Forum, 2019), very little current, peer-reviewed research is available that investigates behavioural elements and risk factors that are specific to drownings within the UK: a prioritised focus of the UK drowning prevention strategy 2016-2026. Towner and Mytton (2009) claimed in their review of child injury prevention strategies that the UK has been at the forefront of drowning prevention safety procedures, and Sibert et al. (2002) linked a 10-year reduction in UK child drownings (from 1988/89-1998/99) to the prevalence of engineering and supervision improvements nationwide. However, no explicit evidence of these efforts and/or campaigns and the impact on subsequent drowning rates has been reported in the peer-reviewed literature. Despite the potential for the adoption of such measures and associated evaluations in other HICs, Towner and Mytton (2009) stated it would be inaccurate to presume outcomes would be similar between the UK and other HICs and to generalise to UK efforts, as circumstances and risk factors may vary between nations, and hence results are not necessarily transferable. This lack of evidence regarding the effectiveness of UK drowning prevention efforts,

alongside an absence of research fulfilling the aims of the UK drowning prevention strategy 2016-2026, suggests an evidence-base to inform focused drowning prevention efforts in the UK is necessary.

Drowning Trends in Australia

Australian fatal drowning data has been collected since 1920, with the earliest drowning rate reported as 8.76 per 100,000 people (Mackie, I., Tebb, N & Eady, T, as cited in Franklin, 2010). Since 1920, a gradual decrease in fatal drowning has been observed, with the most recent drowning rate (2019/20) reported as 0.98 per 100,000 people, with 248 people losing their lives over the year (RLSSA, 2020). When compared to the 10-year average from 2009/10-2019/20, the 2020 drowning data shows a 12% reduction from the average 283 drownings per year. Fatal drowning incidence, however, does not represent the full impact of drowning, with many non-fatal drowning experiences resulting in hospitalisation and ongoing morbidity. Australian data from 2002-2015 indicated that 6,158 people were admitted to hospital following a non-fatal drowning incident over this time, a fatal to non-fatal unintentional drowning ratio of 1:2.71 (Peden et al., 2018d). Children (defined for this study as under 17 years old) were most at risk of experiencing a non-fatal drowning incident compared to those aged 18 years and older, and most non-fatal drowning incidents occurred in swimming pools (35.6% of cases).

Prior to the release of the Australian Water Safety Strategy 2030 (at the time of writing, the 2030 strategy had undergone a consultation phase and was being finalised), Australian drowning prevention efforts had utilised the 2016-2020 Water Safety Strategy to address the incidence of fatal drowning in Australia (Australian Water Safety Council, 2016). A major aim of this strategy was to reduce drowning fatalities by 50% by 2020. However, on review of the most recent 2019/20 drowning rates (N = 248), compared to

the 10-year average (N = 283), this aim was unfulfilled (RLSSA, 2020). It is therefore likely these aims will be amended within the 2030 Water Safety Strategy to reflect current drowning rates within Australia.

The 2016-2020 Australian Water Safety Strategy outlined a life stages approach to drowning prevention, and focused on four groups identified to be at greatest risk of drowning: children aged 0-14 years; young people aged 15-24 years; males aged 25-64 years; and, people over 65 years old (Australian Water Safety Council, 2016). Risk factors relevant to each age group were reported, and key objectives for drowning prevention efforts in each target group were described.

The main risk factor associated with the 15-24 year age group was risk-taking behaviour in, on and around water (Australian Water Safety Council, 2016). This included drug and alcohol use. Key intentions to address drowning for this group related to reducing these risky behaviours, education on lifesaving skills and research investigating risk factors and campaign effectiveness (Australian Water Safety Council, 2016). Alcohol was shown to be involved in drownings across all the life stage groups (excluding children) identified within the Australian Water Safety Strategy (Australian Water Safety Council, 2016), leading to the inclusion of key objectives aiming to: reduce alcohol use in aquatic contexts; conduct research on the role of alcohol in drownings; and, develop, implement and evaluate alcohol-related interventions. Such recommendations were reinforced in the most recent Australian drowning report, where the ‘Make the Right Call’ campaign was detailed which encourages Australians to be safe in aquatic settings and to avoid alcohol consumption around water (RLSSA, 2020).

International and interstate visitors were also highlighted as at-risk groups within Australia (Australian Water Safety Council, 2016). The 2020 Australian national

drowning report indicated 21% of drowning cases in that year involved a known visitor to the area—both Australian and international (RLSSA, 2020). Hence, along with promoting water safety to international visitors, attention is still required to provide widespread messages to Australians about the dangers of unfamiliar, and local, aquatic settings where individuals may choose to recreate without knowing the relevant risk factors and safety procedures (Ballantyne et al., 2005; Morgan et al., 2008; Peden et al., 2016c; Wilks, 2011).

Another group identified as at-risk in the Australian Water Safety Strategy was Aboriginal and Torres Strait Islanders (ATSI; Australian Water Safety Council, 2016). Peden et al. (2017) analysed coroners' reports investigating unintentional fatal river drownings over the period July 2002-June 2012. Findings showed that alcohol was a factor in over half of ATSI river drownings, and river drowning victims identifying as ATSI were significantly ($p < 0.01$) more likely to record a presence of alcohol compared to victims who did not identify as ATSI. More specific results relating to drownings in those identifying as ATSI were reported in a retrospective analysis of Queensland data from 2002-2008. Wallis et al. (2015) found that fatal and non-fatal drownings amongst ATSI children and young adults was 44% more common than their non-ATSI counterparts, except in the 15-19 year age group. Future investigations have been recommended to determine any culturally specific factors that might act as preventative measures and explain the relatively lower drowning incidence in that 15-19 year age group. This understanding could be called on to design culturally appropriate drowning prevention strategies for the other high-risk ATSI age groups (Wallis et al., 2015).

While drowning incidents occur in a wide range of environments in Australia, including harbours, lakes and the beach, rivers, creeks and streams were among the most common waterways for drowning in each of the identified age categories in the

Australian Water Safety Strategy (Australian Water Safety Council, 2016), highlighting the high risk status of these locations. This was confirmed in a review of coroners' reports of drownings from July 2002-June 2012, whereby 26.6% of the 2,892 unintentional drownings occurred in rivers (Peden et al., 2016b). Males accounted for 80% of these fatalities, and the mean age for all drowning casualties was 42 years. A fall into the water was the leading activity prior to drowning in rivers, followed by non-aquatic transport and swimming. Regional locations were at higher risk than city areas, with individuals in very remote locations being 28 times more likely to drown in rivers than those in major cities (Peden et al., 2016b). Rivers and creeks were identified as the top location for drowning incidents in Australia in the most recent 2019/2020 drowning report. While indicating that reductions in drownings at these locations has occurred, rivers and creeks continue to be prominent for Australian drowning incidents (RLSSA, 2020).

Drowning Risk Factors for Young Adults (aged 15-24 years)

Risk factors for drowning vary across age groups and country, particularly in relation to country income level. For a close link with the topic of this study, risk factors discussed here focus on young adults aged 15-24 years in HICs. Evidence-based risk factors identified in the literature have been synthesised in this review, and include: gender and associated risk perceptions; cold-water shock; perceived and actual swim ability; drugs; and, alcohol (Quan, 2014a). Alcohol is the focus of this PhD and is discussed in greater depth as a stand-alone section of this literature review.

Gender and Associated Risk Perceptions

Statistics have shown that males account for up to 80% of all drownings worldwide (Centers for Disease Control and Prevention, 2016; RLSSA, 2020; The National Water Safety Forum Strategy Working Group, 2015; Water Safety New Zealand, 2019a). This is true in HICs, where males are repeatedly over represented in all

age groups (WHO, 2014a). For example, according to the 2020 national drowning report (RLSSA, 2020), 69% of drownings in the 15-24 year age group in Australia were male. Similarly, UK data from the 2019 water incident database report indicated that for this same age group, 77% were males (The National Water Safety Forum, 2019). Hence, young adult males are considered a significant cohort to target when seeking to reduce drowning rates (WHO, 2014a).

Quan (2014a) provides potential explanations for the elevated drowning incidence for males in this age group, indicating that young males may be more exposed to aquatic contexts; and, young males' behaviour and risk-taking in aquatic contexts is different to females, including in their alcohol consumption. In their review of literature, Millstein and Halpern-Felsher (2002) focused on adolescents' perceptions and assessments of risk, to provide insight into their decision making processes in risky situations. Adolescent males were reported to display an inaccurate sense of general risk perception, and perceived fewer risks than females for some behaviours, such as alcohol use (Millstein & Halpern-Felsher, 2002). The authors noted that adolescents often overestimated the associated risks to themselves within a hazardous situation but did not demonstrate an invincibility trait, as commonly believed. This is in contrast to more recent evidence within peer-reviewed literature, which has suggested that an invincibility trait can lead to young adults overestimating their ability to cope with risks, and in application to an aquatic setting, ultimately increase their risk of drowning (McCool et al., 2008; Moran, 2011).

An important consideration when interpreting such results is that many of the studies collecting data on risk perceptions, including several of those discussed by Millstein and Halpern-Felsher (2002), are based on hypothetical scenarios and not actual real-life incidents. When faced with a hypothetical scenario, the emotional response of

participants may not mimic their response to an actual event, hence field-based research would be needed to validate and support these conclusions (Millstein & Halpern-Felsher, 2002). Michalsen (2003) elaborated on this difference in risk, aiming to provide evidence from the literature regarding the concepts of risk assessment and risk perception. Risks within the control of the individual were generally perceived as less risky than those in seemingly uncontrollable circumstances. Michalsen considered that this locus of control varied between individuals, and was susceptible to subjective and objective factors. It can be speculated that some young males perceive their abilities as more advanced than reality, and hence may participate in high-risk activities beyond their capacity, within aquatic settings and other contexts, therefore placing themselves at risk of negative outcomes.

To investigate why males were more likely to appear in drowning statistics than females, Howland, Hingson, Heeren et al. (1993) and Howland, Hingson, Mangione et al. (1996) reported results from a telephone survey of households in the United States of America (USA), in which individuals aged over 16 years were recruited. A total of 3,042 surveys were completed, and statistical comparisons between males and females were conducted, examining: exposure to aquatic environments; submersion potential; aquatic skills; risk-taking behaviours; and, alcohol use in aquatic settings. They found that males were significantly more likely than females to report participating in riskier behaviours and aquatic activities. Furthermore, 33% of male respondents claimed to have consumed alcohol on their most recent aquatic day, with 16-25 year old males recording an average of more than eight drinks on that day. Males who drank alcohol during the previous aquatic day were also less likely to swim in supervised environments and less likely to wear a personal flotation device when powerboating. While this research provides possible explanations for male prominence in drowning data, simply identifying that

males participate more frequently in aquatic activity does not fully explain why they are overrepresented in drowning statistics compared to females (Moran, 2011). The use of self-report data also limits the applicability of these findings due to the possible impact of social desirability bias (Grimm, 2010).

Similar risky aquatic behaviours were reported by New Zealand youth in a cross-sectional investigation based on data from a longitudinal study with the Dunedin Multidisciplinary Health and Development project. Individuals were assessed at regular time points from birth throughout their life (Gulliver & Begg, 2005; Silva, 1990). The sample was established from the number of live births at the Queen Mary Hospital in Dunedin between 1 April 1972 and 31 March 1973, and included those within the province of the hospital and where parents consented (Silva, 1990). The data reported in this PhD literature review was gathered from a cross-sectional study which involved face-to-face interviews when participants were 21 years old. Discussions, held with 1,037 retained participants, covered their confidence in water, protective behaviours, risk behaviours, exposure to risk and any related incidents (Gulliver & Begg, 2005). In comparison to females, males were more likely to engage in risky behaviours; participate in activities in unsafe locations; and have a more frequent visitation rate to unsafe water environments. Further, males who self-reported as aquatically confident (interpreted by their self-reported ability to continuously swim 50 meters freestyle in a swimming pool and tread water in open water with wind and waves) were more likely than the rest of the sample to be involved in aquatic activities (not boating) within 2 hours of consuming alcohol. In contrast, females were more likely than males to take part in boating activities within 2 hours of drinking alcohol. Gulliver and Begg (2005) also analysed what they termed, 'near-drowning incidents', described as "any experience on, in, or near the water when they were afraid they might drown" (Gulliver & Begg, 2005, p. 239). They found

that more ‘near-drowning incidents’ involved males, and the only explanatory factor associated with these incidents was males’ exposure to more risky environments.

Gulliver and Begg’s (2005) self-report data comes with associated limitations, as young adults’ perceptions of their aquatic abilities have been shown to not always align with actual abilities (Petrass et al., 2012). Nevertheless, sufficient evidence points to the notion that males do take more risks than females due to underestimating the risks and overestimating their abilities (Moran, 2011), and this inadvertently contributes to their likelihood of drowning (Pringle, 2016; Quan, 2014a; WHO, 2014a).

Perceived and Actual Swimming Ability

While the ability to swim has been regarded in society as a preventative method for drowning, no strong evidence is available that clearly highlights drowning frequencies to be higher in poorer swimmers (Weiss & Committee on Injury Violence and Poison Prevention, 2010). Though enhanced skills could be protective, it is arguable that competent swimmers would be more likely to participate in aquatic activity because of this familiarity and skill, therefore increasing their exposure to water and hence possibly heightening drowning risk. Once a young person reaches adolescence, more lifestyle and behavioural variables, such as peer pressure and alcohol use, become factors in their participation in aquatic activity rather than just their swimming competence (Brenner & Taneja, 2014; Smith, 1995). However, a factor argued to likely contribute to young adults’ drowning risk is their inaccurate perceptions of their aquatic capabilities (Moran, 2019; Moran et al., 2012; Petrass et al., 2012).

Petrass et al. (2012) examined the perceived and actual swimming ability of 263 Australian university students enrolled in physical education and sport science degree programs (aged 17-19 years). A survey of swimming competence was administered to

ascertain perceived ability (self-estimate of their ability to perform a range of practical swimming skills including safe dive entries; floating; a continuous swim; underwater swim; and, swim on their back, as well as their perceived level of risk in a range of scenarios), followed by practical swimming tests to determine actual ability. Results indicated that participants underestimated the distance they could swim, as on average, they were able to swim further than projected. Females had a stronger significant association between projected ability and actual ability than males: they more accurately determined how many laps they could swim (Petrass et al., 2012). Whilst this study contributes to the understanding of perceived versus actual swimming abilities, a limitation acknowledged by the authors was that participants were invited from degree programs where it could be expected that they were more interested in physical activity and perhaps have stronger swimming abilities than members of the general population, and hence the findings cannot be generalised to other demographics of young adults (Moran et al., 2012; Petrass et al., 2012).

Similarly, a more recent study of aquatic floating skill prediction and competence utilised a sample of 39 New Zealand university students (aged 17-22 years) enrolled in physical education, sport and health degree programs (Moran, 2019). The participants completed a self-report survey of perceived exertion and ability for several floating tasks that progressed from easy through to more difficult (such as treading water, motionless float, and treading water while holding a rubber brick), before and after practically completing the tasks. The study findings showed that participants underestimated the exertion required for the floating tasks, with significant differences between the pre- and post-exertion reports. They also overestimated the length of time for which they could float (Moran, 2019). Participants reported not being taught aquatic floating skills and felt less confident about their floating than swimming competence, yet still perceived their

abilities to be better than reality (Moran, 2019). However, the study was completed in a heated open-air swimming pool, and therefore further research is required in open water to provide a more complete understanding of floating competencies in more unpredictable aquatic environments. Moran recommended further investigation of the flotation component of water safety programs, as well as the inclusion of activities that encourage participants to develop a realistic understanding of their competence levels. It appears that self-estimates of aquatic abilities and associated confidence vary depending on the specific skill, and the drowning prevention community requires further information as to why this could be the case and the corresponding potential impact on drowning risk.

Cold Water Shock

Independent of swimming ability, cold water shock can influence the body's response to cold water submersion and can result in drowning. Cold water shock is defined as the body's response that occurs from the rapid cooling of the skin that causes "a gasp response followed by uncontrollable hyperventilation—obvious precursors to drowning. A concurrent rise in cardiac output and blood pressure can precipitate cardiovascular difficulties in susceptible individuals" (Tipton, 2003, p. 12). This response can reduce survival time to seconds for an individual suddenly submerged in cold water (Tipton, 2003). Preventative methods to reduce the cold shock response have been investigated by Barwood et al. (2017). Utilising a within-groups repeated measures design, 16 participants (12 male, four female) were immersed in cold water (15°C) with or without the addition of an anxiety-provoking maths test. Results showed heightened anxiety was found to prevent habituation in cold water, and in this condition, the body maintained the cold shock response to the situation rather than adapting its reaction (Barwood et al., 2017). However, these results should be interpreted with caution due to the small sample size; limited use of female participants; and, a possible self-selection

bias of the sample to those with lower anxiety levels. Despite this, The Royal National Lifeboat Institution (RNLI; 2018) campaigns in the UK: '*Respect the Water*' and '*Float to Live*,' encourage people to remain calm and minimise anxiety levels when unexpectedly in cold water. By remaining calm and floating until the cold water shock passes, it is anticipated that the effects of the response may be lessened and that individuals can think more clearly about how best to rectify their situation (RNLI, 2018).

Another aspect investigated in terms of cold water shock is the effect of alcohol on the cardio-respiratory responses when initially immersed in cold water. Franks et al. (1997) used a repeated measures design with 16 individuals (15 male) aged 18-35 years, whereby participants consumed an alcoholic or a non-alcoholic drink before being immersed up to their laryngeal prominence in cold water of 15°C for 3 minutes. Respiratory rate, tidal volume, heart rate, rectal temperature and skin temperature were monitored throughout submersion. For the alcohol condition, blood alcohol levels on immersion were 0.80%. Participants stated feeling more comfortable in the cold water during the alcohol condition, and findings showed the alcohol slightly reduced participants' initial responses to cold water: after alcohol consumption, rate of breathing reduced in the first 20 seconds only, but temperatures and heart rate did not differ between conditions (Franks et al., 1997). Franks et al. (1997) explained the alcohol may have decreased participants' concentration on their respiratory response upon initial immersion, which could ultimately decrease drowning risk in the initial cold water immersion phase. However, participants were young, fit and knew the requirements of the study, therefore such effects on initial cold water response may not be reflected in unexpected cold water immersion. These findings are reflected in other research which has used similar measurements and methods to analyse effects of alcohol upon submersion in cold water for extended time periods, specifically 20 minutes (Martin et

al., 1977), and 45 minutes (Fox et al., 1979). While results may indicate that alcohol can reduce the initial response to submersion in cold water, collective conclusions from this research indicate that alcohol does not act as a protective agent against cold water, and can increase risk of drowning through decreasing coordination and swimming ability, rather than directly exacerbating risk of hypothermia (Fox et al., 1979; Franks et al., 1997; Martin et al., 1977).

Drugs

Illegal and prescription drugs can be screened in coroners' reports of the investigations of drowned casualties, however drowning prevention research often describes a presence of *alcohol and/or drugs*, grouping these two risk factors together in their explanation (e.g., Reijnen et al., 2018) and limiting the identification of determinants of drug and alcohol involvement separately. Certain drugs can cause a Long QT-syndrome whereby the heart beat changes, which, if occurring during swimming, can cause heart rate irregularity and serious health complications (Schwartz et al., 1993). This has been suggested as a contributing factor and potential explanation for some drownings in several HICs, particularly those involving older adults on prescription medication (Ahlm et al., 2013; Reijnen et al., 2018; RLSSA, 2019; 2020).

The involvement of drugs in young adult drownings has also been documented and highlighted as a risk factor for this age group in recent data from some HICs. The 2018 national drowning statistics for the UK recorded cases where alcohol and/or drug presence was known, but also distinguished separately rates of alcohol and drug involvement, a feature not included in the 2019 statistics. In 2018, among those drowning incidents involving drugs (n = 31, 12%), 38.7% were young adults aged 15-24 years (The National Water Safety Forum, 2018). Likewise, the Australian drowning report for 2020 identified that during the 2019/20 period, 26 drownings (10.5%) indicated a presence of

drugs, and 19% of these cases involved illegal substances (RLSSA, 2020). From 2008/09-2018/19 (most recent 10-year average comparative data available), 80 drug-related drowning deaths were recorded in Australia. For those involving illegal drugs, 87% were male, and the most prevalent age group for illegal drug use was 35-44 years old (27%), followed by 18-24 year olds (23%) and 25-34 year olds (22%; RLSSA, 2019). Swimming or recreating (26%) was the most common activity prior to a drowning incident with the involvement of illicit drugs, and most incidents occurred in rivers, creeks and/or streams (42%).

In Finland, Pajunen et al. (2017) analysed the 1,697 unintentional drowning cases from 2000-2009 among those aged 15 years and older, where a toxicology report was provided. Drugs were most prevalent in non-boating drownings with male to female distribution of 4:1 respectively, and 11:1 in drug-positive boating-related drownings. Positive cases for drugs and/or alcohol were most likely in those aged 20-54 years old. This study highlighted the prevalence of prescription drugs in drowned victims, however testing for illicit drugs did not occur in this sample unless suspicion arose, so it is possible that the presence of prohibited substances was underestimated (Pajunen et al., 2017).

While the physiological effects of illicit and prescription drugs are well documented, the associated role of drugs in drowning has yet to be examined in sufficient detail to determine comprehensive profiles of those at risk, to allow strategic focusing of prevention efforts (Australian Water Safety Council, 2016). The presence of alcohol and/or drugs in drowning has been highlighted (RLSSA, 2020; The National Water Safety Forum, 2018), however, the extent and prevalence of their use among young adults requires further investigation. Alcohol consumption is not always coupled with the use of other drugs (Pajunen et al., 2017) and hence the investigation of alcohol and drugs should not necessarily be combined. Indeed, to encourage honest disclosure of information, it

may be preferable to exclude questions about illicit behaviours (e.g., drug use) when seeking information about legal activities (e.g., alcohol consumption among those of legal drinking age), to avoid the impact of social stigmatisations and associated issues with survey reliability (Johnson & Mott, 2001).

Alcohol as a Risk Factor for Drowning in Young Adults

Alcohol has been identified as a prominent risk factor in recent drowning prevention reports and research from HICs, and these have suggested that more needs to be done to overcome this issue (e.g., Australian Water Safety Council, 2016; Peden et al., 2019; RLSSA, 2019, 2020; The National Water Safety Forum Strategy Working Group, 2015). The WHO global report on drowning also stated that “alcohol use around water is an important risk factor for drowning in many countries, especially for adolescents and adults” (WHO, 2014a, p. 6).

Alcohol has been shown to impact an individual’s physiological and cognitive behaviours, influencing judgement and neuro-muscular reactions (Howland & Hingson, 1988). Accordingly, alcohol consumption can result in increased risk-taking behaviours, potentially jeopardising the individual in an aquatic environment, particularly if their swimming competency is limited (Driscoll et al., 2003). When consuming alcohol and participating in aquatic activity, swimming ability can reduce without the individual realising, increasing the risk of injury and endangering life if capabilities are overestimated (Perrine et al., 1994). The blood vessel dilation effect of alcohol can increase the time an individual spends in the water without feeling the cold: ultimately heightening the threat of hypothermia and increasing drowning risk (Driscoll et al., 2003; Tveita, 2014).

In a systematic review investigating the role of alcohol in leisure-related drownings, Driscoll et al. (2004b) found that drowning incidence increased as blood alcohol concentration (BAC) increased, and identified (from the studies analysed) that alcohol contributed to 30-70% of drowning deaths. Driscoll et al. (2004b) suggested alcohol is likely to be a factor in 10-30% of all recreational drowning fatalities, but recognised a limitation of their review was a lack of valid blood alcohol values available in the studies that met inclusion criteria, for several reasons including inconsistencies in collecting BAC in a timely manner following death. Despite their review, it is still unclear at what BAC an individual's aquatic abilities are negatively affected (Peden et al., 2017).

Post-Mortem Alcohol Production

It is widely accepted that the human body produces ethanol after death due to microbial activity (Corry, 1978), referred to as post-mortem (PM) alcohol production. As a result, a cut-off time point has been suggested to be crucial for gathering accurate BAC data from victims that have drowned. This approach is required to avoid the impact of PM alcohol production on BAC measurement, which could result in over-estimating the contribution of alcohol to the drowning death. The appropriate cut-off time point however, is disputed. For example, Wintemute et al. (1990) reported reliable BAC levels can be taken within 24 hours of death, whereas Hadley and Smith (2003) suggested 12 hours. As there is currently no agreed cut-off time point, the influence of PM alcohol production needs to be considered when investigating alcohol involvement in drowning fatalities.

A recent Finnish study aimed to establish the extent PM alcohol production impacted the accuracy of recorded BACs following a drowning event (Pajunen et al., 2018). The study examined 967 unintentional drowning deaths that occurred between

2000 and 2013 and that underwent a medico-legal autopsy and toxicological analysis. It included the collection of blood samples and urine- and vitreous-humour samples (Pajunen et al., 2018). PM alcohol production was estimated to have influenced alcohol levels in only four (0.4% of the total sample) of the casualties. This finding indicates that PM alcohol production may be less influential than previously thought, and exclusion criteria based on the concern of the influence of PM alcohol production may have resulted in the omission of relevant data. In effect, this means that when measured BACs have been modified to account for predicted PM alcohol production, the resultant BAC may have been underestimated, and hence the role of alcohol in drowning may also have been underestimated.

Coronial Reports

Where toxicology reports have been conducted, the BAC level of a drowned casualty can be stated within a coroner's report, and this detail is often analysed within drowning prevention research to determine the involvement of alcohol in the drowning death. Studies utilising BAC information from coroners' reports (e.g., Peden et al., 2016b; Peden et al., 2017; Wintemute et al., 1990) are useful to verify the percentage of drowning deaths where alcohol was a significant contributor, and analysis of these reports can provide some clarity of risk factors and commonalities observed in these drownings. However, coroner information is often inconsistent and may lack sufficient detail about the incident, such as a toxicity report, limiting what can be determined about the circumstances that contributed to the drowning death (Driscoll et al., 2003; Petrass et al., 2011; Stephenson et al., 2019). For example, when discussing the role of alcohol among the 248 drownings in 2019/20, the most recent Australian national drowning report stated "at the time of publication, presence of alcohol was unknown in 79% of all cases" (RLSSA, 2020, p. 29), later detailing "Figures may change depending on ongoing

coronial investigations and findings, as 78% of cases are still under investigation (i.e. open) as this report went to press” (RLSSA, 2020, p. 48). Without consistent inclusion of BACs in coroners’ reports, national drowning statistics may underestimate the role of alcohol in drowning incidents, especially in circumstances where drownings are included in annual data prior to the case being closed. Therefore, it is important for coroner reports to always include toxicity results to both ensure the information around each drowning incident is accurate, and to best inform research projects and prevention efforts developed around these data. Nevertheless, this section will synthesise the drowning literature that is based on coroners’ reports as this information provides useful insights and explanations for previous drowning rates.

Peden et al. (2017) completed an alcohol-specific investigation of the National Coronial Information System (NCIS) records to determine the role of alcohol in Australian river drownings between 2002-2012. Of the 770 people who drowned in rivers over this time, 28.8% had an unknown BAC level, 40.8% recorded alcohol presence at autopsy and 70.3% of those had a BAC $\geq 0.05\%$. Alcohol was more common amongst ATSI, and in drownings occurring in the early morning and evening hours. In 33.3% of cases where the alcohol-related drowning involved a child (aged 14-17 years), the average BAC level was $>0.10\%$ (Peden et al., 2017), twice the legal limit for driving a motor vehicle in Australia (Fell & Voas, 2014). The prevalence of alcohol in these adolescent drowning reports raised questions regarding accepted alcohol consumption, supervision, underage drinking, peer pressure and risk-taking behaviour among young Australians in aquatic settings (Peden et al., 2017). Within this study, only cases that reported a BAC level of 0.05% or higher were included. Effects of alcohol have been recorded for BAC levels less than 0.05%, such as increases in relative risk and reduced self-awareness in aquatic contexts (Perrine et al., 1994; Smith et al., 2001), therefore, this

criteria may have omitted records where alcohol influenced the death of the drowned casualty. Peden et al. (2017) justified this exclusion criteria based on the effects of PM alcohol production on BAC levels. However, in light of more recent results that have indicated PM alcohol production may have little impact on recorded BAC levels (Pajunen et al., 2018), this investigation may have overlooked relevant data and underestimated the involvement of alcohol on Australian drownings. An alternative exclusion criterion could have omitted cases based on the timing of when the BAC was collected, instead of the actual recorded BAC.

Coronial reports have been used in other HICs to determine the role of alcohol in drowning risk. For example, a retrospective descriptive study of Canadian coronial records identified 2,391 qualifying cases of unintentional aquatic fatalities between 2008 and 2012 (Clemens et al., 2016). Findings showed that of the 592 drowned casualties aged 20-34 years, 51.4% had consumed alcohol prior to the incident. People in this age category were the most prevalent users of alcohol, however 15-19 year olds also showed high levels of alcohol involvement (40.8% of the total 142 cases; Clemens et al., 2016). In contrast, data from the USA reported noticeably lower occurrences of positive BAC reports within the same age groups, with alcohol stated as a factor in 33% of drownings in 20-34 year olds and 13% in 15-19 year olds (Quan & Cummings, 2003). Clemens et al. (2016) stated the differences in alcohol involvement in these two studies could be the result of differing cultural uses of alcohol, but this requires further investigation. Variations in cultural use of alcohol should be reflected in the style and content of interventions being delivered to address alcohol use in aquatic settings. Campaigns should be culturally appropriate, utilise relevant data to tailor programs to the characteristics of the target group, and be evaluated to ensure effectiveness and appropriateness for the issue (Leavy et al., 2015).

Cummings and Quan (1999) investigated the role of alcohol and medical care in drowning trends in King County, Washington State, USA over a 21-year period from 1975-1995. They reported a decrease of 81% in the incidence of drownings attributable to alcohol over the time period. Suggestions for this decline are speculative as no measure was made of person-time around water while consuming alcohol, but recommendations from an editorial by Smith and Howland (1999) implied that either: over time people were less involved in aquatic pursuits; or that these pursuits occurred in more supervised environments where alcohol consumption was prohibited. This indicates that the intentions of drinking alcohol in an aquatic setting may still have been present, but alcohol restrictions in popular locations for water-based activities limited this behaviour. If this is the case, more investigations should be conducted to understand whether attitudes towards participation in alcohol-influenced aquatic activity have changed, and why, to determine if altering outlooks can cause this reduction.

Experimental Studies

Alcohol is present in many drowning deaths involving young adults and often in these drowning cases the adolescent victim was under the legal age for drinking. Several of those who drown in these circumstances were swimming in unsupervised locations (Peden et al., 2017), had previously been partaking in recreational activity in and around the water (Quan & Cummings, 2003), and were mostly young males (Clemens et al., 2016; Quan, 2014a; WHO, 2014a). These factors raise questions relating to peer pressure, education, adult supervision, risk-taking behaviour, acquisition of the alcohol, and the effect of these multiple factors on the drowning outcome: all of which cannot be answered through analysis of coroner reports or reviews, and require direct input from at-risk groups.

To analyse the effects of varying BAC levels on participants' ability to conduct a safe shallow water dive, Perrine et al. (1994) recruited a sample of 13 male recreational divers, aged 21-35 years old. Participants were required to complete three shallow-entry dives in each of seven sessions with progressively increasing BAC levels. This study was conducted in water depth of 12 foot (366 cm), but participants were asked to keep their dive depth shallower than the line on the wall of the pool, at 3.5 foot (107 cm) depth, to simulate the conditions of a more shallow pool. Results demonstrated that as BAC increased, dive performance decreased. This contrasted with participants' self-reports of their diving skill (reported following each dive) which showed they did not recognise this decrease in performance or increased risk as their BAC level rose. Despite the limitation of a small sample, Perrine et al. (1994) claimed that if a 3.5-foot depth had actually existed in the diving simulation, significantly more participants would have hit the pool bottom at an average BAC of 0.04% than when the BAC was zero. This study provided evidence of a considerably reduced awareness of personal safety and diving skill at this BAC: a level below the legal driving limit in many countries (0.05%; Fell & Voas, 2014), and below that used to determine alcohol involvement in toxicology reports of drowned casualties (e.g., Peden et al., 2016b; Peden et al., 2017). While the participants in this study were recreational standard divers and hence arguably representative of the general public in this characteristic, the small male-only sample may limit the applicability of the findings across broader aquatic contexts, therefore further investigation of this topic is required. This study was also completed in a closed aquatic environment (i.e., swimming pool) and this may have affected participants' perceptions of their safety and their subsequent behaviours and survey responses.

A cohort population-based study considered aquatic activities, alcohol use and drowning risk in Massachusetts, USA (Howland et al., 1990). In the summer of 1988,

2,260 Massachusetts residents were contacted through random digit dialling and invited to complete a survey about road traffic safety behaviours. Of these, 294 (46% male, mean age = 42 years) were interviewed over the phone regarding details of their aquatic pursuits. Findings showed that fishing from the shore was the aquatic activity related to the heaviest drinking behaviour, and of those who participated in aquatic activities; 23% reported consuming alcohol on the most recent occasion; and, 54% of 20-29 year olds reported consuming four or more drinks during their most recent aquatic activity occasion—the highest rates of all the age groups (Howland et al., 1990). Male participants who reported drinking alcohol and taking part in aquatic activities were four times more likely to also report drinking and driving a motor vehicle over the previous month, for women this became 14 times as likely (Howland et al., 1990). This highlights that those people, particularly females, more likely to consume alcohol in aquatic settings (a risky behaviour), were also more likely to participate in other risky activities, such as drink driving. However, this study only questioned participants as to their consumption of alcohol in aquatic contexts over the course of the previous August, that is, over one month, and may not demonstrate participants' normal behaviours in non-summer months. Additionally, this study was conducted in 1990, and is therefore dated and may be inaccurate today due to the societal changes that have occurred in the intervening years, which affect the rates of alcohol consumption and its use in combination with other activities, such as drink driving (WHO, 2018c).

Watt et al. (2012) questioned the effectiveness of water safety and alcohol education offered to young adults following a cross-sectional investigation of 426 individuals (18-24 years old) that inquired about behaviour over the previous 12 months. Participants were approached while on a Queensland beach in Australia and invited to participate in a breathalyser and face-to-face interview concerning their: alcohol use

(usual and in the 6-24 hours prior to their beach attendance); water safety knowledge; attitudes; and, use of the beach. Findings showed 26% of the sample reported drinking alcohol within 2 hours of swimming in the past 12 months, and 7% had a positive BAC reading on the day of interview. These results demonstrated a lower incidence than that found in Howland's 1990 USA study, but nonetheless, clearly indicate that for these young Australians, the dangers of alcohol consumption and participation in aquatic activity were still present.

Similar methods were also utilised by Peden et al. (2018a), who breathalysed and surveyed river attenders, aged 18-55+ years, in various high-risk Australian river locations during summer months. Results from the 684 included participants (51.6% female) revealed 15.9% (n = 109) recorded a positive BAC, with people aged 18-34 years and those described as living in Inner Regional areas significantly more likely to record a positive BAC. Those aged 18-34 years were the age group most likely to record a BAC level >0.05%. Warmer temperatures and public holidays were associated with more respondents recording a positive BAC reading, and frequent river attenders were significantly more likely than less frequent attenders to record a BAC >0.05% (Peden et al., 2018a). Such results make an important contribution to understanding why rivers and creeks are primary locations for Australian drownings, and assist with identifying rates of alcohol use in river settings. Peden et al. (2018a) identified that the focus of this study may have encouraged self-selection among alcohol consumers, and inadvertently omitted those who abstained from alcohol use thinking it did not apply to them. The focus of this research was also on river users generally, rather than a specific age group. The current author notes that it would be interesting for Peden et al. to have conducted more detailed investigations of those in the 18-34 year age group, perhaps qualitatively, to elicit more

information about their alcohol use in these settings. This could be considered in future research.

To explore young Australian adults' use of alcohol and awareness of a national binge drinking campaign van Gemert et al. (2011) conducted a survey of 1,072 music festival attendees (aged 16-29 years). The study found that those who were more likely to participate in sessions of heavy drinking were less likely to recognise a drink aware campaign aimed at reducing such behaviours, when compared to those who did not drink alcohol as heavily (van Gemert et al., 2011). This demonstrated that campaigns aimed at reducing alcohol consumption may need to more specifically target those who are likely to drink larger quantities of alcohol. A limitation of this study was that the music festival displayed the campaign messages and as such, the results may not be representative of the participants' previous exposure to the campaign in a natural setting.

Surveying young adults at a festival was also implemented by Enkel et al. (2018), who conducted a cross-sectional investigation of Western Australian school leavers (aged 17-18 years), at a four-day school leavers festival held at a beachside location. The survey focused on intended and actual alcohol consumption, as well as alcohol use in aquatic settings; their knowledge of the risks involved; and awareness of drink drowning campaigns. Of the 549 respondents, most (92.5%) were able to identify at least one risk associated with alcohol-influenced aquatic activity and 90.4% were aware of the '*Don't drink and drown*' campaign. However, 156 participants (29%) had consumed alcohol in an aquatic context during their school leavers celebrations, 47% of these while swimming. This study highlighted that school leavers demonstrated awareness of the risks involved with drinking alcohol in an aquatic context but appeared unable to apply this to their actual behaviour (Enkel et al., 2018). Follow-up interviews reported by Ridge and Nimmo (2018) indicated that 50% of young adults who attended a '*Don't drink and*

drown’ campaign event at the festival, reported the campaign messages would affect their future behaviours. However, similar to the limitation of the study by van Gemert et al. (2011), this research was conducted in a festival setting where the ‘*Don’t drink and drown*’ campaign messages were visible; therefore, some of the survey responses could have been influenced by social desirability bias (Enkel et al., 2018), particularly because a self-report survey was used. Further, no indication of survey validity or reliability was provided, nor if the research had a theoretical underpinning, and this limits the soundness of the conclusions drawn.

To date, little research has investigated sociocultural influences and decision-making among young adults regarding their involvement in alcohol-influenced aquatic activities, nor how such a behaviour can be discouraged. Only two qualitative studies, to the researcher’s knowledge, have investigated this in some way. Sinkinson (2014) conducted three focus groups with 17 young adults aged 17-24 years to discuss risk and fun when alcohol consumption and water-focused activities were combined. The results suggested that alcohol involvement made the aquatic activities more enjoyable. Participants also reported taking measures to ensure safety in the aquatic location, such as dedicating one person to remain sober and act as a ‘minder’. However, this report did not detail application of a theoretical underpinning to the study design or data analysis, a component deemed necessary for qualitative research (Crotty, 1998; Reeves et al., 2008). Without a theoretical underpinning, the study may have had restricted capacity to properly identify determinants of young adults’ involvement in alcohol-influenced aquatic activity (Sleet & Gielen, 2004). Despite other limitations of a small sample, this study provides an informative snapshot of a potential direction for water safety education, targeting the ‘fun’ aspect of drinking alcohol around water, and for future research to determine how and why this attitude is developed and maintained.

The second qualitative study was conducted more recently by Abercromby et al. (2020), who led eight focus groups with 41 Western Australian young adults (61% female) aged 18-24 years. Discussions focused on young adults' knowledge, attitudes and behaviours relating to alcohol consumption and involvement in aquatic activities. The study was underpinned by the Health Belief Model and results were reported aligned with the components of this model (i.e., perceived susceptibility; perceived severity; perceived benefits; perceived barriers; cues to actions; and, self-efficacy). Findings suggested the Australian culture acted as both encouragement and deterrent from participating in alcohol-influenced aquatic activities, due to norms for activities on public holidays and integration of aquatic safety into the Australian lifestyle. There was also indication of an emerging 'aquatic alcogenic environment' among young adults, which normalised alcohol use in aquatic contexts and was affected by peers, social influences and cultural norms (Abercromby et al., 2020). Self-efficacy was identified to be a possible mediator between intended and actual involvement in alcohol-influenced aquatic activities, due to participants stating that common sense and prior water safety education influenced their positive decision making relating to their involvement in alcohol-influenced aquatic activities. As such, the authors suggested self-efficacy should be incorporated in prevention campaigns, alongside peer-focused cues to action and socio-environmental supports to overcome the pressure from peers and cultural influences (Abercromby et al., 2020). This study is the first qualitative exploration of such concepts within Australia and provided a new understanding of factors that could be influencing young adults' involvement in alcohol-influenced aquatic activities. Participants in this study were drawn only from a metropolitan area. To support the transferability of this research to a wider population, further investigation, with a larger cohort from rural, regional and

metropolitan areas is recommended, as participant exposure to water safety messaging might vary between locations.

Another study particularly relevant to this field is that by Hamilton and Schmidt (2014) who used a cross-sectional correlational survey design (with alpha co-efficient scores of .56-.96) to gain an understanding of the factors influencing 211 young Australian men, aged 18-34 years, in their intention to drink alcohol and swim in the upcoming 6-month period. The convenience sample was recruited through online advertising, face-to-face or snowballing, and most participants lived in Queensland. The TPB underpinned the investigation to predict the males' intentions. Self-report questions focused on attitude towards the behaviour; subjective norms; intention; perceived susceptibility; perceived severity; PBC; risk perception; group norm; and anticipated regret. A hierarchical multiple regression analysis indicated that intention to participate in drinking alcohol and swimming was driven predominantly by participants' positive attitudes and approving subjective norms of the behaviour: those most likely to drink and swim viewed this behaviour in a positive way and believed those important to them would approve. However, no influence of PBC was found. To dissuade young adults' from combining alcohol consumption and aquatic activity, Hamilton and Schmidt (2014) encouraged practitioners to develop campaigns which promote the negative affective outcomes of this behaviour.

Hamilton and Schmidt (2014) used a quantitative approach, therefore questions remain regarding the factors that influenced participants to initially commence drinking alcohol in aquatic settings. Further qualitative investigations would reinforce and complement the work conducted by Abercromby et al. (2020) and provide critical information to minimise the drowning deaths attributed to alcohol consumption in aquatic contexts. While Hamilton and Schmidt (2014) identified new knowledge to understand

why young adults drink alcohol and swim, they only included a male sample which limits the applicability of results to a wider population. Despite males being more prevalent than females in the incidence of alcohol-influenced drownings (WHO, 2014a), it is necessary to include females in such studies, as this field is lacking information on both genders and thus would benefit from research designs incorporating inclusive participant groups.

Public Awareness of Alcohol Risks

The effects of alcohol on an individual's ability to drive a car are well-documented and largely, this practice has become socially and legally unacceptable, yet the challenge remains for the consumption of alcohol whilst in, on and around the water to be viewed in the same way (Chochinov, 1998). Research has focused on the dangers of driving a car after consuming alcohol, with education, health promotion campaigns and law enforcement throughout the Western world contributing to reduced alcohol-related deaths on the roads (Christophersen et al., 2016).

Girasek et al. (2002) recruited a sample of 943 participants (aged 18+ years) through list-assisted random-digit dialling of USA households, for a phone survey investigating their: perceptions of injury prevention; risk-taking; injury history; and, perceived alcohol involvement and supposed protective effects in road traffic incidents. The sample consisted of 63.4% women predominantly from the Midwest and South of the USA. Results showed that most participants believed the myth that alcohol acted as a protective agent against injury in a motor vehicle crash. Responses to a multiple-choice question, found that 57% of those interviewed believed that in a car crash, the drunk passenger would be less likely to suffer injury than the sober passenger, whereas only 35% reported both passengers would be at equal risk. Girasek et al. (2002) did not provide transparent details of survey development, therefore validity and reliability of the measure is unknown, limiting the trustworthiness of the data and subsequent conclusions.

This disregard or unawareness of risk was also reported by Jewell et al. (2004). These authors investigated drinking and driving attitudes and behaviours among 163 college students from a university in the Midwest of the USA (mean age = 20.6 years) immediately before and after a drink driving education program using Fatal Vision Goggles, which gave the visual perception of a specific level of alcohol intoxication. Participants were randomly assigned to one of three groups; using the goggles to perform driving tasks, observers of the group who wore the goggles, and a control group. Overall, male students were significantly more tolerant of drink driving despite knowing the risks, and 29% of those tested reported drink driving at least 10 times in their lifetime. One suggestion for this result is that young adults display a higher tolerance for rule breaking and autonomy needs, therefore are more likely to knowingly participate in negative behaviours (Millstein & Halpern-Felsher, 2002). The experience of wearing the goggles influenced change: comparing pre-test and post-test responses, those wearing the goggles were significantly more likely than the other groups to change their attitudes towards drink driving following the program. The findings of this small study demonstrated that the Fatal Vision Goggles experience may help young people to adopt safer approaches to drink driving and could be integrated into prevention efforts. However, further longitudinal investigations should be conducted to determine effects over time.

Youth risk-taking behaviour has been shown to impact drink driving rates among young adults, but also argued to be contributory is societal acceptance of the behaviour. Sheehan et al. (1996) conducted a 12-week school-based drink driving education program with 4,545 students in 1988. Participants were randomly assigned to a control or intervention group, and surveyed at pre- and immediate post-test on drink driving behaviours, beliefs, intentions and behaviours as a passenger. At the 3-year follow up in 1991, 1,774 (62%) participants (59% female and all aged 17+ years) responded to a

survey similar to the pre-test survey, to ascertain the impact of the program on the same drink driving related values. No longitudinal effect of the program was demonstrated regarding participants' drink driving behaviours, despite initial indication of the program's short-term success. Notwithstanding the lack of significance, fewer participants reported drink driving occurrences in 1991, which Sheehan et al. (1996) attributed to the influence of an important shift in public awareness and social unacceptability of drink driving which coincided with the research. It is therefore difficult to determine whether the education program had an effect, or if the sociocultural expectations were more influential.

Public Awareness of Aquatic-Specific Alcohol Risks

In contrast to drink driving, public awareness and education concerning the use of alcohol whilst in an aquatic setting is lacking (Chochinov, 1998). In a peer-reviewed commentary, Chochinov (1998) claimed society has greater tolerance for risk-taking behaviour when driving a boat as opposed to driving a motor vehicle. This finding was mirrored by a study which analysed Finnish boating and non-boating drownings recorded by the Laboratory of Forensic Toxicology at the University of Helsinki, between 2000 and 2009 (Pajunen et al., 2017). Alcohol was identified in 65% of the 303 boating-related drownings, and 60.7% of the 1,443 non-boating drownings. Pajunen et al. (2017) suggested that the elevated BAC levels (records included BAC levels from 0.05% to $\geq 0.30\%$) almost certainly contributed to the drownings observed. Once again, this study only included cases where the drowning casualty recorded a BAC level of 0.05% or higher and thereby could have missed some relevant records.

These elevated BAC levels in boating-related drownings were also shown in a Swedish investigation that analysed the autopsy reports of 5,125 drownings between 1992 and 2009 (Ahlm et al., 2013). Of the 471 individuals tested who were reported to have

drowned following a fall from a boat, 54% recorded a positive result for alcohol. Legal BAC limits were in place for driving a large boat at the time of the study, but not for smaller recreational boats of less than 10 metres. The variation in the rules associated with drinking alcohol while boating could have influenced the associated rates of drownings, and thus rules regarding alcohol consumption should be considered in future research when analysing the prevalence of alcohol use among boat users.

Howland, Hingson, Heeren et al. (1993) and Howland, Hingson, Mangione et al. (1996) reported outcomes from a telephone survey in the USA which investigated public perception of laws relating to alcohol use whilst boating. Overall, 3,042 participants were recruited (aged 16-94 years, 45% male and 81% White) through a random-digit dialling, two-stage Waksberg procedure (Howland et al., 1993, 1996). The results showed that only one third of participants were aware of laws prohibiting the use of alcohol when operating a boat. One reason postulated to explain the public's unfamiliarity with these laws related to alcohol advertisements involving aquatic locations, hence providing the public with poor information about safe practice (Howland et al., 1993). This unsafe practice was common in the sample, as 61% of the 1,889 participants reported drinking alcohol whilst taking part in an aquatic activity, with boating and swimming the most common pursuits. Interestingly, 56% of those questioned stated that alcohol did not affect their enjoyment levels when in the aquatic environment, and only 2% said they enjoyed the activity more having used alcohol (Howland et al., 1993). While this study provided some insight regarding alcohol use when operating a boat and identifying the gaps in the public's knowledge as to safe practice around water, more recent literature should be consulted and further research conducted to clarify these claims.

An analysis of alcohol-related boating laws in Australia was conducted by Diplock and Jamrozik (2006) through contacting water police forces and via internet

searches to assess the associated recreational boating legislation and enforcement provisions. Laws prohibiting the use of alcohol during recreational boating varied between and within States and Territories. Those upholding such regulations limited boat drivers' BAC to 0.05% and reported conducting random breath tests of boaters (Diplock & Jamrozik, 2006). However, disparities in these rules and provisions for testing led the authors to recommend that national consistency should be ensured throughout Australia. A case study was conducted as part of the same study: alcohol restrictions in public places in the Australian state of New South Wales (NSW) were reviewed. Eighty-six of the 152 shires within NSW responded to the inquiry: only 33 of these reported any restrictions of alcohol use in some aquatic environments, with these limits more common in metropolitan and coastal areas (Diplock & Jamrozik, 2006). The authors stated that while restricting alcohol consumption in land areas adjacent to aquatic contexts would prove difficult, it should be implemented to offer a comprehensive approach to drowning prevention.

To investigate perceptions of countermeasures to prevent prominent fatal injuries in the USA, including drowning, Girasek and Gielen (2003) utilised a random digit dialling approach. The telephone survey included 943 participants—a 35% response rate of the original 6,761 numbers generated. With regard to the drowning prevention results, safety education and promotion was the most commonly perceived countermeasure, followed by changes in laws and regulations and increasing swimming lessons. Isolation fencing was not perceived well by participants, which the authors considered surprising, following the scientific evidence in support of this measure (Girasek & Gielen, 2003). Younger, Hispanic participants were more likely than non-Hispanic participants to identify drowning countermeasures, and overall, participants with higher levels of education were able to suggest countermeasures for all the identified fatal injuries. This

study provided a useful insight of public perceptions of effective measures to prevent drowning, however the authors identified these perceptions appeared to be influenced by socio-economic status, as those from higher economic backgrounds were more likely to have been exposed to safety messaging, products and promotions (Girasek & Gielen, 2003). No investigation was conducted on the actual effectiveness of the suggested countermeasures offered by participants, therefore the suitability and applicability of their suggestions was unassessed.

Education for Drowning Prevention

The WHO publication *Preventing drowning: An implementation guide* provides recommendations for drowning prevention globally, and details the type of research necessary to enhance drowning prevention practice (WHO, 2017c). The report identified a three-step process; (1) analyse existing data and improve data collection; (2) identify risk factors; and, (3) research to improve understanding of intervention effectiveness and implementation (WHO, 2017c, pp. 90-94). In terms of determining the involvement of alcohol in drowning, step 1 has commenced, at least in some HICs, as demonstrated by the synthesis of data from several countries and from a variety of aquatic settings presented in this literature review. Ongoing exploration of coronial data is needed across all aquatic drowning settings for continued monitoring of drowning rates. Step 2 has also commenced, through analysis of coroners' reports and systematic reviews (e.g., Hamilton et al., 2018; Peden et al., 2017; Warner et al., 2000). However, simply identifying the most common risk factors associated with drowned casualties is insufficient. Additional investigations, such as cohort studies, are necessary to further clarify risk factors, to accurately inform prevention efforts. Enhanced activity in Steps 1 and 2 will provide a solid evidence-base of high-quality drowning research to inform new prevention programs to use in Step 3.

Despite these qualms about current drowning research, progress to date has informed attempts to reduce alcohol-related drownings, and some HICs have implemented measures to discourage the use of alcohol around water. Examples include: the *'Don't drink and drown'* campaigns in Australia and the UK (RLSSA, 2018a; RLSS UK, 2018). The methods employed to promote these campaigns' messages include the use of mass media (RLSSA, 2018a; RLSS UK, 2018), presence at community events (RLSSA, 2018c), and increased enforcement (National Association of State Boating Law Administrators, 2019). The campaigns tend to focus on encouraging public recognition of safe activities and behaviours around water, and raising awareness of a danger perhaps not previously considered. While some campaigns have been available and accessible over several years, for example the *Don't let your mates drink and drown* campaign was developed in 2017 and continues to have relevant information available online (RLSSA, 2018a), it is so far unclear to what extent these campaigns and the corresponding messages have been promoted since development.

Notwithstanding the importance of alcohol-themed drowning prevention programs in reducing the rates of alcohol-related drownings, often, these campaigns and others produced across the world by similar organisations are unevaluated, or evaluations are not widely accessible or available, and their effectiveness to achieve active drowning prevention is unknown (Driscoll et al., 2004b). This leaves practitioners, and those wishing to replicate the campaigns, in the dark about how the campaign performed and whether it successfully achieved the desired aims. Without conducting and publishing the outcomes of campaign evaluations, practitioners are unable to develop and enhance previous efforts, and progress will therefore be hindered in preventing alcohol-related drownings.

Summary

Several organisations in HICs have identified the prevalence of alcohol in drownings involving young adults, and consequently recommended that additional research and prevention practice is required to avoid further incidents (e.g., Australian Water Safety Council, 2016; RLSSA, 2019, 2020; The National Water Safety Forum Strategy Working Group, 2015). Associated research has commented on the rates of young adult alcohol-related drownings within the context of other studies, for example, when contextualising the demographics of river drowning casualties, and reviewing coroner reports of drownings (e.g., Peden et al., 2018a; Peden et al., 2017; Warner et al., 2000). Alcohol-focused drowning prevention campaigns have been implemented, (e.g., *Don't let your mates drink and drown*; RLSSA, 2018a), yet evaluations of these campaigns are often unavailable and hence their effectiveness is unknown. Consequently, there is a dearth of research that has focused specifically on young adults' alcohol use in aquatic contexts; to the author's knowledge, only five publications and one abstract have reported empirically investigating this concept in HICs (Abercromby et al., 2020; Enkel et al., 2018; Hamilton & Schmidt, 2014; Ridge & Nimmo, 2018; Sinkinson, 2014; Watt et al., 2012). Sample limitations of this research (e.g., male-only and/or including young people from one university degree program and/or participants only from metropolitan areas) demonstrate that gaps in the literature still exist. Therefore, further research is required to more comprehensively determine factors influencing young adults' involvement in alcohol-influenced aquatic activities, to inform the development of prevention efforts and reduce the drowning rates in young adults.

SECTION TWO

Systematic Review

Publication One Outline

Title: A systematic review of alcohol education programs for young people: Do these programs change behaviour?

This section presents the systematic review project of this PhD (Publication One). Initial aims of this systematic review were to evaluate the effectiveness of alcohol-themed drowning prevention campaigns reported in the peer-reviewed literature, and rate their quality using an evidence-based quality scoring system developed, for the purpose of this review, from health education literature. However, a lack of such peer-reviewed drowning prevention programs resulted in modified aims to determine the quality of general alcohol education programs offered to young people aged 15-24 years, and highlight criteria associated with successful campaigns. As the quality criteria and included studies in this systematic review were not context specific, the findings can be transferred to other contexts to change young adults' alcohol-related behaviours, such as aquatic environments. Therefore, this study addressed the following research questions of this PhD:

1. What does current evidence tell us about the effectiveness of alcohol education campaigns?
2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?

This is the accepted manuscript of the article published by Oxford Academic in Health Education Research in February 2021, available online

<https://academic.oup.com/her/article/36/1/87/6031209?login=true>. This manuscript details a Supplementary File which was submitted to the journal and can be found in Appendix C, which, when viewed digitally, can also be accessed through this link:

[Supplementary File](#). For referencing consistency throughout this thesis, the manuscript is presented in this chapter as a Word document with the references in the style of APA 7th Edition and included in the thesis reference list.

The reference (in APA 7th style) for this publication is as follows:

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Hannah L. M. Calverley	60		07/12/2020
Lauren A. Petrass	25		07/12/2020
Jennifer D. Blitvich	15		07/12/2020

PUBLICATION ONE

A systematic review of alcohol education programs for young people: Do these programs change behaviour?

Abstract

Background: Numerous education programs have addressed young peoples' alcohol use. To date, no peer-reviewed publication has evaluated the effectiveness of such programs delivered across a range of contexts to change alcohol-related behaviours, attitudes and/or knowledge. **Methods:** This systematic review aimed to identify alcohol education programs addressing young people, and determine whether they changed alcohol-related behaviour, knowledge and attitudes; and, ascertain components of successful programs. Studies were identified, guided by the PRISMA review process, from the earliest records until June 2020. **Results:** Included studies ($N = 70$) comprised an alcohol education program which focused on young people (15-24 years). Forty programs reported behaviour changes, and these programs were the highest quality. Others impacted attitudes and/or knowledge only ($n = 12$); or reported no impacts ($n = 17$). Recent programs were more likely than older programs to feature online delivery and report behaviour changes. **Conclusions:** To enhance alcohol education, future programs should include the identified quality criteria, alongside process and long-term outcome evaluations, to better monitor effectiveness. Findings indicated some education programs have capacity to positively change alcohol-related behaviour; however, outcome consistency varied even in high-quality programs. Alcohol education programs should be designed alongside health education/promotion models and best-practice recommendations, to improve the likelihood of desirable behaviour-related outcomes.

Introduction

The World Health Organization (WHO) identified adolescents (aged 15-19 years) as a high-risk group for alcohol-related harm, including, injuries, falls or violence (WHO, 2018c). Despite legal age limits for consumption, many young people have consumed alcohol before the authorized age (Barry et al., 2016; Kosterman et al., 2001) and on occasion, drink to excess and participate in hazardous behaviour (WHO, 2018c). High-income countries, such as those within Europe, North America and the Western Pacific, record heavier drinking among this age group than do low/middle-income countries, and also record more treatments and associated interventions and policies (WHO, 2018c). However, methods for prevention differ between and within high- and low/middle-income countries as they are often dependent on available resources, associated laws and legislation and government priorities (WHO, 2018c). As a result, efforts to reduce adolescents' alcohol use are inconsistent.

A large number of educational programs address alcohol use among early teenagers (aged 11-16 years) through to early adulthood (18-24 years) (Hingson et al., 2017; Kloep et al., 2001) and a plethora of studies has investigated whether alcohol education programs positively change young peoples' alcohol practice (e.g., Patton et al., 2013; Tanner-Smith & Lipsey, 2015), which may subsequently reduce their risk of alcohol-related harm. Yet, questions remain within the injury prevention and public health domain as to whether educational programs are scientifically rigorous, effective, practical and capable of widespread adoption (Hanson et al., 2012). Health promotion experts and community leaders have suggested that even when programs are research-based and efficacious, they may not always meet community requirements as they are too difficult, costly, or complex to integrate with pre-existing activities, or may be difficult to translate

into practice (Dzewaltowski et al., 2004; Green & Mercer, 2001). To address adoption barriers, Cohen and Swift (1999) recommended aligning development and implementation of education programs with a multi-component, systems approach through their model – The Spectrum of Prevention. The six levels of this model interrelate and complement one another, facilitating the development of injury prevention programs, and encouraging developers to adopt a multifaceted approach to program delivery (Cohen & Swift, 1999). The Public Health Model upholds a similar approach, comprehensively addressing health and social issues and recognising that multiple factors contribute to causing harm (Hanson et al., 2012). These models provide examples of frameworks for a continuum of research that could move beyond a primarily educational approach (Cohen & Swift, 1999; Hanson et al., 2012). Both models recognise the importance of early and ongoing engagement and the contribution of stakeholders, including researchers, practitioners, policy makers and the community, for success (Cohen & Swift, 1999; Hanson et al., 2012).

For health education programs to be considered successful, they should be behaviourally-focused and address factors that influence health behaviour, including personal knowledge and attitudes (Goldberg & Wright, 2017). It is of note however, that some programs focus solely on, and/or only report changes in knowledge and/or attitudes, remaining silent about behaviour. In the context of alcohol education, limited evidence exists to determine whether education programs are effective in reducing alcohol-related behaviours, as behaviour change results are often self-reported, not reported or not robustly measured. Systematic reviews of alcohol education for young people have typically considered a specific contextual area of focus, synthesised the type of prevention programs being conducted, and compared knowledge-only programs against comprehensive programs for preventing alcohol use (Lemstra et al., 2010; Teesson et al.,

2012). The prevalence of young people experiencing alcohol-related harm (WHO, 2018c) demonstrates the need for more detailed understanding of whether education programs are effective, and if so, which factors influence program success for this age group. Previous reviews have identified factors which are influential in changing young peoples' substance use behaviours, and recommended these factors/criteria be incorporated into prevention efforts to enhance the likelihood of success (Cuijpers, 2002; Pentz, 2003; Thom, 2017). However, to the authors' knowledge, to date there is no published systematic review that has: included alcohol education programs covering a variety of contexts where young people (defined for this study as adolescents and young adults aged 15-24 years) consume alcohol (e.g., drink driving, binge drinking, university drinking); confirmed whether those programs have resulted in positive changes in alcohol-related behaviour; and, identified the components most commonly associated with program success.

Accordingly, the primary aim of this systematic review was to determine whether participation in alcohol education programs resulted in significant, positive alcohol-related behaviour change for young people (aged 15-24 years), which may reduce their risk of alcohol-related harm. Assuming the confirmation of this aim, a secondary aim was to rate the quality of the alcohol education programs reviewed and ascertain the key program components that were utilised within successful educational programs. The identification of components associated with successful alcohol education programs would benefit practitioners seeking to reduce this age group's alcohol consumption in novel contexts, such as aquatics (Calverley et al., 2020), cycling (Airaksinen et al., 2018) and rural locations (Valentine et al., 2008).

Method

This systematic review was guided by the PRISMA checklist (Moher et al., 2009).

Search Strategy

Six bibliographic databases (Scopus, CINAHL complete, Drug Informit, PsychInfo, Web of Science and PubMed) and Google Scholar were searched from the earliest records available to June 2020. Multiple databases ensured maximum recall of relevant articles (Bramer et al., 2017). Databases were chosen because of the relevance and scope of the journals they covered, as well as their focus on alcohol and the social, behavioural and life sciences.

Only English search terms were included, with numerous keywords and synonyms used to capture all potentially relevant articles. In addition, wildcards, related terms and truncation search features were implemented. The search included the terms: “alcohol” or “drinking behaviour” in conjunction with “education” or “education program” or “program evaluation” or “intervention” or “campaign”. These were combined with “young people” or “youth” or “adolescent” or “students” or “young adults” or “teenagers” or “college students”. Due to the nature of the exclusion criteria it was necessary to add “NOT” in some searches, these included the following: “drug” or “smoking” or “cigarette” or “HIV” or “tobacco” or “Fetal Alcohol Spectrum Disorder”. All potentially relevant references were downloaded into Endnote software and duplicates removed. One author reviewed titles and abstracts of identified articles for suitability, and potentially relevant articles were retrieved and assessed for inclusion (based on reading the full text). Reference lists of all inclusions were hand searched for further studies (see Fig. 7 in the Supplementary File in Appendix C for detailed description of search strategy). Hand searching identified newly published manuscripts that were unavailable when initial searching occurred. All articles were independently reviewed for inclusion by two researchers, with disagreements resolved through discussion.

Selection Criteria

Studies were included if they met all of the following criteria: (i) the study comprised an alcohol education program that targeted young people aged 15-24 years. Where age range was not reported, mean age was used; if the age range covered part of the target age, the article was included; if no indication of age was given, the article was excluded; (ii) the sole focus of the program was alcohol, not a combination program addressing drugs/tobacco etc. and not relating to rehabilitation; (iii) participants were: not mandated to take part; not alcohol dependent/criminals/violators of alcohol use regulations; and/or not selected based on specific drinking habits such as 'heavy' or 'risky'; (iv) the study reported at least two time points of observation (i.e. pre-program and/or during, and post-program); and (v) evidence of the program outcome was reported. Conference abstracts, dissertations, theses and articles published in non-peer-reviewed journals were not included for review and publication language was restricted to English.

Quality Assessment

Several reviews and/or original research studies, published in Quartile 1 and 2 journals (Quartile 1 to Quartile 4 refer to journal ranking quartiles within a subdiscipline using the scientific journal rankings citation index, which is an index of weighted citations per article over a period of three years), in the area of substance misuse among young people have identified evidence-based quality criteria for assessment of prevention programs (Cuijpers, 2002; Pentz, 2003; Thom, 2017). As this review focused on synthesising education programs, a compilation of these criteria led to the development of 10 quality criteria used in this review to determine program quality (Table 2). The criteria selected aligned with best practice approaches for harm-reduction, evidence-based programs targeting alcohol-related behaviour in young people (Cuijpers, 2002; Foxcroft et al., 2003; Kelly-Weeder et al., 2011; Pentz, 2003; Stigler et al., 2011; Thom, 2017): the

focus typical of health promotion and injury prevention models (Spectrum of Prevention; Cohen & Swift, 1999; Translating Research into Injury Prevention Practice Model; Finch, 2006; e.g., Public Health Model; Hanson et al., 2012). To determine the quality criteria covered in the included studies, two researchers independently coded all articles. Any disagreements were resolved through discussion.

Table 2

Quality criteria to assess alcohol education programs for young people aged 15 to 24 years old.

Stage of Program	Number	Quality Criteria	Description of Criteria
Pre-program	1.	Based on theoretical framework/s	The program was underpinned by a theoretical framework or model in the development, implementation and evaluation phases.
Pre-program	2.	Culturally and context sensitive content	The program considered: (i) the influence of the content on different social groups; and (ii) the cultural relevance of the content to the target group. Where relevant, the program was adapted to suit target groups.
Pre-program	3.	Comprehensive interactive training for program providers	Suitable training was provided for those who conducted the program. Training was interactive with opportunities for: discussion of ideas; thoughts regarding the content; and, trainees to receive personal feedback.

Stage of Program	Number	Quality Criteria	Description of Criteria
Within-program	4.	Interactive approach to delivery	The program included interactive methods of delivery for participants and provided opportunities for: discussion of ideas; thoughts regarding content; and, receiving feedback.
Within-program	5.	Multicomponent approach to delivery	Communities, parents, media and/or other familiar environments were incorporated for delivery of the prevention messages and to educate the target group.
Within-program	6.	Skills training to build resilience	The program included elements that allowed participants to develop and practice skills for certain situations, for example, alcohol refusal techniques under peer pressure and methods to monitor personal drinking on nights out.
Within-program	7.	Accurate content about peer behaviours and social norms	The program provided accurate and relevant details about peer alcohol use to offset incorrect beliefs and common misunderstandings.
Within-program	8.	Developmentally appropriate information for the target age group	Information provided was appropriate to the participants in their current circumstances and prepared them for likely situations they could encounter.
Within-program	9.	Used peer leaders	Peer leaders were involved with delivery of program content, as implementers or assistants. For this purpose, peer leaders refers to individuals of the same age or situation as the participants for example, fellow classmates or other university students.
Post-program	10.	Provided resources to reinforce content	Participants received materials that reinforced the educational messages.

As no evidence exists regarding which factors were most influential to the success of a program, each criterion was equally weighted and a score of 1 was allocated for each criterion addressed. Hence, the overall quality score became a score out of 10 (see Table 2). A rating of ‘excellent’ was allocated to studies that covered 9-10 of the quality criteria; ‘very good’ for studies that covered 6-8 criteria; ‘adequate’ for studies that covered 4-5 of the criteria; and ‘poor’ for studies that measured up to 3 criteria.

Results

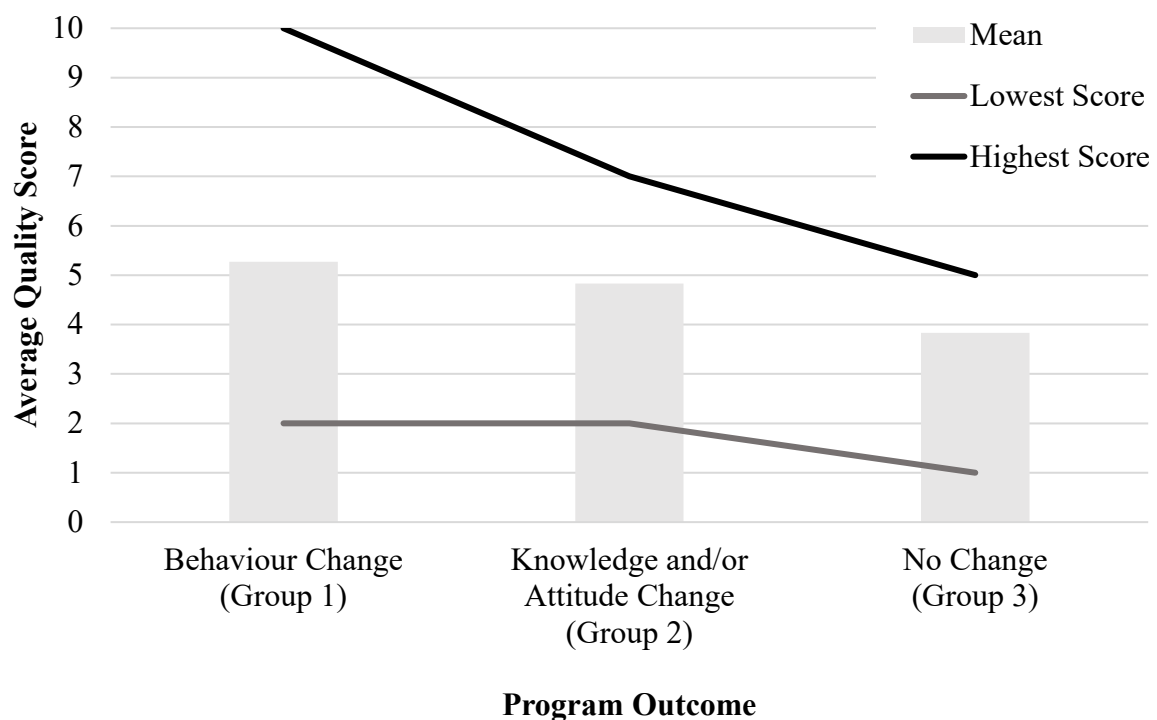
In total, 70 studies met the inclusion criteria. These included alcohol education programs delivered as interactive health communication (e.g., Bewick et al., 2010), within the community (e.g., Bordin et al., 2003) and/or through media advertising (e.g., Lalonde et al., 1997). Most programs addressed college and university student drinking habits and behaviours. Others focused on high school students, drunk driving and alcohol use among young people in the military. Quality scores ranged from 1-10, with a mean score of 4.8 (\pm 1.72). Randomised control trial (RCT) was the most common study design, 58% of the included studies. This design was more commonly used in studies reporting program effects on behaviour (60%); however 58.8% of studies reporting no changes also used an RCT design. Other less frequently used designs were quasi-experimental studies (14.5%), cohort studies (11.6%) and cross-sectional studies (4.3%). Table 19 in the Supplementary File (Appendix C) provides brief program details, including study design; publication date; sample size and age; quality score; group categorisation; and a summary of results for each included study.

Aligned with the secondary aim of this review, to identify the components associated with successful alcohol education programs, only programs that reported positive changes, that is, improved alcohol-related behaviour, knowledge and/or attitudes, were included in this component of the analysis. This resulted in the removal of one study

(Midford et al., 2000) that reported significant increases in alcohol use amongst participants at the post-test. For reporting in this review, programs were categorised into one of three groups based on program outcome (i.e., Group 1: positively changed participants' alcohol-related behaviours; Group 2: improved attitudes towards alcohol use and/or enhanced alcohol-related knowledge; Group 3: reported no change) and the results are discussed accordingly (Fig. 5).

Figure 5

The mean quality score and range presented according to program outcome.



Programs categorised into Group 1 ($n = 40$) demonstrated changes to participants' behaviour. For 50% of these programs, changes in behaviour were observed among some participant subgroups (e.g., males only), whereas for the remaining 50%, behaviour

changes were recorded across all participant subgroups. For 17.5% of programs in Group 1, behaviour change occurred in conjunction with changes in knowledge and/or attitudes (Bernstein et al., 2018; Bingham et al., 2011; Buckner et al., 2019; Doumas et al., 2020; Glider et al., 2001; Shope et al., 1996; Wodarski, 1987), indicating the ‘gold standard’ for alcohol education outcomes. The remaining programs in Group 1 did not impact participants’ knowledge and/or attitudes, or these aspects were not reported. Programs in Group 2 only reported knowledge and/or attitude changes, for example: increased awareness of harm reduction techniques to minimise negative effects of alcohol, such as alternating alcoholic and non-alcoholic drinks (Haleem & Winters, 2011); further awareness of alcohol overdose (Reis et al., 2000); and, reductions in perceptions of peer drinking, that is, estimations of how much alcohol their peers consumed (Doumas et al., 2017). Among programs only changing knowledge and/or attitudes (Group 2), 83% reported that they aimed to change behaviour among participants, but failed to do so. Programs in Group 3 reported no significant effects on any of the measured criteria which they intended to change, be that attitude, knowledge and/or behaviour.

Year of Program Delivery

Programs that met the inclusion criteria dated from 1983 to 2020: programs from 2010-2020 were more likely than earlier programs to report effects on behaviour, and consequently were more prevalent in Group 1. A notable change over time has been the inclusion of an online component of programs. Approximately 23% of programs conducted before 2010 included an online delivery component, and all of these were conducted from 2000. In contrast, among programs from 2010-2020, just over 71% of programs were either entirely online, or involved an online component. From 2013, programs began to include text messaging as another way to communicate program details and feedback.

Program Quality

Based on the quality scores determined within this systematic review, Group 1 programs received the highest quality rating (Mean = 5.3 ± 1.82) containing on average more quality criteria than the other groups; followed by Group 2 (Mean = 4.8 ± 1.53); and lastly Group 3 (Mean = 3.8 ± 1.15). Table 3 lists the included quality criteria for each Group along with relevant design factors of the studies.

Table 3

Percentage of studies in each Group including the quality criteria and study design components.

	Group 1 (Behaviour changes)	Group 2 (Attitude and/or knowledge changes)	Group 3 (No changes)	Total
Studies	(Bedendo et al., 2019a; Bedendo et al., 2019b; Bernstein et al., 2018; Bewick et al., 2013; Bingham et al., 2011; Bordin et al., 2003; Borsari & Carey, 2000; Braitman & Henson, 2016; Braitman & Lau-Barraco, 2018; Buckner et al., 2019; Caudwell et al., 2018; Dumas & Andersen, 2009; Dumas et al., 2020; Dumas & Haustveit, 2008; Ganz et al., 2018; Glider et al., 2001; Hallgren & Andreasson, 2013; Hardoff et al., 2013; Haug et al., 2017; Haug et al., 2013; Hausheer et al., 2018; Hustad et al., 2010; Jander et al., 2016; Kazemi et al., 2011; Kessler & Kurtz, 2019; LaBrie et al., 2008; LaBrie et al., 2007; Larimer et al., 2001; Lovecchio et al., 2010;	(Croom et al., 2009; Dumas et al., 2017; Dumas et al., 2014a; Haleem & Winters, 2011; Hallgren et al., 2011; Harrington et al., 1999; Lalonde et al., 1997; McCarty et al., 1983; Paschall et al., 2006; Reis et al., 2000; Thadani et al., 2009; Wood et al., 2009)	(Bewick et al., 2010; Brannon & Pilling, 2005; Bremberg & Arborelius, 1994; Dumas et al., 2014b; Geshi et al., 2007; Gilbertson, 2018; Gmel et al., 2012; Hallgren et al., 2009; Jewell & Hupp, 2005; Lane et al., 2012; McKay & Dunn, 2015; Murphy et al., 2001; Palfai et al., 2014; Peleg et al., 2001; van Leeuwen et al., 2013; Werch et al., 2000; Zamboanga et al., 2019)	69 studies

	Group 1 (Behaviour changes)	Group 2 (Attitude and/or knowledge changes)	Group 3 (No changes)	Total
Studies (continued)	Martinez-Montilla et al., 2020; Mattern & Neighbors, 2004; Moore et al., 2005; Neighbors et al., 2009; Norman et al., 2018; Riordan et al., 2015; Schulte, 2010; Sheehan et al., 1996; Shope et al., 1996; Stahlbrandt et al., 2007; Wodarski, 1987)			
Program Criteria				
1. Based on theoretical framework/s	49%	67%	33%	50%
2. Culturally and context sensitive content	95%	100%	94%	96%
3. Comprehensive interactive training for program providers	20%	20%	11%	17%
4. Interactive approach to delivery	54%	50%	56%	53%
5. Multicomponent approach to delivery	29%	0%	17%	15%

	Group 1 (Behaviour changes)	Group 2 (Attitude and/or knowledge changes)	Group 3 (No changes)	Total
6. Skills training to build resilience	49%	33%	17%	33%
7. Accurate content about peer behaviours and social norms	83%	50%	44%	59%
8. Developmentally appropriate information for the target age group	100%	100%	89%	96%
9. Used peer leaders	10%	8%	11%	10%
10. Provided resources to reinforce content	37%	33%	11%	27%
Study Design Components				
Used a control group	68%	80%	53%	67%
Follow up period longer than 1 year	18%	25%	18%	20%
Program lasted longer than 1 day	53%	42%	53%	49%

Table 3 shows the most commonly used criteria among all groups were criteria 2 (culturally and context sensitive content) and 8 (developmentally appropriate information for the target age group), and the least commonly used criteria were 3 (training for program providers), 5 (multicomponent delivery) and 9 (used peer leaders). No evidence existed as to which of the quality criteria were more influential for program success across a range of contexts, therefore the criteria in this review were not weighted and hence, for some programs, quality may have been misrepresented. For example, some programs scoring high quality in this review found no program effects, despite aiming to improve alcohol-related behaviour, knowledge and/or attitudes, and cannot be considered to be effective programs. This suggests that some criteria are more influential to program success than others; however, this review does not provide sufficient clarity to detail which criteria should be more heavily weighted.

Discussion

The alcohol education programs reviewed for this paper varied in quality as measured by the tool described in Table 2, although most programs that met the inclusion criteria achieved a score of at least ‘adequate’ (mean value 4.8 out of 10 quality criteria). Of the programs reviewed, 58% resulted in behavioural changes among the participants. This confirms that alcohol education programs aimed at young people can induce desired behaviour changes, and practitioners can apply these results to address young peoples’ alcohol consumption in various mainstream (e.g., schools) and novel (e.g., aquatics) contexts—a finding which could enhance programs in contexts with little research evidence.

Some programs demonstrated positive changes in knowledge and/or attitudes, but did not report changes in behaviour. Only some of these indicated that they aimed to change behaviour, despite behavioural change being considered a primary outcome for

reducing risk (Gielen & Sleet, 2003). While positive change in knowledge and attitudes is desirable, the overall success of such programs must be considered limited, as changes in knowledge and attitude are often shown not to align with actual behaviour change (Doll et al., 2007). Unless programs facilitate a behaviour change, the applicability of these results to real-life practice is questionable (Naidoo & Wills, 2009), a critiqued aspect of education programs generally (Hanson et al., 2012). Thom (2017) recommended that adolescent-focused alcohol education programs should aim to induce behaviour changes, through realistic approaches to reduce use or frequency, rather than abstaining altogether (Thom, 2017). Thom considered that this approach was more likely to result in effective education programs (Thom, 2017).

Some criteria were more frequently implemented than others across programs: criteria 2—providing culturally and contextually sensitive content, and criteria 8—developmentally appropriate information for the target age group were included in 96% of programs. Only 10% included criteria 9 (used peer leaders), perhaps related to the limited experience of this age group (15-24 years) to effectively deliver content to their peers. The most successful programs in this review, those effecting a behaviour change, included more of the quality criteria than those not inducing behaviour change. As the quality criteria corresponded to the focus typical of health promotion models, it could be speculated that programs with a higher quality score may be better aligned to such models than are lower scoring programs, but this requires investigation. Our findings lead us to recommend that researchers and practitioners consider all 10 criteria as part of program design and implementation, to ensure programs have the greatest likelihood of success in changing behaviour.

Examination of programs in this review demonstrated that many programs (of high and low quality) were delivered over a short period, such as a one-off program, and

included only short-term follow up evaluations, of up to six months. With only short-term evaluations, it is not possible to provide evidence of ongoing impact and therefore the extent of influence remains unknown (Foxcroft et al., 2003). To enhance the applicability of the current criteria for program assessment, and to encourage high quality program delivery, it is suggested that long-term outcome evaluation, as well as process evaluation during implementation, be included as an 11th criterion in the quality criteria measure. To provide evidence of long-term retention, measurement of outcome evaluation is required at periods after program cessation, in addition to the typical immediate post-program evaluation. The inclusion of process evaluation during implementation (Green & Kreuter, 2005b), to identify any aspects of program delivery requiring improvement, can also enhance program success. With such extensive evaluation, the value of programs can be confirmed.

An important limitation of many of the programs reviewed was the omission of a control group and the absence of an intention-to-treat (ITT) approach, with only three studies referencing ITT in their analyses (Haug et al., 2017; Martinez-Montilla et al., 2020; Norman et al., 2018). Several studies reported not retaining all original participants for the final analyses, and many made no mention of initial and final participant numbers. Without an ITT approach, program impact may be misrepresented, as those not retained at post-program evaluation are not considered in the results (Bollini et al., 1999; Hollis & Campbell, 1999).

Similarly, 33% of the programs reviewed (e.g., Glider et al., 2001; Haug et al., 2013) did not include control groups making it difficult to ascertain the influence of the program on behaviour without a comparison group and limiting the capacity to effectively demonstrate significant behaviour-related outcomes, thus misrepresenting the quality of the program. Foxcroft et al. (Foxcroft et al., 2003) recognized that the lack of a

suitable control group was one of the factors that contributed to poor quality programs identified in their review of primary prevention for alcohol misuse in young people. For some studies, the inclusion of a control group can be difficult, as problems can arise through: contamination from program participants; control participants receiving program exposure; or, issues with appropriately matching the control to the program participants (Valente, 2002). In addition, the use of a control group may not be feasible for those aiming to have an ecologically valid study instead of one with a strong research focus, as this enhanced control could limit the generalisability of the program outcomes (Salkind, 2010). Despite these difficulties, it is recommended that practitioners and researchers endeavour to include control groups in their program evaluations, to ensure outcomes accurately represent the program's capacity prior to more extensive program implementation.

The comparative cost of implementing programs of different lengths was not considered in this review; however subjective evaluation of programs based on details provided indicates that some methods would be more time-intensive and expensive to deliver than others (e.g., Bordin et al., 2003). It is likely that high cost and time commitment could be inhibiting factors that would limit replicability or adoption in the context of busy school education systems, under-resourced health departments, or in community groups that depend on volunteers. Similarly, low-cost programs could also have disadvantages, as funding limitations could restrict the scope of program design, delivery, availability of appropriate resources and evaluation of program success.

The variability in outcomes among programs considered in this review is consistent with the findings of previous systematic reviews (Flynn et al., 2015; Foxcroft & Tsertsvadze, 2012; Korczak et al., 2011; Lee et al., 2016) and raises questions about which prevention approaches should be prioritised for young people. It is important to

highlight that demonstrating the impact of education programs addressing young peoples' alcohol-related behaviour could be curbed due to program delivery at a time when this age group has a tendency for extending personal boundaries, increased autonomy and the opportunity for new experiences, such as their first alcoholic drink (Midford et al., 2000; Millstein & Halpern-Felsher, 2002). Calls have been made for continuing education prevention efforts throughout this “risky developmental time frame” (Neighbors et al., 2006, p. 306).

To enhance the quality of non-context specific alcohol education programs for young people, we recommend that, at least until criteria weighting information becomes available, practitioners consider all the quality criteria used in this review. In accordance with prior literature, it is also recommended that future programs consult health promotion and education theories and models when designing, implementing and evaluating programs, to ensure programs are evidence-based and align with best practice (Grim & Hertz, 2017). Other relevant recommendations from prior literature include: draw on the combined expertise of researchers, policy makers and practitioners to generate scientifically rigorous, effective programs that are relevant to the target group and capable of widespread adoption; and, incorporate comprehensive program evaluation, including process, impact and outcome evaluation to maximise the likelihood of program success (Dake & Jordan, 2017). Adoption of these recommendations by researchers and practitioners should result in the development and implementation of evidence-based, high quality prevention programs.

A further improvement for program developers to consider is the importance of transparency and detailed guidance, for those wishing to replicate programs and/or adapt the programs to be applied in other contexts. For example, within this review, e-CHUG was utilised for 10 separate projects by five different lead authors between 2008 and 2020

(Doumas & Andersen, 2009; Doumas et al., 2017; Doumas et al., 2020; Doumas et al., 2014a; Doumas et al., 2014b; Doumas & Haustveit, 2008; Ganz et al., 2018; Hausheer et al., 2018; Hustad et al., 2010; Lane et al., 2012) and each produced different results and outcomes. Generally, the quality scores increased as time progressed (scores ranged from 3 to 5) but there was no obvious improvement in behavioural outcomes over this time. It appears practitioners modified program delivery but with little impact on the effectiveness of e-CHUG to encourage behavioural changes. With more transparency and sharing of methods and findings, program implementation could have been altered in light of prior attempts to improve the e-CHUG program and enhance outcomes.

Further, this review showed that web-based and online programs, such as e-CHUG and AlcoholEdu, have become increasingly common since 2010. Contradictory results have been reported in the literature as to the effectiveness of online/technology methods for prevention (e.g., Kiluk et al., 2019; White et al., 2010), and caution has been advised when implementing programs with online components, due to variations in study design quality and applicability of the findings (White et al., 2010). It is of note that one of the quality criteria implemented within this review referred to the interactive nature of program delivery. For many of the online programs reviewed, there was insufficient detail in publications to determine the extent of this interaction; however it is well known that interactions in an online environment are different to a face-to-face context. With expanding use of technology for educational purposes, the nature and effectiveness of online interactions may need further investigation to ensure suitability.

A limitation of the publications considered within this review is that no indication was provided as to whether participants' pre-program behaviour was positive or negative and this may have affected the capacity for the programs to demonstrate improved alcohol behaviour. If participant behaviour was already positive in relation to alcohol, it

may be difficult, or perhaps not even necessary, for programs to demonstrate significant change. This factor was not considered in the publications reviewed.

Limitations of the Review

The purpose of this review was to determine whether alcohol education programs for young people could be effective in improving their alcohol-related behaviour; and if so, to ascertain key program elements used in successful programs. To achieve these aims, we categorised programs based on program outcomes (Group 1: Behaviour Change; Group 2: Knowledge and/or Attitude Change; and Group 3: No Change), without reference to study design. We acknowledge that study design limitations, such as the absence of a control group, or no long-term retention assessment, can limit the identification of program outcomes, potentially resulting in Type 1 or 2 errors. It was not considered appropriate, however, to add a ‘study design’ criterion to the quality criteria used in the review, as the selected criteria were justified based on evidence-based findings and were designed to ‘measure’ the content and delivery of intervention programs in a practical, real-world environment. This approach is different to the more usual review of research designed in the ‘experimental’ environment.

A further limitation of this review is that it was limited to studies published in English within peer-reviewed literature; therefore, relevant programs that were not written up for publication, or were presented in a different language, were omitted.

Conclusion

While alcohol education programs aimed at helping young people to develop positive alcohol behaviours have been implemented widely, the outcomes of such programs have been mixed. This study sought to (i) assess whether alcohol education programs can change young peoples’ alcohol-related behaviour, and (ii) detail, using an

evidence-based scoring system, the criteria associated with successful programs. This review confirmed that education programs can induce alcohol-related behaviour changes in young people, but the recorded outcomes are dependent on program design and implementation—a finding which can be utilised by practitioners in various contexts and has not been considered in previous systematic reviews.

Despite the relationship between high quality scores and effects of programs on participant behaviour, a high scoring program did not always predict behaviour change or impact alcohol-related knowledge and/or attitudes, and in part this is likely due to an absence of quality criteria weighting. To enhance the success of future alcohol education programs in influencing behaviour changes, it is recommended the quality criteria in this review are considered alongside suggestions from injury prevention, health promotion and health education literature when designing, implementing and evaluating education programs. These recommendations, combined with more evaluative research of alcohol education within various contexts for young people, and more transparent sharing of successful programs, will help to ensure alcohol programs are high quality and contribute to the reduction of alcohol-related harm in all contexts where young people are at risk.

SECTION THREE

Program Audit

Publication Two Outline

Title: Alcohol-focused drowning prevention campaigns: What do we know, and what should we do now?

This section presents the Program Audit project of this PhD (Publication Two), which reviewed alcohol-themed drowning prevention programs conducted within HICs, with a view of critiquing and providing recommendations for best practice. It addressed the following research questions of this PhD:

2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?
3. How have aquatic-focused alcohol education campaigns targeted behaviour change among at-risk groups?

This study was accepted and published in the *International Journal of Aquatic Research and Education* in April 2020. A copy of the accepted manuscript is presented here, and the version of record is provided in Appendix D. For referencing consistency throughout this thesis, the manuscript is presented in this chapter as a Word document with the references in the style of APA 7th Edition and included in the thesis reference list. The reference (in APA 7th style) for this publication is as follows:

Calverley, H., Petrass, L., & Blitvich, J. (2020). Alcohol-focused drowning prevention campaigns: What do we know and what should we do now?

The author contribution details for this manuscript (in agreed order of author listing) are:

Full Name	Share of contribution (%)	Signature	Date
Hannah L. M. Calverley	65		07/12/2020
Lauren A. Petrass	20		07/12/2020
Jennifer D. Blitvich	15		07/12/2020

PUBLICATION TWO

Alcohol-focused drowning prevention campaigns: What do we know, and what should we do now?

Abstract

Alcohol and drugs have been identified as key risk factors for youth (aged 15-24 years) and adult drownings in high-income countries (HIC). Whilst alcohol specific drowning prevention education programs have been developed and implemented, youth continue to be over-represented in drowning statistics, including those linked with alcohol. Therefore, this project aimed to: (i) review and assess all alcohol themed drowning prevention campaigns within HICs; (ii) determine whether the campaign had undergone evaluation for effectiveness; and (iii) provide recommendations to improve the effectiveness of future interventions. For each of the eighty-one HICs identified for the 2019 fiscal year, searches of peer-reviewed literature (through academic databases) and grey literature (through webpages and emails to organisations) were conducted. Twelve alcohol focused campaigns were identified, with only two providing limited information about program evaluation. For most campaigns identified, there was a dearth of information available and therefore assessment of campaign quality was unfeasible. This brief report highlights a lack of alcohol themed drowning prevention campaigns in HIC, and an absence of evaluations on their effectiveness. Implications associated with a lack of program evaluation are discussed and adoption of the recommendations from this brief report should enhance the quality of future research in this area.

Introduction

In High Income Countries (HIC), drowning is one of the top five causes of death for people aged 1 month to 24 years, with over 17% of all drownings in these nations involving this age group (World Health Organization, 2014a). To date, research has typically focused on identifying the overall drowning problem, and the implementation and evaluation of drowning prevention strategies for children aged under five years (for example Leavy et al., 2016), however there remains a lack of understanding of how best to prevent drowning in the later age groups.

Risk factors for youth drowning are dependent on several variables, including: age; gender; aquatic location; country of residence; and frequency of exposure to aquatic settings (Quan, 2014a). Alcohol and drug use has been identified as a key risk factor, influencing 25-50% of drownings amongst youth (aged 15-24 years) and adults (Howland & Hingson, 1988; Quan, 2014a; Quan & Cummings, 2003). In the UK between 2013-2017, 451 drowning fatalities were found to have involved alcohol and/or drugs: representing 29% of all unintentional drownings (Royal Life Saving Society - UK, 2018). In Australia, alcohol was shown to be involved in 21% of all fatal drownings (Peden et al., 2017), and 24% of all male drownings, with 67% of males who tested positive for alcohol recording a blood alcohol concentration of greater than 0.05% (Peden et al., 2017). Despite the development and implementation of alcohol specific drowning prevention programs in HICs, young people continue to be over-represented in drowning statistics, including those with alcohol involvement.

When analysing effective methods to deliver health education to young people, previous research has indicated variable success of media, including social marketing media campaigns (Glider et al., 2001) and public service announcements (Brannon &

Pilling, 2005) to incite behaviour change. Previous publications have indicated that for a youth alcohol education campaign to be successful, it should comprise several elements, including: a theoretical underpinning; specificity to the target group, including culturally and context sensitive and developmentally appropriate information; comprehensive interactive training for the program providers; interactive and multicomponent delivery, including peer leaders; skills training for high pressure situations involving alcohol; provision of information relating to peer behaviours and social norms; and effective resources to reinforce prevention messages (Cuijpers, 2002; Foxcroft et al., 2003; Pentz, 2003; Thom, 2017). However, it is unclear if any alcohol themed drowning prevention campaigns align with such recommendations for effective practice.

No peer-reviewed literature is available on the evaluation and/or effectiveness of alcohol influenced drowning campaigns (Quan et al., 2008; Ramos et al., 2015). It is important to note that not all published research appears in peer-reviewed publications, with grey literature also providing an avenue for disseminating research of potential high quality (Bailin & Grafstein, 2010): however, the quality can vary considerably as it does not undergo a peer review process. Further, as grey literature may be distributed privately within organisations, or published outside the traditional academic publishing channels, searching is more time consuming and information can be difficult to discover and access (Osayande & Ukpebor, 2012).

Therefore, the primary aim of this paper was to search comprehensively both the peer-reviewed and grey literature to (1) identify all available information about alcohol themed drowning prevention campaigns in HIC; (2) identify and assess the information provided to the targeted groups to maximise the likelihood of success; and (3) identify whether campaigns had undergone evaluation for effectiveness. Finally, the paper

provides recommendations to improve practice, with the explicit goal of enhancing the effectiveness of future interventions.

Method

A comprehensive search was conducted for literature on alcohol-focused drowning prevention campaigns in HIC. A list of HIC were identified from The World Bank Group (2018) for the 2019 fiscal year, and for the purpose of this study, drowning campaigns were defined as campaigns or information made available with a direct focus of preventing death by drowning. The inclusion criteria required campaigns to specifically focus on the role of alcohol in drowning and heavily incorporate this within the prevention and education messages. Campaigns were excluded if their prevention messages did not provide details about alcohol and its involvement in drowning risk. The age focus of the campaigns was recorded to identify commonly targeted age groups, but no age restrictions were applied within the inclusion criteria due to the infrequency of alcohol themed drowning prevention programs.

Search Strategy

The search strategy logic is outlined in Figure 6. We began by reviewing drowning prevention webpages for each of the identified HIC and used The International Life Saving Federation (2018) Member Federations webpage to assist in finding websites for drowning prevention and/or lifesaving groups and organisations within each of the 81 HIC. Where a webpage was provided and accessible, if necessary, it was translated into English, and searched for references to ‘alcohol’ or equivalent. If no page was listed, the country, along with the terms “drowning prevention” and/or “water safety”, were searched using Google. All identified and relevant webpages were searched for references to ‘alcohol’ or the equivalent translation. If no relevant sites were found, the

country was referred to as ‘unable to find information’ (n=23). In total 71 websites were analysed and records on these pages were reviewed from the earliest available through to 1st November, 2018.

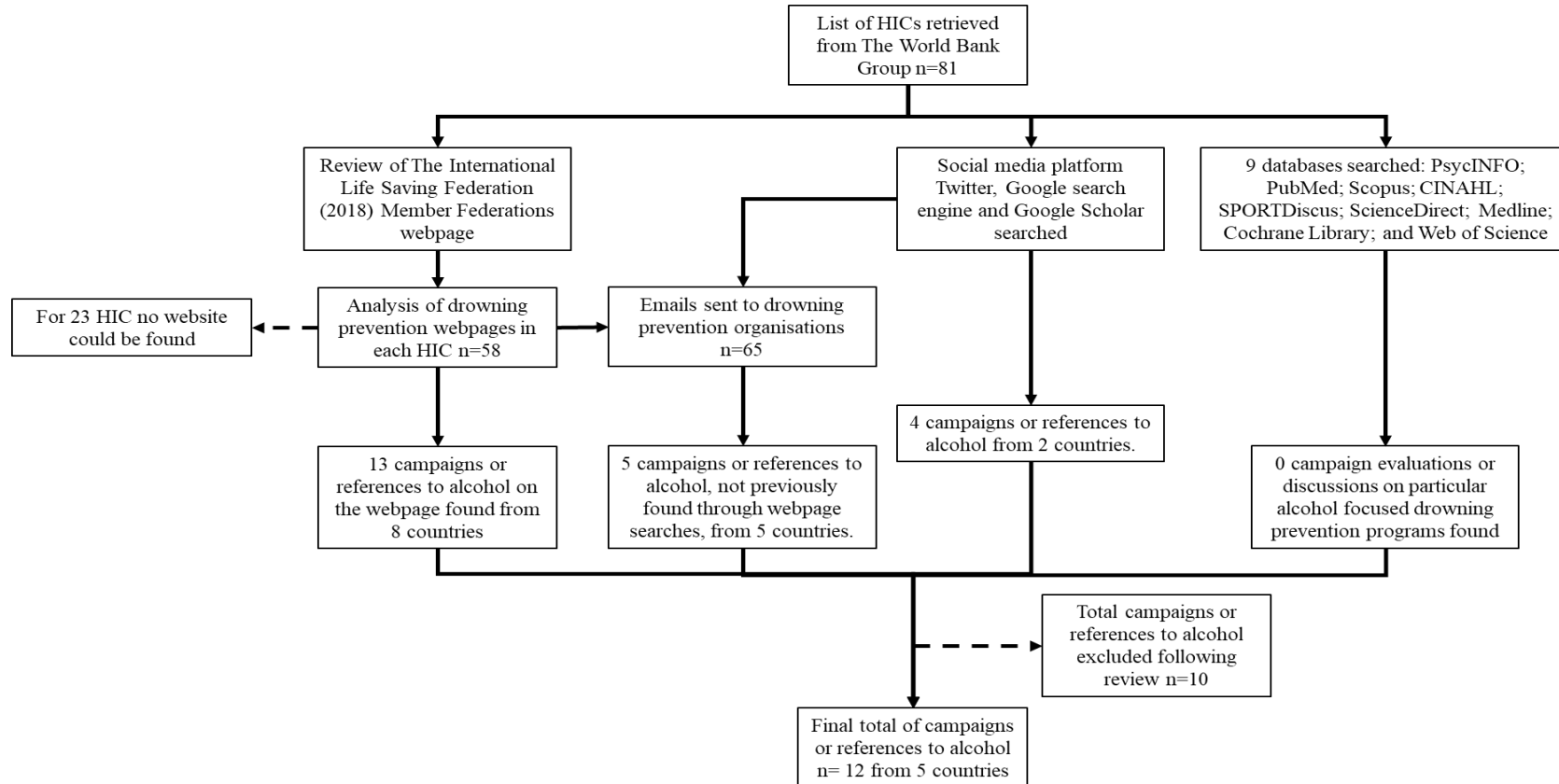
Academic databases were also comprehensively searched for any peer-reviewed literature containing information relating to alcohol themed drowning prevention campaigns and evaluations. PsycINFO; PubMed; Scopus; CINAHL; SPORTDiscus; ScienceDirect; Medline; Cochrane Library; and Web of Science databases were searched from the earliest records available to the 1st November, 2018. These databases were selected as they have been used previously to inform drowning prevention systematic reviews (Hamilton et al., 2018; Peden et al., 2016a). Search terms included combinations of the following: “alcohol”; “drowning”; “campaign”; “initiative”; “program”; “prevention”. The social media platform ‘Twitter’ and the Google and Google Scholar search engines were also explored using the same terms, for references or promotional material for any alcohol focused drowning prevention programs.

Email addresses (n=65) for relevant drowning prevention organisations in 49 countries were identified through some of the analysed websites, and these were used to request information relating to alcohol themed drowning prevention campaigns or information within the respective country. Four emails rebounded due to a fault in the advertised email address. Five organisations responded; four stated there were no relevant campaigns or materials, and one provided appropriate information. After one month, follow-up emails were sent to organisations in the 40 countries that had not responded. This resulted in a further seven responses, four stated no relevant campaigns existed, and three provided information relating to appropriate campaigns or relevant promotional material.

Subsequent analysis excluded ten of the retrieved campaigns or references based on: insufficient detail being available that confirmed alcohol was a significant part of the campaign; and/or webpage references to alcohol were inappropriate to be referred to as a 'prevention message' due to an inadequate level of information provided about the risks of combining alcohol and aquatic activity. A total of 12 campaigns were reviewed and assessed on the level of information available about alcohol and water safety, the group the information targeted and any evaluation on its effectiveness.

Figure 6

Search strategy for identifying alcohol themed drowning prevention campaigns.



Results and Discussion

Following extensive searching through various methods, 12 campaigns, relevant materials or information were retrieved from five predominantly English-speaking Western nations (Table 4). As alcohol use is related to cultural norms (Brown et al., 2001; Patock-Peckham et al., 1998) and legal restrictions (Møller, 2002), it was acknowledged this may explain the lack of alcohol specific campaigns in some nations. For example, there is a strong Muslim culture in Brunei and alcohol is prohibited (GOV.UK, 2018), consequently this nation is unlikely to produce alcohol themed campaigns.

The majority of the campaigns and information was aimed at targeting the public about the risks of combining alcohol and aquatic activity and how to keep safe around water, however there was considerable variation in the level of detail available (Table 4). Due to this lack of information and the small number of campaigns retrieved, the aim to assess the programs against pre-determined criteria to maximise success was unable to be fulfilled. As alcohol influenced drownings are prominent amongst young people in all HIC (World Health Organization, 2014a), it is concerning that so few prevention campaigns were discovered in this audit. Of further concern, evidence of program evaluation was available or provided for only two campaigns, hence the effectiveness of campaigns is unknown. None of the three campaigns that focused on young people provided any evaluation of effectiveness.

Table 4

Alcohol focused drowning prevention campaigns and general information provided in High Income Countries.

Country	Campaign/s, program/s and any other relevant material	Details	Evidence of evaluation
Australia	Sinkers #DontDrinkAndSink Royal Life Saving Society - Australia (2014)	Focused on young people and their alcohol use around water using celebrity endorsement. The campaign had videos of celebrities drinking from premixed cans of alcohol which were called, for example, ‘Vodka and Sea Water’. They then spat out the contents and the campaign message followed ‘Drinking and swimming don’t mix’.	No
	Don’t let your mates drink and drown – focused on all ages but mainly men Royal Life Saving Society - Australia (2018a)	Mainly focused on men aged 25-34 and informing them to look out for their mates around water. Messages encouraged men to stand up against risk taking behaviour around water, including alcohol consumption. The campaign encouraged men to ‘Be like Dave’ who is a fictional risk aware character and is the face of the campaign.	No
	Respect the River Royal Life Saving Society - Australia (2018c)	Targeted all river users and informed about the dangers of inland waterways, including alcohol use around the river. This campaign followed research that indicated Australian rivers as a prime location for drownings.	No

Country	Campaign/s, program/s and any other relevant material	Details	Evidence of evaluation
	<p>Swim safe swim sober Royal Life Saving Society - New South Wales (2013)</p>	<p>An online program for school leavers in New South Wales, encouraged them not to drink alcohol and swim. The program was provided through secondary schools and was described as ‘an innovative online education experience’ (Royal Life Saving Society - New South Wales, 2013).</p>	No
	<p>Play it safe by the water Victoria State Government & Life Saving Victoria (2019)</p>	<p>A campaign throughout the state of Victoria. The aspect of this campaign relevant to alcohol focused on men and informing them of the risks of alcohol consumption in, on and around water. The campaign linked to messages from ‘Don’t let your mates drink and drown’ and recommended standing up to friends who want to swim after drinking.</p>	No
Canada	<p>Operation Dry Water National Association of State Boating Law Administrators (2019)</p>	<p>Targeted boat users and encouraged them to learn the legal blood alcohol limits of driving a boat. The campaign also increased enforcement on waterways over public holidays to monitor intoxicated boat users and publicised messages about alcohol awareness leading up to those days.</p>	Yes
	<p>Boat Sober</p>	<p>Targeted boat users and encouraged them to learn the legal blood alcohol limits of driving a boat. This campaign also included</p>	Yes

Country	Campaign/s, program/s and any other relevant material	Details	Evidence of evaluation
	Lifesaving Society (obtained through personal communication)	information about the effect of other recreational drugs on ability to drive a boat.	
Ireland	Beer mats with alcohol drowning messages Irish Water Safety (obtained through personal communication)	Targeted people drinking in bars or pubs informing them of the dangers of alcohol use and aquatic activity. The beer mats contained statistics about drownings in Ireland, the risks of alcohol and swimming, and encouraged lifejacket use and learning swimming and lifesaving skills.	No
New Zealand	The Swim Reaper Water Safety New Zealand (2019b)	Social Media campaign targeting young people, particularly males, with a caption of ‘swim dumb and you’re done’ (Water Safety New Zealand, 2019b). The campaign involved pictures of the Grim Reaper in different aquatic settings and posting comments on social media encouraging young people to be foolish by, for example, swimming whilst intoxicated.	No
United Kingdom	Don’t drink and drown Royal Life Saving Society - UK (2018)	Targeted drinkers of all ages and informed them of the dangers of combining alcohol and aquatic activity as well as walking near water when intoxicated. This campaign followed a sequence of student	No

Country	Campaign/s, program/s and any other relevant material	Details	Evidence of evaluation
		drownings, therefore targeted young people with some of the messages and videos.	
	#Safe_And_Dry Kent Search and Rescue (2019)	Targeted drinkers of all ages and informed them of the dangers of combining alcohol and aquatic activity as well as walking near water when intoxicated. One feature of the campaign included promoting to people going on nights out to stay away from the river.	No
	Be Water Aware National Fire Chiefs Council (2018)	Targeted runners and walkers, drinkers and people away from home. Activities conducted through fire and rescue services. Of particular prominence was encouraging people to be vigilant whilst on holiday and in unfamiliar surroundings.	No

In the current analysis, campaigns conducted in Australia and Canada contained the greatest level of detail. Canadian and Australian agencies (Royal Life Saving Australia and the Life Saving Society) also provided information about press releases and webpages detailing several of the programs. Within the designated time period, Canada was the only country that provided, via email, an unpublished evaluation of one of the campaigns relating to boating safety and the messages it was promoting. The evaluation considered the percentage of those questioned who recalled advertised safety messages, their reactions to the campaigns, and compared these statistics to previous years. However, the evaluation lacked rigour in that they did not detail the level of evaluation that was conducted, for example how many participants were contacted, the time between the program being publicised and the evaluation taking place, and any qualitative results. Therefore, the scant information provided in the evaluation did not strongly support the claims made of the program's success.

For Australia, through the Royal Life Saving Australia website, yearly drowning reports provide descriptive statistics, including the role of alcohol, and compare these rates to previous years (Royal Life Saving Society - Australia, 2018b). Further, there are numerous evaluation reports which have appraised certain campaigns and messages provided to the Australian public (Royal Life Saving Society - Australia, 2018b). On review, three of these reports detailed alcohol use and drowning risk amongst the target groups, such as the New South Wales Grey Medallion program evaluation report which detailed that those surveyed identified alcohol as a high risk factor for drowning in their age group (Royal Life Saving Society - New South Wales, 2014). However, no reports solely focused on evaluating any of the country's alcohol themed drowning prevention programs.

Program evaluation can occur at different times for different purposes (Green & Kreuter, 2005a). For example, evaluation should occur in the diagnostic and implementation phases to document program fidelity (Helitzer & Yoon, 2002) and ensure programs are making a positive difference (Posavac, 2015). Also, program evaluation at these stages typically entails assessment of program delivery and uptake to enable appropriate amendments if implementation quality reduced (Helitzer & Yoon, 2002). Further evaluation should also be conducted in the follow-up phases of the program, to monitor how it is received and ensure the organisation can remain aware of its progress in changing behaviours and facilitate prompt action to correct any arising issues as they occur.

The lack of program evaluation evident within the results of this study is of concern as questions remain unanswered about: how well each of the drowning prevention programs met their stated objectives; the impact on the participants and the community as a whole; and whether there were any planning and implementation issues. This lack of evaluation also inhibits the repeatability of the programs as details of the development, implementation and execution are lacking and therefore future attempts at delivering similar campaigns will be unable to build from the efforts previously undertaken.

Recommendations for Effective Intervention and Future Research

The findings of this audit clearly demonstrate that the effectiveness of current alcohol focussed drowning prevention campaigns is largely unknown, as intervention details are lacking and program evaluation is largely absent. For best practice and to support effective program outcomes, sound program design, incorporating thorough, evidence-based planning, along with process, impact and outcome evaluation, is required

(Green & Kreuter, 2005a; Helitzer & Yoon, 2002; Posavac, 2015). To address the evaluation vacuum, it is recommended that organisations allocate time and resources to program evaluation at each stage of program delivery: prior to program commencement to provide a baseline; during program delivery, to enable any necessary amendments if required; immediately post evaluation to confirm whether change has actually occurred; and at a time period after the implementation, to determine the long-term effect of the program. Effective evaluation is a cost that needs to be considered at the planning stage, and funding applications should ensure that sufficient resources are requested for this purpose.

It is also important that practitioners and researchers share both their programs and the evaluations of these. The generation of publicly available reports and/or peer-reviewed publications containing this information, i.e. the development and implementation of drowning prevention programs and the results of evaluations, will contribute to increased program quality. Further, such results and publications could be used to highlight the importance of evaluation and advocate for the expansion and/or continuation of the program.

Research is also required to provide an evidence base to underpin future campaigns that investigate youth attitudes, perceptions, knowledge and influencers on behavioural practices relating to alcohol use in aquatic settings. The Royal Life Saving Society Australia highlights this, calling for more thorough research of drowning risk factors, such as alcohol, along with behavioural research into the decision making processes of at-risk groups to aid in the development of evidence-based prevention programs (Mahony & Peden, 2016). Doing so would ensure that campaigns were current

and targeted the cause of the problem instead of analysing drowning statistics and promoting unevaluated and unsupported programs.

Conclusions

Despite previous reports calling for more campaigns and research focused on youth alcohol use in aquatic contexts (Clemens et al., 2016; Peden et al., 2017), this work highlights a substantial lack of such campaigns in all HIC, as well as an absence of any evaluations of program effectiveness. Bringing program evaluation and behavioural research to the forefront of drowning prevention practice and disseminating this information widely should enable both researchers and practitioners to build on previous work and enhance the progress in the prevention of alcohol influenced youth drownings.

CHAPTER FOUR

Methodology

Chapter Outline

This chapter details the methodologies for the quantitative and qualitative projects of this PhD. To avoid repetition, some methodological details necessary for journal submission are only presented in the appropriate publications in the corresponding chapters.

In this chapter, Section One details the methodology of the quantitative project within this PhD: a survey. Additional justification for the theory underpinning the project is provided, along with details of survey development and data analysis. The publications presenting the results from this research are provided in Chapter Five, and titled:

- Alcohol consumption in aquatic settings: A mixed-method study exploring young adults' attitudes and knowledge.
- Predicting young adults' intentions and involvement in alcohol-influenced aquatic activity.

Section Two provides the methodology of the qualitative project within this PhD, which consisted of one-to-one and small group interviews, and details study design, procedure and analysis. The resulting publications from this research are presented in Chapter Six, and titled:

- "They don't think it will ever happen to them": Exploring factors affecting young Australian adults' participation in alcohol-influenced aquatic activity.

- Respecting alcohol, respecting the water: Young adult perspectives on how to reduce alcohol-influenced drownings in Australia.

SECTION ONE

Quantitative Methodology

Study Design and Theoretical Underpinning

The quantitative research aims (also detailed in Chapter Two) emerged during the literature review of this PhD (Chapter Three, Section One), as these concepts appeared to require further empirical investigation, or were an identified gap in current drowning prevention knowledge. These aims addressed the PhD research questions established in Chapter Two, and were to:

- Establish young adults' level of knowledge about alcohol consumption, both generally and in an aquatic context.
- Investigate factors impacting young adults' attitudes towards participation in alcohol-influenced aquatic activity.
- Determine the predictors of young adults' intention to participate in alcohol-influenced aquatic activities.
- Determine the predictors of young adults' self-reported participation in alcohol-influenced aquatic activities.

These research aims intended to address trends and establish an overview of young adults' approach towards alcohol-influenced aquatic activity. Therefore, a positivist quantitative approach, using a survey, was an appropriate underpinning for this project.

Health promotion and education experts have indicated that utilising models and theories to underpin injury research can enhance prevention programs (Sleet & Gielen,

2004). Therefore, prior to this quantitative project commencing, a search was undertaken to identify a theoretical model which would also facilitate this study to comprehensively address the PhD research questions and project aims. The Theory of Planned Behaviour (TPB; Ajzen, 1985) was identified in this search and selected as the most appropriate theoretical underpinning to the quantitative project. The selection of this model was justified based on: (i) the frequency of use in studies predicting human behaviour, and the effectiveness of interventions (underpinned by the TPB) in changing human behaviour (Steinmetz et al., 2016); systematic review and meta-analysis findings supporting the use of this model to explain alcohol consumption (Cooke et al., 2016); and, the components within the TPB aligned with the RLSSA (2018d) recommendations for the direction of drowning prevention strategies, to “increase awareness of the hazards associated with different aquatic environments and the drowning risk they pose to different age groups” (first stated p. 40). During data collection for this project, The RLSSA released the 2019 drowning report which detailed recommendations for research to “Explore the decision-making process of young people to better understand attitudes to risk taking and how this influences behaviour around water” (RLSSA, 2019, p. 65), substantiating the TPB to be an appropriate selection for this project to align with current research requirements.

The TPB has been used successfully in: drowning prevention research (e.g., Giles et al., 2009; Hamilton & Schmidt, 2014); research exploring predictors of young adults’ alcohol consumption (e.g., Huchting et al., 2008; Norman et al., 2018); and, other risky behaviours (e.g., Bazargan-Hejazi et al., 2016; St-Pierre et al., 2015), all topics that are of importance to the aims of this PhD. Further, other meta-analyses have recommended its adoption, with results showing the TPB can produce R^2 values of up to .41 when explaining intention and .34 when explaining behaviour; signifying the variance that can

be explained by the TPB for both intention and behaviour (Armitage & Conner, 2001; Godin & Kok, 1996).

Survey Development

The research aims addressed a number of interlinked topics, therefore, the use of a survey was considered appropriate to seek an initial understanding via responses from a large and diverse sample of young adults. This then allowed findings to be expanded in subsequent qualitative research. Significant exploration of peer-reviewed research and grey literature was conducted to identify whether an existing instrument could be adapted or applied to address the research aims. Sources examined included: government information current at the time of survey development in December 2018 (Australian Government Department of Health, 2012; Government of Western Australia, 2014; National Health and Medical Research Council, 2009; United Kingdom Government, 2018); organisations focused on health and the prevention of alcohol misuse (Alcohol and Drug Foundation, 2017b; National Health Service, 2018); and previously established and relevant questionnaires such as: ‘Can You Swim?’ (Moran et al., 2012; Petrass et al., 2012); adolescents’ alcohol use in aquatic settings (Hamilton & Schmidt, 2014); an online alcohol platform (Quizlet, 2018), and; youth risk-taking behaviours (McCool et al., 2009; McCool et al., 2008; Moran, 2008a, 2008b, 2011). This review identified several surveys that included a focus on young adults’ alcohol/risk-taking behaviours or prevention of drowning. One survey that addressed young adult alcohol-related behaviours in aquatic settings was identified, authored by Hamilton and Schmidt (2014).

The survey by Hamilton and Schmidt (2014) closely aligned to the focus of the current PhD as it: investigated factors predicting intention to drink and swim; used the TPB to underpin the survey development; and, was guided by evidence from research in alcohol and aquatics (Driscoll et al., 2003), drinking and walking (Haque et al., 2012) and

drinking and driving (Rivis et al., 2011). However, development of a new survey was deemed essential because the scope of Hamilton and Schmidt's survey did not address the full extent of the research aims for this current project, specifically, the survey: did not include any reference to knowledge of alcohol use in aquatic contexts; was limited in its exploration of young adults' attitudes towards alcohol-influenced aquatic activity; and, lacked details of involvement in alcohol-influenced aquatic activity. In addition, the adolescents' alcohol use in aquatic settings survey by Hamilton and Schmidt (2014) focused on swimming as the sole aquatic activity and concentrated only on young Australian males. In contrast, the current project aimed to investigate involvement in aquatic activities more generally among young adults in the UK and Australia, nationwide. As such, more inclusive terminology and activities were required to ensure all participants would understand and correctly interpret the questions. Consequently, Hamilton and Schmidt's existing survey could not facilitate adequate investigation of the current research aims and a new survey was required.

To inform the development of the purposively designed survey, a secondary literature search was conducted exploring the following areas: research into risk-perceptions and behaviours (Weber et al., 2002); drink driving (Delcher et al., 2013; Ulleberg & Rundmo, 2003); effects of alcohol on performance (Weatherwax-Fall, 2008); youth alcohol education (Midford et al., 2000; Sharmer, 2001; Thadani et al., 2009; Wood et al., 2009); alcohol use in aquatic settings and alcohol-related drowning rates (Driscoll et al., 2003; Driscoll et al., 2004b; Perrine et al., 1994; Quan, 2014a; Sinkinson, 2014); and, best practice in survey design (Nair & Adams, 2009; Tourangeau, 2018). This literature review provided sound evidence that attitude, knowledge, behaviour and influencers were key areas for consideration in the design of a new survey instrument.

The full survey (Australian and UK versions) is provided in Appendix E, which, when viewed digitally, can be accessed through this link: [Final Survey](#).

Target Behaviours and Definitions

Participation in alcohol-influenced aquatic activities was the target behaviour to be measured through the survey, and a number of questions focused on factors relating to this behaviour. For the purpose of this project, alcohol-influenced aquatic activity was defined as ‘activities in and on the water following/during the consumption of alcohol, and while alcohol effects could be influential on the individual’. Other definitions were adapted from those used by Hamilton and Schmidt (2014) and provided on the survey to assist participants in supplying information relevant to the contextual requirements of the survey, research questions and aims. ‘Aquatic activities’ were defined as activities in and on the water undertaken for fun, pleasure or amateur sport. This included activity in all waterways, such as lakes, the sea and swimming pools, but did not include boating or activities involving powered watercrafts such as jet skis. The exclusion of boating and powered watercrafts from this study was due to the legal alcohol limits associated with these aquatic activities (e.g., Roads and Maritime Services, 2018), as these restrictions could overshadow the influences on other, non-restricted activities. ‘Current qualifications/training’ referred to those qualifications/training that were current, or completed in the two years prior to the time of survey completion.

To define ‘consuming alcohol’ for this project, it was important to consult prior literature and legal drinking limits in both the UK and Australia. When investigating the role of alcohol on drowning, some previous research, such as Driscoll et al. (2004b), has considered a Blood Alcohol Concentration (BAC) of 0.05% (the legal driving limit in many countries; Fell & Voas, 2014) as evidence of alcohol involvement. However, the BAC level that impacts drowning risk is currently unknown (Peden et al., 2017), and

previous research has shown alcohol can negatively affect safe diving ability and skill perception at a BAC level of 0.04% (Perrine et al., 1994). Accordingly, for this study, ‘consuming alcohol’ was defined as consuming any alcoholic beverage, without emphasis on a specific BAC. This definition was also selected as the survey was distributed to participants in the UK as well as Australia where the drink driving limits are different (0.05% in Australia; Alcohol and Drug Foundation, 2017a; 0.08% in England, Wales and Northern Ireland; and, 0.05% in Scotland; UK Government, 2018). Moreover, within Australia, newly qualified drivers (minimum age 16-18 years depending on the State or Territory), are placed on a probationary licence and are legally required to have a BAC level of zero for the duration of this licence (Department of Transport, 2019; Government of South Australia Department of Planning Transport and Infrastructure, 2020; Government of the Australian Capital Territory, 2020; Northern Territory Government, 2020; Queensland Government, 2017; The Department of State Growth, 2016; Transport for New South Wales, 2020; Victoria State Government, 2019). In contrast, in the UK newly qualified drivers (minimum age 17 years; UK Government, 2020b) are automatically placed on a full licence with a driving BAC limit of 0.05% in Scotland or 0.08% in England, Wales and Northern Ireland, after passing a practical test (UK Government, 2018, 2020a). Hence, the decision to include any involvement in alcohol-influenced aquatic activity ensured that all occasions where adolescents experienced the effects of alcohol that may have placed them at risk were included, even if their BAC was lower than the legal driving limit within their country of residence.

Description of Survey Questions

The questions within the survey addressed: attitudes; knowledge; past behaviour; intentions; subjective norms; perceived behavioural control (PBC); and influencers. This facilitated the identification of factors that could affect young adults’ involvement in

alcohol-influenced aquatic activities, and also where future prevention efforts should be focused to discourage this behaviour.

The attitude section contained the largest set of questions because, as identified by Ajzen (1991), attitude views can shift depending on context, environment or perceived outcome. Also, in comparison to the other components that comprise the TPB, there has been a higher concentration of research investigating young adults' attitudes towards consuming alcohol and participating in aquatic activity (e.g., Driscoll et al., 2003; Driscoll et al., 2004b; Hamilton & Schmidt, 2014; Moran, 2008a; Perrine et al., 1994; Petrass et al., 2012; Sinkinson, 2014), therefore more information was available to inform and influence the attitude section of the survey than for other sections. Additionally, some questions in other survey sections were omitted following the validity and reliability process, hence condensing the number of questions in those sections.

Many aspects measured in this survey have not been considered previously for this age group in the UK or Australia, or indeed anywhere in the world (e.g., influencers and knowledge). Therefore, while the number of questions within each section of the survey was uneven, this imbalance was not considered detrimental, as the detail obtained from the survey enabled large progressions of knowledge within the field of alcohol-influenced drowning prevention efforts.

Question Categories and Styles

Scaled responses were the most frequently used question format throughout the survey as this was considered the most appropriate style to measure the research aims (e.g., attitudes towards alcohol-influenced aquatic activity; Likert, 1932), and has been used in previous TPB research in the field of alcohol use (e.g., Ajzen et al., 2011; Johnston & White, 2003). This format enabled numerical allocation to illustrate the level

of agreement with statements, which could then be collated to provide participants a score for each survey section (Johns, 2010). Five-point Likert Scales were selected, as research has shown that inaccuracies can occur in scales where there are fewer than five-points and more than seven (Johns, 2010).

Other question styles used less frequently in the survey were: dichotomous, categorical and multiple-choice questions which all required participants to select the most appropriate response from the options provided; and short open-ended responses that allowed participants to provide additional detail or offer their response if it was not covered in the forced selections available (Thomas et al., 2011). These response styles were selected because they are a familiar format for young adults, can be administered quickly which was desirable in surveying this age group, and are easy to use for questioning several different topics (Rodriguez, 2016). Table 5 details the survey sections corresponding with each component of the TPB, the questions targeting that area, and the associated response styles.

Table 5

Survey sections, aligning questions and responses styles.

Survey Section	Theory of Planned Behaviour Concept?	Question(s)	Response Styles
Demographic and Background Information 21 questions	X	1 – 21	Multiple-choice Rating scales (0-10) Dichotomous
Attitudes 3 questions containing 19 statements	✓	22 – 24	Five-point Likert Scales
Knowledge 10 Questions (13 including all UK and Australian versions)	X	25 – 34	Multiple-choice
Behaviour 4 questions containing 12 statements	✓	35 – 38	Multiple-choice Five-point Likert Scales
Intention 2 questions, 1 containing 3 statements	✓	39 – 40	Dichotomous Five-point Likert Scales
Subjective Norms 1 question containing 5 statements	✓	41	Five-point Likert Scales
PBC 1 question containing 4 statements	✓	42	Five-point Likert Scales
Influencers 3 questions containing 15 statements	X	43 – 45	Five-point Likert Scales

Demographic and Background Information

In the final survey, 21 questions collected demographic and background information (questions 1-21). Several of these were standard demographic questions, such as: age; gender; nationality; employment status; and level of education. Participants were

also required to indicate in which country they had received most of their education (question 5): Australia or the UK. Responses to this then affected the wording of the subsequent questions in the online survey. In addition, two questions (20 and 21) were designed to ascertain if and where participants received aquatic education. In previous aquatic research, this has been proven a valuable addition (e.g., Petrass & Blitvich, 2018; Petrass et al., 2012), as these questions provided further insight into participants' aquatic education and from where they obtained aquatic risk awareness.

As this research explored alcohol use in aquatic contexts, quantifying participants' swimming confidence and ability in aquatic situations was important, particularly when using this to explore differences in participants' attitudes, knowledge and behaviours in aquatic settings. Questions 10-13 assessed participants' self-reported confidence in their abilities to deal with different aquatic scenarios (e.g., *"You fall into the deep end (1.8m) of the local swimming pool"*). These four questions were based on similar validated questions from the 'Can you swim' survey (Moran et al., 2012), with some amended terminology following the validity panel's review (see Table 7). The final question assessing swimming ability (question 14) was another self-report, this time of how many laps the participant could swim in a swimming pool. This question was modified from the version used in the survey by Hamilton and Schmidt (2014), following recommendations from the validity review panel (see Table 7).

In the demographic and background information it was also necessary to ask if the respondents had ever participated in aquatic activities after consuming alcohol. This made it possible to identify participants who had been involved in this activity and thus use this information as an independent variable when analysing survey responses. Further, the response to this question of either 'Yes' or 'No' determined which questions followed in the online survey. For example, if the participant had never consumed alcohol and

participated in aquatic activity, they were not shown questions relating to their engagement in this behaviour.

Attitudes

Attitudes were measured to determine what participants thought about drinking alcohol and participating in aquatic activities, and whether there was variation in these beliefs depending on situation, context, and any protective factors. Three questions (questions 22-24), that included a total of 19 statements rated on five-point Likert Scales, covered the following areas: perceptions of risks in certain contexts (e.g., “*It is safe for me to get drunk in aquatic settings*”); perceptions of risks associated with consuming alcohol in certain aquatic locations (e.g., “*Please indicate how risky you believe it would be for you to drink alcohol and participate in aquatic activities at a patrolled beach*”); and, worry associated with alcohol use in aquatic contexts (e.g., “*How worried are you about drowning when participating in aquatic activities if you have consumed alcohol?*”). Eleven statements (22a, 22b, 22c, 22f, 22j, 23a-23f) measured cognitive attitudes (e.g., “*It is safe for me to swim in open water, such as lakes, rivers and the sea, after consuming 1-2 alcoholic drinks*”) and eight statements (22d, 22e, 22g, 22h, 22i, 22k, 24a, 24b) assessed affective attitudes (e.g., “*I am confident in my knowledge about how alcohol could impact my safety when involved in aquatic activities*”).

Question 22 consisted of 11 statements requiring a response on a five-point Likert Scale that included *strongly disagree, disagree, neither agree or disagree, agree, strongly agree*. These 11 statements were developed following review of the findings from previous research and questions from established surveys (e.g., Hamilton & Schmidt, 2014). The majority were adopted from the results of the ‘Can You Swim’ survey, the findings of which were reported by Petrass et al. (2012) and Moran et al. (2012). One aspect of the ‘Can You Swim’ survey considered protective strategies, for example

“Consuming an alcoholic drink in and around a private pool is safe, as long as everyone can touch the bottom”, which young people may use when drinking alcohol in aquatic settings, and these were included in some statements in question 22. These protective strategies were also prominent in research conducted by Sinkinson (2014), whose qualitative results were summarised into one statement in question 22 (“*Drinking alcohol makes aquatic activities more fun for me*”) to establish young adults’ perception of using this protective method. A further influence on the statements in this initial attitude question was Midford et al. (2000) who investigated general alcohol education for young people. This research was adapted to encompass aquatic contexts for the purpose of the current survey.

The second question in this group (question 23) required participants to rate, on a five-point Likert Scale, the level of risk they perceived associated with consuming alcohol and participating in aquatic activity in six aquatic settings (*patrolled beach, unpatrolled beach, lake/dam/quarry, river/creek/stream, private pool and a public pool*). Likert-scale responses were *extremely risky, quite risky, neutral, not very risky, not at all risky*. These statements were designed to elicit young adults’ perceptions of the riskier and safer places to consume alcohol and participate in aquatic activities: an important concept that would facilitate focused and relevant prevention efforts. This question was influenced by Weber et al. (2002), who investigated risk and used similar Likert-scale choices.

The final question (question 24) in this section consisted of two statements relating to how much the participant worries about themselves or friends drowning when participating in aquatic activities after consuming alcohol. Responses were rated on a five-point Likert Scale with the headings *extremely worried, quite worried, neutral, not very worried, not at all worried*. This question was influenced by research on risky drink

driving behaviour among young people (Delcher et al., 2013; Ulleberg & Rundmo, 2003) and adapted to aquatic contexts.

Knowledge

The participants' level of knowledge was assessed through 10 multiple-choice questions. Five questions related to general alcohol use and the associated risks of excessive consumption (question 25-29), for example, "*Which is the legal blood alcohol concentration limit for driving a motor vehicle in Australia/the UK?*" The remaining five questions addressed the effects of alcohol on someone in an aquatic context; for example, "*In a survival setting in water, which of the following will best prevent hypothermia (condition of having abnormally low body temperature)?*" These questions were informed and verified by previous research using the same multiple-choice format (Petrass et al., 2012; Thadani et al., 2009), an alcohol-fact quiz website (Quizlet, 2018), previous research on alcohol (Weatherwax-Fall, 2008) and aquatics (Driscoll et al., 2003; Moran et al., 2012; Perrine et al., 1994), and government regulations and health recommendations current at the time of survey development (National Health and Medical Research Council, 2009; National Health Service, 2018; Office for National Statistics, 2018; UK Government, 2018).

Behaviour

The behaviour section of the survey involved four questions (questions 35-38) that assessed how often the participant took part in the target behaviour at each of five specific aquatic locations; who they participated with; and how much alcohol they consumed on the occasions they frequented an aquatic location and consumed alcohol. These questions provided information relevant to understanding the details of participation in the target behaviour, which was considered essential to inform the focus of prevention efforts.

Question 35 used a multiple-answer, multiple-choice question format where more than one response could be selected to highlight who participants were with when they participated in the target behaviour. Question 38 also used a multiple-choice design, but to identify, on average, the amount of alcohol participants consumed in aquatic contexts. These questions were informed by the surveys of Hamilton and Schmidt (2014) and Moran (2008a), who also assessed youth participation in aquatic activity after consuming alcohol.

Questions 36 and 37 were linked, to understand any differences in behaviour at each identified aquatic setting. The first question listed aquatic settings (*patrolled beach, unpatrolled beach, lake/dam/quarry, river/creek/stream, private pool, public pool*) and required the participant to indicate whether they had visited that location in the previous 12 months. In the online survey, only those locations visited were then presented in the following question which inquired as to how often they had visited that setting, and how often they consumed alcohol there, using the Likert-Scale responses *never, once, not often (2-4 times), quite often (5-9 times) very often (10+ times)*. For the paper version of the survey, participants indicated how frequently they attended each location using the mentioned scale, and then how frequently they also consumed alcohol at each location. The aquatic settings and frequency options included in the survey questions reflected prominent locations for drownings in HICs and were based on questions used by Peden et al. (2017), Moran (2008a), Petrass et al. (2012) and Moran et al. (2012).

Intention

Question 40, which included three statements, concisely measured participants' intention to take part in the target behaviour in the upcoming 12 months with the headings *strongly disagree, disagree, neither agree or disagree, agree, strongly agree*. A five-point Likert Scale, rather than a closed response of 'yes' or 'no', was selected to

distinguish the extent of their intention to participate in alcohol-influenced aquatic activity. This question aligned with the TPB (Ajzen, 1985) and was adapted from the survey by Hamilton and Schmidt (2014) to provide specific reference to taking part in aquatic activities after consuming alcohol, rather than the original version of drinking and swimming.

Subjective Norms

One question (question 41), with five statements, investigated subjective norms (descriptive and injunctive) to assist in understanding the importance the participant placed on the opinions and beliefs of people they valued and respected. The inclusion of only one question combining descriptive and injunctive norms was deemed appropriate, as it provided an initial understanding of the subjective norms of participants from several perspectives, and also aligned with other research whereby a small number of questions/statements were used that combined descriptive and injunctive norms (e.g., Ajzen et al., 2011; Hamilton & Schmidt, 2014). Further investigation of subjective norms was planned for the qualitative aspect of this PhD.

A five-point Likert Scale (*strongly disagree, disagree, neither agree or disagree, agree, strongly agree*) was used to identify the influence of others on participants' subjective norms. Two statements focused specifically on friends/mates, whilst the other three statements were more generic to those who are important to the participant. At this age (18-24 years), peers are considered important influencers on alcohol-related behaviour (MacArthur et al., 2017), therefore, the variations within the statements of this question were important to determine the level of influence of group and societal norms on alcohol use in aquatic contexts. This is an important component of the TPB as it highlights the influence that significant others have on the participant's behaviour and whether the participant wishes to comply with the norms of others (Ajzen, 1985).

Perceived Behavioural Control

Question 42 consisted of four statements that investigated the level of control the participant felt they had over their participation in the target behaviour, as well as the ease or difficulty applying this control (Ajzen, 1985). These statements were adapted from previous survey work by Hamilton and Schmidt (2014), to be specific to the target behaviour in this survey. A five-point Likert rating scale (*strongly disagree, disagree, neither agree or disagree, agree, strongly agree*) was provided to determine the level of control they felt, instead of a closed response of ‘yes’ or ‘no’. Information about their perceived level of control, along with results from other areas in this survey such as subjective norms, was considered important in enhancing the level of understanding of why young adults participate in alcohol-influenced aquatic activity. This in turn would highlight areas for practitioners to focus prevention efforts.

Influencers

This final group of questions (questions 43-45) aimed to extend the subjective norms questions to identify the specific influences that participants perceived impacted on their knowledge, attitudes and involvement in alcohol-influenced aquatic activity. The list of influencers remained the same for each question (*family; friends; external groups/ organisations/ institutions; the media; social media*). These options were informed by the work of Moran (2008a), and amended following panel review and content validity testing. The Likert Scale-style responses provided were *not at all, low, moderate, high, very high*, to highlight the extent to which the participant felt influenced by each listed group. This allowed comparison of influencers depending on whether the question focus was attitudes, behaviour, or knowledge. By using this approach, the survey could identify the strongest self-reported influencers on young adults’ participation in the target

behaviour: important information for practitioners seeking to develop interventions aiming to modify such behaviour.

Question Wording

For the purposes of validity and reliability, where possible, the wording of questions used in previous research was retained. However, for clarity within the current study, time periods such as '*within the previous 12 months*' were added to ensure the responses reflected current behaviour. For example, question 36 became "*In the past 12 months, how often have you participated in aquatic activities in each of the following contexts?*" Some time periods were changed from the original wording of '*within the previous 6 months*', as the survey was conducted in both the UK and Australia simultaneously, therefore, the previous 6 months would have included different seasons and this would likely have influenced participation in aquatic activities, particularly in outdoor environments. Altering this retrospective analysis to data reflecting a 12-month period meant that behaviour across all seasons was considered.

Other reasons for modifications to the original wording related to the age of participants (18-24 years old) and the range of sociocultural and education levels. Questions needed to be clear, concise and written in non-technical and jargon-free language. As the survey was conducted in both the UK and Australia, it was necessary to tailor some questions to each location based on cultural and linguistic differences. Tailoring included defining alcoholic drinks (i.e., units or standard drinks); modifying descriptive terms (e.g., laps or lengths when determining swimming ability); and, including aquatic activity examples more common in one location than the other (e.g., walking on coastal rocks). For the online version of the survey, the software automatically directed participants to the UK or Australian version of questions depending on their response to the demographic and background question which asked

where they received most of their education (question 5). For the paper form of the survey, a UK and an Australian version were developed, and these were distributed as appropriate. With the exception of differences in the wording, or phrasing of some of the questions, the UK and Australian versions of the survey were otherwise identical.

Target Population

This research required a purposive, volunteer sample of young adults aged 18-24 years, who had received most of their education in Australia or the UK. While the age categorisations for drowning data in many countries typically include a 15-24 year age group, the narrower age range of 18-24 was selected for this study to avoid an identified ethical concern. This concern arose as the survey required participants to disclose previous involvement in alcohol-influenced aquatic activity, and as the legal alcohol consumption age is 18 years in both the UK and Australia, this would require admitting to a behaviour that was illegal for any participants aged under 18 years old (Kelly & Halford, 2007). To counter this concern, the plain language information statement and debrief form (Appendix H) provided participants with contact information for support organisations if they were concerned about their alcohol use or experiences.

This project was conducted in the UK and Australia, and limited participation to those who had received most of their education in either of these countries. Restricting the sample according to where the participant had received most of their education enabled the study to omit participants who may have recently moved to the UK or Australia, who would not be able to provide accurate or representative responses relating to either country. Participants were recruited either online (i.e., via email lists, social media and university course platforms) or in person (i.e., through university lectures, tutorials and events). Incentives were used to attract participants to complete the survey: supermarket vouchers to be allocated randomly among those who fully completed the

survey and who provided an email address. Once the data collection was completed, a random number generator, through Microsoft Excel (=RANDBETWEEN(1, *number of participants*)), was used to select eight participant numbers—aligning with the number assigned in the SPSS database. As this process depended on participants providing an email address, it continued until eight eligible participants were selected. The vouchers were then emailed to the winners.

Ethics

Ethical approval for this project was received from the Human Research Ethics Committee at Federation University, Australia, (project number: B18-049; Appendix F) prior to validity and reliability testing. Following this testing, the revised survey was submitted as an amendment to the ethics application and approved prior to the commencement of data collection.

Content and Face Validity

The penultimate draft of the survey was sent to 20 people for review, including drowning prevention experts, academics, professionals experienced in survey development and administration, practitioners within drowning prevention and a psychology researcher. Twenty experts were selected based on previous research stating content validity testing using both content experts and lay experts should consist of six to 20 individuals, with a higher number likely to generate more information (Rubio et al., 2003). Fifteen individuals completed the validity review (see Table 6 for panel details), and these included people from several different countries, some whose first language was not English.

Table 6*Professional details of survey review panel members.*

Name	Professional details as of December 2018	Country of Origin
Barbara Byers	Public education and research director at Lifesaving Society Canada.	Canada
Dr Catarina Queiroga	Experienced drowning prevention and water safety researcher.	Portugal
Daniel Graham	Experienced drowning prevention and water safety researcher.	UK
Elizabeth Bennett	Director, Community Health and Engagement, Seattle Children's Experienced drowning prevention and water safety researcher, public health practitioner.	USA
Professor Fergal Grace	Professor of Exercise Sciences	Ireland
Jonathon Webber	Managing Director at Aquasafe New Zealand. Experienced drowning prevention and water safety researcher.	New Zealand
Josephine O'Donogue	Psychology researcher.	Australia
Justin Scarr	Chief Executive Officer, RLSS Australia. Drowning Prevention Commissioner, International Lifesaving Federation.	Australia
Lee Heard	Head of RLSS UK volunteering.	UK
Lindy Hall	Lecturer in professional practice, Health and Life Sciences.	Australia
Peter Moyes	Chief Executive Officer Life Skills Education Charity, UK. Former President of RLSS UK.	UK
Dr Rebecca Sindall	Experienced drowning prevention and water safety researcher.	UK
Dr Scott Talpey	Senior lecturer in exercise, sport science and strength and conditioning.	USA
Dr Steven Langendorfer	Experienced drowning prevention and water safety researcher. Editor of International Journal of Aquatic Research and Education.	USA
William Koon	Experienced drowning prevention and water safety researcher.	USA

The panel examined the survey for content validity to ensure the instrument accurately reflected the content area and would collect information appropriate to the topic of interest (Fayers & Machin, 2013). Experts were invited to provide feedback that related to the question wording; terms used; content areas included; and any other recommendations for consideration. Comments and alterations to questions based on feedback from the panel members are shown in Table 7.

Face validity was established following content validity and prior to test-retest reliability. Ten individuals aged between 18 and 24 years (five from the UK and five from Australia) were recruited in person at an international lifesaving sport event to complete the survey and provide feedback about the question wording, their understanding of the questions and content. The same incentives were used to assist recruitment of reliability participants as those used to recruit the final sample—the chance to win a shopping voucher. The comments and amendments made to the survey questions as a result of the face validity process are outlined in Table 7.

Table 7

Content and face validity suggested amendments to the penultimate draft survey questions.

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
<p>What is your employment status?</p> <p>a) Full-time b) Part-time and/or casual c) Not currently employed d) Other (please provide details)</p>	<p>Separate part-time and casual from the same answer.</p> <p>Student should be an option here.</p>	<p>NA</p>	<p>Q8. What is your employment status?</p> <p>a) Full-time b) Part-time c) Casual d) Student e) Not currently employed f) Other (please provide details)</p>
<p>What is your highest level of education?</p> <p>a) Primary School b) Secondary School c) Vocational/ Trade/ Diploma Certificate d) Undergraduate Degree e) Post-Graduate Degree</p>	<p>NA</p>	<p>Does this mean current education, or completed education? For the original question, if you are in your final year at university you would have to respond with B. However, this does not reflect your education level and ability as there is a big difference between secondary school level and university level education.</p>	<p>Q9. What is your level of education? If you are still in education, please indicate the level you are working at. If you are no longer in education, please indicate the highest level you achieved.</p> <p>a) Primary School b) Secondary School c) Vocational/ Trade/ Diploma Certificate d) Undergraduate Degree e) Post-Graduate Degree</p>

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
<p>How do you rate your swimming ability? (rate from 1 'not at all confident' to 10 'very confident')</p>	<p>Consider the wording here. The question does not seem to match the Likert response. Are you looking for self-reported ability? Or confidence in swim skills?</p>	<p>NA</p>	<p>Q10. How confident are you in your ability to swim? (rate from 1 'not at all confident' to 10 'very confident')</p>
<p>Please indicate how confident you are in your ability to successfully deal with each aquatic situation:</p> <p>You are walking along a river bank with a river that is running quickly and accidentally fall in (rate from 1 'not at all confident' to 10 'very confident')</p>	<p>Add more descriptors.</p> <p>Change 'running' to 'flowing'.</p>	<p>NA</p>	<p>Please indicate how confident you are in your ability to successfully deal with each aquatic situation:</p> <p>Q11. You are wearing street clothes whilst walking along a river bank where the river is flowing quickly and you accidentally fall in (rate from 1 'not at all confident' to 10 'very confident')</p>
<p>Please indicate how confident you are in your ability to successfully deal with each aquatic situation:</p> <p>You fall into the deep end (1.8m) of the local pool (rate from 1 'not at all confident' to 10 'very confident')</p>	<p>This should say 'swimming pool'.</p>	<p>NA</p>	<p>Please indicate how confident you are in your ability to successfully deal with each aquatic situation:</p> <p>Q12. You fall into the deep end (1.8m) of the local swimming pool (rate from 1 'not at all confident' to 10 'very confident')</p>

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
<p>Please indicate how confident you are in your ability to successfully deal with each aquatic situation:</p> <p>You are walking on a reef and a wave knocks you into deep, rough water (waves 1m) (rate from 1 ‘not at all confident’ to 10 ‘very confident’)</p>	<p>Would change this to “rocks” or “seawall” more commonly used in AUS, reef is under the water and should not be walked on.</p>	<p>NA</p>	<p>Please indicate how confident you are in your ability to successfully deal with each aquatic situation:</p> <p>Q13. You are walking on coastal rocks and a wave knocks you into deep, rough water (waves 1m) (rate from 1 ‘not at all confident’ to 10 ‘very confident’)</p>
<p>How many lengths of a 25m swimming pool can you currently swim using any stroke without stopping or touching the bottom?</p> <p>a) Cannot swim b) Less than 25m (up to 1 length) c) 25m up to 100m (1-4 lengths) d) 125m up to 200m (5-8 lengths) e) 225m up to 300m (9-12 lengths) f) 325m up to 400m (13-16 lengths) g) More than 400m (more than 16 lengths)</p>	<p>‘Laps’ is more commonly used in Australia than ‘lengths’.</p> <p>May need to reverse the order of the options to match the question order.</p> <p>Does this matter which stroke you use?</p>	<p>NA</p>	<p>Q14. How many laps of a 25m swimming pool can you currently swim, using any stroke, without stopping or touching the bottom?</p> <p>a) Cannot swim b) Up to 1 lap (less than 25m) c) 1-4 laps (25m up to 100m) d) 5-8 laps (125m up to 200m) e) 9-12 laps (225m up to 300m) f) 13-16 laps (325m up to 400m) g) More than 16 laps (more than 400m)</p>

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
<p>Do you have any of the following aquatic qualifications? Please select all qualifications that you hold which are current:</p> <ul style="list-style-type: none"> a) Lifeguard – e.g., pool or beach lifeguard training and qualification b) Swimming Teacher/Instructor – e.g., AUSTSWIM or the swimming teachers association. c) Life Saving Qualification – e.g., bronze medallion d) Other (please provide as much detail as possible) e) No current qualification/s 	<p>Suggest you separate the pool lifeguard and beach lifeguard.</p>	<p>NA</p>	<p>Q18. Do you have any of the following aquatic qualifications? Please select all qualifications that you hold which are current:</p> <ul style="list-style-type: none"> a) Pool Lifeguard – e.g., training and qualification b) Beach Lifeguard – e.g., training and qualification c) Swimming Teacher/Instructor – e.g., AUSTSWIM or the Swimming Teachers’ Association. d) Life Saving Qualification – e.g., bronze medallion e) Other qualification (please provide as much detail as possible) f) No current qualification/s
<p>Have you received water safety education in any of the following settings (please select all that apply)?</p> <ul style="list-style-type: none"> a) Private swimming lessons b) Primary school education – such as swimming lessons and/or classroom discussions on water safety c) Secondary school education – such as through Physical Education, Sport or Health classes, camps, or 	<p>There is a big difference between classroom education and swimming lessons. Suggest differentiating.</p> <p>There are a lot of water safety programs run through Nippers and surf clubs, include something that relates to this too.</p>	<p>NA</p>	<p>Q20. Have you received water safety education in any of the following settings?</p> <ul style="list-style-type: none"> a) Private swimming lessons b) Primary school education – such as classroom discussions on water safety c) Primary school swimming lessons d) Secondary school education – such as through Physical Education, Sport or Health classes, camps, or classroom discussions about water safety

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
<p>lesson discussions about water safety</p> <p>d) University education – such as Physical Education, Sport or Health courses</p> <p>e) Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online</p> <p>f) External organisations such as those providing education at carnivals, fetes or events</p> <p>g) Other (please provide as much detail as possible)</p> <p>h) No previous education about water safety</p>			<p>e) Secondary school swimming lessons</p> <p>f) University education – such as Physical Education, Sport or Health courses</p> <p>g) Life Saving organisations</p> <p>h) Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online</p> <p>i) External organisations such as those providing education at carnivals, fetes or events</p> <p>j) Other (please provide as much detail as possible)</p> <p>k) No previous education about water safety</p>
<p>It is safe for me to swim in open water, such as lakes, rivers, and the sea, after consuming 1-2 standard alcoholic drinks</p> <p>(rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)</p>	<p>Need to define ‘standard alcoholic drinks’</p>	<p>NA</p>	<p>Q22. It is safe for me to swim in open water, such as lakes, rivers, the sea, etc. after consuming 1-2 alcoholic drinks (rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)</p>
<p>It is OK for me to be in, on, and around the water while under the influence of alcohol</p> <p>(rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)</p>	<p>Would suggest separating ‘in, on’ and ‘around’ as they are very different risk profiles.</p> <p>‘Under the influence’ is a loaded term because of</p>	<p>NA</p>	<p>Made into two questions:</p> <p>Q22. It is OK for me to be in and on the water after consuming alcohol (rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)</p>

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
	legal significance. Are you asking about any alcohol consumption, or being drunk/ truly impaired?		Q22. It is OK for me to be around the water after consuming alcohol (rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)
I believe alcohol education should decrease the likelihood of young people participating in aquatic activities while under the influence of alcohol (rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)	Difficult to interpret this question.	NA	Question removed from the survey.
Drinking alcohol is an important part of being in, on, and around water for me (rate strongly disagree/ disagree/ neither agree or disagree/ agree/ strongly agree)	What else do you gain from asking this question? It seems unnecessary.	NA	Question removed from the survey.
Please indicate how risky you believe it is for you to drink alcohol and participate in the following aquatic activities (lists 11 activities)	Difficult to encompass all the activities someone could do.	NA	Q23. Please indicate how risky you believe it would be for you to drink alcohol and participate in aquatic activities in the following contexts (patrolled beach, unpatrolled beach, lake/dam/quarry, river/creek/stream, private swimming pool, public swimming pool)

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
<p>What is a potential long-term effect of alcohol on your health?</p> <p>a) Dulled concentration b) Nausea c) Altered judgement d) High blood pressure</p>	<p>There are a huge number of negative long-term effects of consuming alcoholic beverages and no positive effects. I think you might rethink this question.</p>	<p>NA</p>	<p>Question removed from the survey.</p>
<p>Which of the following is an effect that alcohol can have on someone in the water?</p> <p>a) Protects against hypothermia (condition of having abnormally low body temperature) b) Increases coordination c) Reduces swimming strength, power, stamina and speed d) Reduces reaction time to changes in the water environment (makes it better/ faster) e) Don't know</p>	<p>Is this intended to be deliberating confusing, it may be a test of comprehension? Suggest rephrasing if meant to read positive impact on reaction time</p>	<p>Change 'reduces' to 'improves' it will read better.</p>	<p>Q30. Which of the following is an effect that alcohol can have on someone in the water?</p> <p>a) Protects against hypothermia (condition of having abnormally low body temperature) b) Increases coordination c) Reduces swimming strength, power, stamina and speed d) Improves reaction time to changes in the water environment (makes it better/ faster) e) Don't know</p>
<p>In a survival setting, which of the following will best prevent hypothermia (condition of having abnormally low body temperature)?</p> <p>a) Leaving on all clothing, including shoes, and remaining as still as possible</p>	<p>NA</p>	<p>This should say 'In a survival setting in water, which...' for clarity.</p>	<p>Q31. In a survival setting in water, which of the following will best prevent hypothermia (condition of having abnormally low body temperature)?</p> <p>a) Leaving on all clothing, including shoes, and remaining as still as possible</p>

Original question	Feedback from expert panel (content validity)	Feedback from face validity panel	Revised survey question
b) A small intake of rum c) Using slow swimming strokes such as breaststroke or sidestroke d) Being fit and slim e) Don't know			b) A small intake of rum c) Using slow swimming strokes such as breaststroke or sidestroke d) Being fit and slim e) Don't know
Please indicate to what extent each of these Sources has influenced your attitude towards combining alcohol and aquatic activities a) Friends and/or family b) External groups/ organisations/ institutions (such as school) c) The Media (TV/ Newspapers/ magazine) d) Other (please describe)	Add a social media category. Value in separating family and friends into different responses (same comments for the similar questions relating to knowledge and involvement)	NA	Q43. Please indicate to what extent each of these sources has influenced your attitude towards combining alcohol and aquatic activities a) Family b) Friends c) External groups/ organisations/ institutions (such as school) d) The Media (TV/ Newspapers/ magazine) e) Social Media f) Other (please describe) (same changes made to the similar questions relating to knowledge and involvement)

Reliability Testing

Test-retest reliability was conducted on the final version of the survey prior to data collection. It is important to confirm test-retest reliability because it identifies the accuracy of the instrument, and consistency of question interpretation (Kitchenham & Pfleeger, 2002). It is acknowledged that test-retest reliability can be influenced by practice effects, as participants may remember their previous answers (Kitchenham & Pfleeger, 2002; Lavrakas, 2008).

To allow for drop out, a sample of 87 individuals aged 18-24 years from the UK and Australia were contacted and invited to complete the survey for reliability testing. Participants were volunteers, recruited through social media platforms, with subsequent correspondence through email, and in person for those at Federation University, Mount Helen campus. The same incentives as those used for recruitment of the final sample were used to attract participants for the reliability testing: they could enter a draw to win a shopping voucher if they completed both test and retest surveys and provided their email address. Overall, 42 participants completed the initial test and 31 completed the retest, a 74% response rate. This sample size was deemed reasonable following best practice suggestions by Bujang and Baharum (2017) for sample sizes when conducting test-retest reliability using Cohens Kappa. Similar to other best practice recommendations for conducting test-retest reliability (Netemeyer et al., 2003), retesting of this survey was completed after approximately 10-14 days (Mean = 11.29 days, \pm SD = 4.37), in order to measure reliability while avoiding possible behaviour change, and to minimise the effect of memory.

The Lime Survey platform was used to host the online survey during reliability testing. As this platform limited survey completions to one per participant, two identical surveys were uploaded to the platform: one for the initial testing, and one for the

retesting, with each survey having a unique website link. Consequently, when corresponding with participants to encourage their completion of the initial test, the initial testing survey link was sent, and likewise, when encouraging completion of the retest survey, the retest link was sent. Participants generated a unique identification code which was the same on both surveys, this facilitated monitoring and matching participants' responses, and acted as a reference if they wished to withdraw their data prior to de-identification.

The reliability results from the survey were stored on the Lime Survey platform and once the time frame for responding expired, the researcher closed the survey to responses. Using Lime Survey facilitated easy extraction of the data to a Microsoft Excel file. The data were then imported into an IBM SPSS Statistics 24 file for subsequent analysis. This process was repeated for the retest responses, which were then matched with the initial test responses using the participant identification code.

Cohen's Kappa was used to measure reliability for categorical questions and Linear Weighted Kappa for ordinal data (Altman, 1991). These tests were selected as they are robust measures for reliability testing and have been used in many reliability analyses (McHugh, 2012). The test-retest reliability scores are detailed in Table 8. The scores are itemised by survey section and are aligned with the interpretation of Cohen's Kappa offered by Altman (1991). The individual question and statement reliability scores are reported in Appendix G in Table 20.

Table 8*Reliability scores and interpretation for each survey section.*

Survey Section	Level of agreement		Number of Questions/ Statements
Demographic and Background Information (18 quantitative questions with 48 possible quantitative responses)	Poor	<.20	2
	Fair	.21-.40	6
	Moderate	.41-.60	10
	Good	.61-.80	14
	Very Good	.81-1.00	16
Attitudes (3 questions containing 19 statements)	Poor	<.20	2
	Fair	.21-.40	4
	Moderate	.41-.60	12
	Good	.61-.80	1
	Very Good	.81-1.00	-
Knowledge (13 questions, including UK and Australian versions)	Poor	<.20	-
	Fair	.21-.40	3
	Moderate	.41-.60	6
	Good	.61-.80	2
	Very Good	.81-1.00	2
Behaviour (4 questions containing 20 possible quantitative responses, including UK and Australian versions)	Poor	<.20	-
	Fair	.21-.40	3
	Moderate	.41-.60	8
	Good	.61-.80	6
	Very Good	.81-1.00	3
Intention (2 questions, 1 containing 3 statements)	Poor	<.20	-
	Fair	.21-.40	1
	Moderate	.41-.60	2
	Good	.61-.80	1
	Very Good	.81-1.00	-
Subjective Norms (1 question containing 5 statements)	Poor	<.20	-
	Fair	.21-.40	1
	Moderate	.41-.60	4
	Good	.61-.80	-
	Very Good	.81-1.00	-
PBC (1 question containing 4 statements)	Poor	<.20	-
	Fair	.21-.40	2
	Moderate	.41-.60	1
	Good	.61-.80	1
	Very Good	.81-1.00	-
Influencers (3 questions containing 15 quantitative statements)	Poor	<.20	-
	Fair	.21-.40	7
	Moderate	.41-.60	7
	Good	.61-.80	1
	Very Good	.81-1.00	-

As shown in Table 8, most questions (75%) were considered to be of at least moderate agreement (Altman, 1991), therefore the majority of questions were deemed appropriate for inclusion in the final survey. Questions in the demographic and background sections with poor or fair reliability scores related to participants' water safety education. As a result, these questions were only used to contextualise the demographic of the sample and not used in the analysis.

A potential explanation for the varied reliability scores in the attitude section of the survey relates to the participants' actual attitudes, or lack of, towards alcohol-influenced aquatic activity. When individuals do not have a formed attitude it is suggested they may answer associated attitude-themed survey questions randomly (Alwin & Krosnick, 1991), thus decreasing test-retest reliability scores. This is also shown among those who have a formed attitude, but experience ambiguity with internal attitudinal cues, that being, their attitudes are not always consistent and therefore they cannot select one definable response on a scale—causing them also to respond at random and decreasing the reliability of the attitude measure (Alwin & Krosnick, 1991). To counteract the random measurement errors present in surveys where multiple questions are used to measure one construct (as in the current survey), combining the questions into an overall total has been recommended (Allison, 1975; Krosnick et al., 2005; Krosnick & Presser, 2010). Accordingly, the six low reliability scoring statements in the attitude section were combined with the other cognitive or affective attitude statements, as appropriate, to create overall scores. This process of combining the lower scoring statements with those scoring higher was replicated for the PBC, intention and subjective norms sections.

Two of the behaviour questions which achieved a reliability score of 'fair' were removed from the analysis due to the low reliability score and inconsistencies in

participants' responses. The third question with a score of 'fair' was combined with the responses from other higher scoring questions to create a total and counteract the low scoring question, in accordance with prior recommendations (Allison, 1975; Krosnick et al., 2005; Krosnick & Presser, 2010). In relation to the knowledge section, these questions were in a multiple-choice format; therefore, participants who did not know the answers may have changed, or randomly guessed a response each time to increase the likelihood of getting the question correct and caused the lower reliability scores. Nevertheless, the three lower reliability questions in this section were combined with higher scoring questions to create overall scores for general alcohol knowledge and alcohol-related aquatic knowledge (Allison, 1975; Krosnick et al., 2005; Krosnick & Presser, 2010). Finally, six influencer questions which achieved a 'fair' score were omitted, and one was used for analysis as no multicollinearity arose; 'influence of media on involvement'.

Procedure

To supplement the information presented in the manuscripts, only brief detail of the quantitative project procedure is presented here. Upon finalisation of the survey and validity and reliability testing, data collection commenced. As participants were recruited either online or in person, this dictated which form of the survey and accompanying documentation they received. When completing online, participants were directed to the host platform Lime Survey which initially provided the plain language information statement (Appendix H), detailing: the survey focus; participant inclusion and exclusion criteria; support service contact details; and indicated that consent was implied through completion and return of the survey. Participants then worked through the online questions, which took approximately 30 minutes, and on survey completion, were provided the opportunity to input their email address to enter the draw to win a shopping

voucher. Online participants were then shown the debrief form (Appendix H) and thanked for their involvement. The Lime Survey platform restricted completions to one per participant to avoid repetitions. If recruited in person, participants experienced the same survey structure and documentation, however these were all hard copies and returned directly to the researcher.

Data Analysis

The first question of the survey required participants to create a unique identification code in the format of the year they were born followed by the first four letters of their mother's maiden name. The example used in the survey was: *"If you were born in 1995 and your mother's maiden name is Smith, your code will be 1995SMIT"*. The code allowed participants' responses to remain anonymous. Participant data was recorded on the Lime Survey platform as they commenced inputting data. This information was stored online and could only be extracted once the whole survey had been deactivated by the researchers. The data collection period lasted approximately 4 months, at which point the online survey was deactivated to prevent any further responses and no further paper-based responses were sought. Following deactivation, data was exported from Lime Survey into a Microsoft Excel file. Each variable was in a separate column and each participant's response in a separate row. This was then imported into an IBM SPSS Statistics 24 file for subsequent analysis. As some of the surveys were completed in paper form, these results were manually entered into the SPSS file and checked thoroughly on two occasions for any inconsistencies.

Variables were coded using the recoding feature in the SPSS software that allowed categorical variables to be allocated a numerical code within the same or a different variable. These numerical codes were then used for analysis.

Missing data was identifiable by no response under the variable name, recognised by either '-' or '.00', and were flagged accordingly in SPSS. As the SPSS default is to delete missing cases 'listwise' (i.e., remove all the data from the analysis from participants' with one or more missing value), it was necessary to report the absent responses as 'missing' to ensure all relevant data was included in the analysis.

Statistical Tests Selected

To determine whether the data were normally distributed, Shapiro-Wilk tests were conducted on the sections of the survey (i.e., demographic and background information, attitudes, knowledge, intention, behaviour, PBC, subjective norms and influencers). The results from this analysis indicated the data were not normally distributed as all results showed $p < 0.05$ and therefore non-parametric tests were required (Razali & Wah, 2011).

For Publication Three ("Alcohol consumption in aquatic settings: A mixed-method study exploring young adults' attitudes and knowledge"; see Chapter Five, Section One) resulting from this quantitative project, Mann-Whitney U tests and Kruskal-Wallis tests were selected. These tests were chosen because the publication aim was to identify any significant differences in the attitude and knowledge scores among participants when grouped into two independent groups (e.g., previous involvement in alcohol-influenced aquatic activity: Yes or No) and three or more independent groups (e.g., self-reported swimming confidence). These results could then be discussed alongside corresponding findings from the qualitative project of this PhD (methodological details provided in Section Two of this chapter), to provide possible explanations. The survey data met the assumptions for these statistical tests, that being: dependent variables were ordinal; independent variables were categorical, ordinal and continuous with two or more independent groups; and, distribution of scores were similar, as assessed by visual inspection (Freund et al., 2010; McKnight & Najab, 2010a; 2010b).

Publication Four (“Predicting young adults’ intentions and involvement in alcohol-influenced aquatic activity”; see Chapter Five, Section Two) aimed to predict intention to participate in alcohol-influenced aquatic activities, as well as past behaviour, using the survey variables as predictors (i.e., demographic variables, TPB components, knowledge and influences). Therefore, the non-parametric test selected was a cumulative odds ordinal logistic regression. The data met the assumptions for this statistical test: alongside those assumptions detailed for the tests used in the first survey publication, proportional odds existed (O’Connell, 2006) and there was no multicollinearity following the removal of highly correlated predictor variables from the analysis (Midi et al., 2010). The results from these statistical tests and evidence of meeting the assumptions are provided in the corresponding publications in Chapter Five.

Questions Not Reported in the Publications

A few of the questions in the finalised survey were not reported in the survey publications for a number of key reasons. Low reliability scores, alongside difficulties in determining meaning from the results led to the omission of some questions (e.g., questions 43 and 44). Likewise, other questions were not reported in the publications following poor distribution of participants’ responses (e.g., question 4) and inconsistencies in participants’ answers (e.g., questions 35 and 38). Where appropriate, the descriptive statistics from these omitted questions were used to inform the qualitative component of this PhD, by assisting in the development of the interview schedule and the concepts further explored within those discussions.

SECTION TWO

Qualitative Methodology

Study Design and Theoretical Underpinning

The research aims for this qualitative project (also provided in Chapter Two) resulted from the review of literature and previous drowning reports discussed in Chapter Three, Section One, as well as the results from the quantitative PhD project. The qualitative project aims addressed PhD research questions 2, 4 and 5 (detailed in Chapter Two), and were as follows:

- i. Ascertain young Australian adults' perceptions of alcohol use in aquatic contexts.
- ii. Determine the influencers on young Australian adults' alcohol-related behaviours in aquatic contexts.
- iii. Review young adults' awareness and understanding of current Australian alcohol themed drowning prevention campaigns.
- iv. Determine what young adults perceived to be the most effective approaches for preventing alcohol use in aquatic settings among their age group.
- v. Identify the strategies known to, and used by, young adults for personal safety in aquatic contexts if consuming alcohol.

To assist in the research process and facilitate sound conclusions, it was necessary to identify an epistemology and theoretical perspective to guide this qualitative project and the methodology and methods selected (Crotty, 1998; Reeves et al., 2008). A constructionist epistemology, adopting phenomenology, was identified to be a fitting

underpinning to this research, because: the research sought to investigate individuals' perspectives and experiences of alcohol-influenced aquatic activity and their formation of corresponding attitudes and knowledge. The suitability of this underpinning to the qualitative PhD research was further justified because: collective assumptions of the constructionist and phenomenological approaches aligned with the research aims (i.e., how individuals interpret and give meaning to their conscious experiences); and, constructionism and phenomenology are suggested to be interlinked approaches and this could enable the research to be more thorough (Crotty, 1998; Smith, 2013).

The sociocultural theory was also selected to underpin this qualitative project because of its focus on the individuals' awareness of their circumstances and societal norms, and how this affects their behaviours and definitions of risk (Lupton, 2006). This approach complemented the phenomenological theoretical underpinning, by enabling the investigation of individuals' perspectives of influences on their behaviours, and offering a more complete picture of young adults' views and experiences of alcohol-influenced aquatic activity.

Both phenomenology and the sociocultural theory align with aspects of the TPB (the theory used in the quantitative project of this PhD; Ajzen, 1985): the sociocultural theory considers societal norms (Lupton, 2006), and phenomenology states every experience or action involves intention (Sokolowski, 2000). This compatibility with the TPB ensured the qualitative and quantitative PhD results were linked to establish a detailed account of young adults' perceptions of alcohol consumption in aquatic settings, and thus enabled this collective research to comprehensively answer the PhD research questions. The incorporation of phenomenology had implications for the data analysis, supporting the interpretation of meaning from the results, and this approach is discussed under the corresponding data analysis heading.

To address the research aims, this qualitative project incorporated one-to-one and small group interviews of 2-4 people (Frey & Fontana, 1991; Moser & Korstjens, 2018). Offering either one-to-one or small group interviews enabled participants to select their favoured mode, and was purposively incorporated to help participants feel comfortable in the research setting. Participants could also choose the location of the interview, to help to address any potential power imbalance between researcher and participant and to further assist them in feeling at-ease during the interview (Elwood & Martin, 2000).

Interview Schedule Development

To address the research aims, it was important to review and critique any prior research which had conducted relevant quantitative and/or qualitative investigations with young adults regarding alcohol-influenced aquatic activity, to inform the development of the interview schedule. Therefore, an extensive review of the peer-reviewed literature was undertaken to identify any research that had focused on drowning prevention, water safety and/or risk-taking behaviours among young adults. This process highlighted that while some relevant investigative research had been conducted (e.g., Enkel et al., 2018; Hamilton & Schmidt, 2013, 2014; Howland et al., 1996; Leavy et al., 2016; Moran, 2008b; Ridge & Nimmo, 2018; Sinkinson, 2014; Watt et al., 2012), this had only explored typical activities and perceptions of risk without detailing influences on alcohol-influenced aquatic activity or awareness of prevention campaigns. As this earlier research had not extensively explored the concepts included in the current research aims, a new set of qualitative questions was required.

To comprehensively investigate these research aims, a semi-structured questioning style was necessary to allow freedom for in-depth discussions to explore experiences and responses which perhaps had not been considered when designing the questions (Longhurst, 2010). Accordingly, the questions designed for these qualitative

discussions were used as a guide only, allowing the facilitator to ask further, more probing questions to encourage the participant to elaborate on their comments in more detail (Longhurst, 2010). As the role of the qualitative project of this PhD was to build on the quantitative PhD projects, seeking rich data for deeper understanding, most of the questions in the interview schedule were informed by the results of the quantitative survey project. This approach enabled the discussions to more thoroughly explore the survey findings and add to or enhance understanding of any unusual or inconsistent outcomes. An example of this question style is: *“Some research I have previously conducted has shown that many people your age think it is safe to swim in public pools after having 1-2 alcoholic drinks, but less safe in rivers, lakes and the sea. Could you explain what you think about this?”*

The qualitative component of the PhD, using interviews to collect data, enabled investigation of aspects that were not suitable for quantitative measurement (e.g., participant’s familiarity with prevention campaigns). The range of possible responses and level of detail necessary for questions to provide useful information to drowning prevention practitioners required these questions to be incorporated into a qualitative interview schedule design. Finally, as the interview schedule was underpinned and guided by sociocultural and phenomenological theoretical approaches, questions were designed to encourage participants to talk about their own experiences, perceptions and interpretations of alcohol-influenced aquatic activity, for example: *“What experiences have you had with your friends participating in aquatic activities after drinking alcohol?”* See Appendix I for the final interview schedule, which when viewed digitally can be accessed through this link: [Interview Schedule](#).

Ethics

Ethical approval for this project was received from the Human Research Ethics Committee at Federation University, Australia prior to any data collection (Approval number B19-027, see Appendix J). The finalised interview schedule was submitted as an amendment to the ethics committee and approved prior to final data collection.

Validity of Interview Schedule

A trial small group interview was conducted with one male and one female participant (both aged 24 years) to determine the face validity of the questions and to ensure the wording was appropriate for the target population. Following this process, one question (*“Is the influence from friends in an aquatic setting a different influence to other contexts? E.g. in a bar”*) was removed due to interpretation difficulties and similar relevant information was collected through the remaining questions. No other issues were evident and hence the interview schedule was deemed appropriate for use.

Target Population

A purposive, volunteer sample of young adults aged 18-24 years who had received most of their education in Australia was sought for the interviews. This age range was selected for the same ethical reason as detailed in the quantitative aspect of this PhD (see Section One of Chapter Four). Participants were eligible to complete the interviews irrespective of whether they had completed the survey project of this PhD. Participation in the survey was clarified, as the same unique identification code was generated for each participant in the qualitative project as for the quantitative project, and these were cross-referenced.

Participants were recruited via posters (see Appendix K) placed in community gyms, swimming pools, libraries, cafes and the Ballarat campuses of Federation

University, Australia. The poster advertisements briefly described the research project and asked individuals to email the researcher if they were interested, and this enabled a convenient time for the interview to be scheduled and helped address a possible power imbalance between researcher and participant. The researcher also promoted participation by attending university tutorials to invite potential participants, and received approval for nominated university staff to email invitations to students living in the residential accommodation. Snowballing occurred to recruit further participants, as some responders brought friends and/or colleagues who met the inclusion criteria. Incentives were used for this project; following completion of the interview, each participant received a supermarket voucher.

Procedure

Once contact was established between participant and researcher, the participants were invited to indicate their preference for either a one-to-one or small group interview and then a convenient time and place was arranged for the meeting, for example, a booked room on a university campus or sports facility. On arrival, participants were provided with the plain language information statement (Appendix L) that described the study and requirements of their participation. Participants signed a consent form (Appendix L) which outlined, among other factors, that the interview was audio recorded and the anonymity requirements. A short demographic survey was also administered (Appendix M). This included the demographic questions from the survey developed in the quantitative PhD project (detailed in Section One of this chapter), as well as a campaign recognition question that presented images of five alcohol-related drowning prevention campaigns and invited participants to identify those that were familiar to them. Following survey completion, and prior to commencing the audio recording, the researcher answered any questions from participants (e.g., when they would receive the

supermarket voucher). On completion of the interview, participants were thanked for their participation and provided with a participant debrief form (Appendix L) that detailed the aim of the study and directed them to informative resources which educated about the risks of combining alcohol use and aquatic activity. To conclude, each participant was provided with a supermarket voucher.

The interviews were all recorded on a Huawei P8 Lite mobile phone using the sound recorder feature. These were then transferred to the researcher's personal password protected Google Drive for storage as m4a files. Following recommendations from Federation University Research Services, Pacific Transcription (a professional transcription service) were employed to transcribe the interviews verbatim, with speaker identification and timestamping every 5 minutes, in the NVivo Basic format offered by the company. The transcription files were entered into NVivo software for analysis.

Data Analysis

For the qualitative data analysis, thematic analysis was selected as it is a substantiated method for qualitative data analysis and has been used previously in the analysis of health and well-being research (Braun & Clarke, 2014). In addition, interpretative phenomenological analysis was also selected to extend beyond this basic form of analysis, to interpret the discussions reflecting participants' experiences, while also critically questioning their responses to interpret meaning (Smith & Osborn, 2009). This approach recognises that research cannot directly or completely understand an individual's lived experiences, therefore interpretation is required by the investigator to make sense of participants' responses (Smith, 1996). Both thematic and interpretative phenomenological analysis follow a similar trajectory, that being, the development of themes from transcripts.

Qualitative data analysis advanced as additional insight was obtained in a non-linear process, therefore, while the following detail of the analysis is presented in a linear fashion, the researcher revisited each step throughout the analysis to ensure credible and accurate results. The transcripts were initially checked for accuracy by listening to the audio recordings and reading through the transcriptions, correcting any errors along the way. Data familiarisation followed, by rereading the transcripts and generating emerging codes across the data in a systematic manner. Codes were grouped into initial themes using a thematic map, and these were systematically reviewed by the researcher to ensure they accurately reflected the data, codes and participants' responses. This initial thematic map was discussed with the supervisory team to further analyse the data and ensure the results were developed without preconceived bias. Despite these conscious efforts to remove researcher bias, it is possible some deductive or theoretical analysis occurred in the development of some codes and themes because of the researcher's understanding of literature and knowledge gaps in the area (Braun & Clarke, 2006; Percy et al., 2015; Thomas, 2006). The researcher's view towards alcohol-influenced aquatic activity was based on several years of working and volunteering within the drowning prevention field. Accordingly, they viewed it as a risky activity. More detail pertaining to this is provided in the Introduction (Chapter One) of this thesis.

The researcher's understanding and knowledge of the field of research facilitated free flowing conversations within the interview setting, enabling suitable probing questions to generate and explore participants' experiences. The researcher was aware that it is important to acknowledge the potential for personal bias to limit data analysis, and implemented strategies to minimise the effect of bias. Examples of these strategies include: involvement of the entire supervisory panel in data analysis and reporting; the use of theories to underpin the PhD projects and to guide the research process; participant

review of qualitative data outputs; and, throughout, the candidate continually challenged the conclusions and results in an effort to remove any potential effects of bias.

Upon extensive review of the initial themes during the supervisory team meetings, and continued review of the raw data and codes, it was clear that two publications were necessary to report results, specifically, influencers on involvement in alcohol-influenced aquatic activity and perspectives of prevention efforts. Two thematic maps were developed to align with these strands and discussed with the supervisory panel until unanimous agreement of the final themes was reached. All final themes were defined and named to ensure the descriptors truthfully echoed the discussion points and concepts raised by participants. This process ensured the data analysis was conducted in a rigorous way (Braun & Clarke, 2006), and was predominantly interpreted in accordance with interpretative phenomenological analysis and using an inductive approach. Specifically, the themes reflected the data and participants' experiences and interactions, without aiming to align with previous theories or research patterns from a similar area (Smith et al., 1999; Thomas, 2006).

Methodological triangulation was achieved in this project as the outcomes of the quantitative PhD project underpinned the interview schedule of this qualitative PhD project (Korstjens & Moser, 2018; Patton, 2002b). Rigor and trustworthiness were further ensured through establishing confirmability of the results with the supervisory team. The researcher conducted the interviews, but consulted with the supervisory team to gain multiple perspectives on the data, responses, consensus on data saturation, and to monitor the participants' interpretations of the questions (Williamson, 2018). Finally, a version of member checking of the themes occurred with some participants (in accordance with recommendations by Creswell, 2014). Specifically, the participants reviewed finalised themes instead of entire transcripts. This was because most data collection occurred

through small group interviews, and there were concerns regarding the participants' ability and ease in interpreting meaning from these verbatim transcripts of multiple speakers, and the need to maintain anonymity of participants. This process further ensured the results accurately reflected the discussions and further cemented the credibility and validity of the findings (Korstjens & Moser, 2018).

The subsequent results and descriptions of the themes generated from this qualitative project are discussed in the corresponding publications in Chapter Six. Some themes are also discussed alongside results from the quantitative research in the mixed methods publication (Publication Three) in Section One of Chapter Five.

CHAPTER FIVE

Quantitative Research

Chapter Outline

This chapter presents the two publications (Three and Four) that reported the results from the survey which was designed as part of this PhD. This project aimed to determine young adults' knowledge about alcohol and its effects, their attitudes towards alcohol-influenced aquatic activity, and to predict their intentions and involvement in this behaviour. Obtaining this information from young adults in the UK and Australia enabled this project to offer new knowledge to the drowning prevention field, assisting to identify factors which may contribute towards the incidence of alcohol-related drowning among young adults in two high-income countries. This project addressed the following PhD research questions:

2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?
4. What factors influence young adults' involvement in alcohol-influenced aquatic activity in Australia and the United Kingdom (UK)?
5. To what extent have young people in Australia developed their knowledge, perceptions, attitudes and behaviours regarding alcohol-influenced aquatic activity?

Details of both publications are presented at the beginning of the corresponding sections within this chapter: Publication Three is presented in Section One, Publication Four is presented in Section Two.

SECTION ONE

Publication Three Outline

Title: Alcohol consumption in aquatic settings: A mixed-method study exploring young adults' attitudes and knowledge.

This publication aimed to:

- i. Establish young adults' level of knowledge about alcohol consumption, both generally and in an aquatic context.
- ii. Investigate factors impacting young adults' attitudes towards participation in alcohol-influenced aquatic activity.

This is the accepted manuscript of the article published by Taylor and Francis in *Drugs: Education, Prevention and Policy* in October 2020, available online

<https://www.tandfonline.com/doi/10.1080/09687637.2020.1832962>. A copy of the

Supplementary File supporting this publication is provided in Appendix N, which when viewed digitally can be accessed through this link: [Supplementary File](#). For consistency throughout this thesis, this manuscript is presented as a Word document and the references are in the style of APA 7th Edition and presented in the thesis reference list.

The reference (in APA 7th Edition style) for this publication is as follows:

Calverley, H. L. M., Petrass, L. A., & Blitvich, J. D. (2020). Alcohol consumption in aquatic settings: A mixed-method study exploring young adults' attitudes and knowledge. *Drugs: Education, Prevention, and Policy*.

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Full Name	Share of contribution (%)	Signature	Date
Hannah L. M. Calverley	70		07/12/2020
Lauren A. Petrass	17		07/12/2020
Jennifer D. Blitvich	13		07/12/2020

PUBLICATION THREE

Alcohol consumption in aquatic settings: A mixed-method study exploring young adults' attitudes and knowledge.

Abstract

Retrospective studies have identified alcohol as a significant risk factor in drownings involving young adults. Few studies have explored this issue, therefore the current contextual understanding of alcohol consumption in aquatic settings is limited. This study used a survey (N=182) and one-to-one and small group interviews (N=23) to investigate knowledge and attitudes of United Kingdom and Australian young adults (aged 18-24 years) towards involvement in aquatic activity after consuming alcohol. Findings illustrated a poor level of general and aquatic-specific alcohol knowledge. Australian educated participants, and those self-reporting: stronger swimming competence; and/or completion of alcohol and water safety education; and/or participation in aquatic activity following alcohol consumption, achieved significantly higher knowledge scores. Most reported a neutral attitude, and those with previous experience of alcohol consumption in aquatic settings had more accepting attitudes of this behaviour ($p < .001$). The aquatic activity, context and amount of alcohol consumed influenced attitudes. Participants reported a lack of alcohol-focused drowning prevention or water safety education for their age group, and many referred to their upbringing and parents' behaviours as reference for what was safe. Drowning prevention practitioners should consider these results to ensure young adults understand the risks of consuming alcohol in all aquatic contexts.

Introduction

Alcohol significantly contributes to drowning among young adults (aged 15-24 years) worldwide (Ahlm et al., 2013; World Health Organization, 2014a), and reducing alcohol-related drownings in this age group has been prioritized in several high-income countries (HIC; e.g., Australian Water Safety Council, 2016; The National Water Safety Forum Strategy Working Group, 2015). In HICs such as Australia and the United Kingdom (UK), targeted prevention campaigns, and laws and legislation about alcohol use around the water have been implemented to address this issue (Linnan et al., 2014; Royal Life Saving Society - Australia, 2017; The National Water Safety Forum Strategy Working Group, 2015). However, few campaigns have been rigorously evaluated and the findings from such evaluations are not typically published in peer reviewed or grey literature (Calverley et al., 2020; Driscoll et al., 2004b). To the authors' knowledge, only one Australian campaign (*Don't Drink and Drown*) has published details of its effectiveness (Enkel et al., 2018; Ridge & Nimmo, 2018). Without evaluation, it is difficult to ascertain whether campaigns have been effective in decreasing alcohol-related drownings. The 2020 Australian Drowning Report identified alcohol as a risk factor for drowning, and detailed the 'Make the Right Call' campaign which encourages Australians to be safe in aquatic environments, including to "avoid alcohol around water" (Royal Life Saving Society - Australia, 2020, p. 23). Likewise, the UK drowning prevention strategy 2016-2026 recognized the role of alcohol in UK drownings, including a priority target to: "increase awareness of everyday risks in, on and around water" (The National Water Safety Forum Strategy Working Group, 2015, p. 17).

To date, research investigating alcohol-related drownings among young adults has included: analysis of coroners' reports (e.g., Peden et al., 2017; Warner et al., 2000); breathalysing and surveying young people at rivers and beaches (Peden et al., 2018a;

Watt et al., 2012); and, assessing school leavers' awareness of risks associated with consuming alcohol and participating in aquatic activity (Enkel et al., 2018). These confirm young adults are consuming alcohol and participating in aquatic activity, but lack contextual understanding of the behaviour, such as: insight into influencing factors; unprompted awareness and knowledge of risks; and/or attitudes towards alcohol-influenced aquatic activity (defined for this study as activities in and on the water following/during the consumption of alcohol, and while alcohol effects could be influential on the individual). Contextual understanding of behaviour is fundamental to health-behaviour research and injury prevention (Gielen & Sleet, 2003), recognized in models such as Translating Research into Injury Prevention Practice (Finch, 2006) and the Theory of Planned Behaviour (TPB; Ajzen, 1985). Few studies have explored young adults' knowledge and attitudes towards alcohol consumption and participation in aquatic activity (Abercromby et al., 2020; Enkel et al., 2018; Moran, 2008b), thus limited contextual information exists to inform alcohol-specific drowning prevention campaigns.

Two studies used focus groups to explore young adults' behaviours and attitudes towards consuming alcohol in aquatic settings in Australia (Abercromby et al., 2020) and New Zealand (Sinkinson, 2014), making some headway towards identifying potential reasons for young adults' prevalence in alcohol-related drowning statistics. Sinkinson found 'fun' was a major attraction to the behaviour, and perception of associated risks was dependent on the amount of alcohol consumed. This finding suggests young adults may not understand the risks of consuming alcohol and swimming, and/or lack awareness of varying levels of risk associated with different aquatic settings. In contrast, Abercromby et al. (2020) indicated young adults were aware of risks associated with consuming alcohol and participating in aquatic activity, but perceived benefits of this activity, with their behaviour influenced by peers, societal and cultural norms. This

influence of norms reflected the findings from the self-report quantitative study of young Australian men by Hamilton and Schmidt (2014), who found that a perception of approving group norms and a positive attitude towards the behaviour predicted intention to drink and swim. In all studies, participants were from specific geographic locations. Hamilton and Schmidt's (2014) study was further limited by their definition of aquatic activity which only covered swimming. Work with more heterogeneous samples from a range of communities is necessary to provide a sound evidence-base to inform prevention efforts and facilitate widespread impact (Driscoll et al., 2003).

This study aimed to contribute to building the necessary evidence base, through the development and implementation of a valid and reliable self-report survey, followed by qualitative inquiry to: (i) establish young adults' level of knowledge about alcohol consumption, both generally and in an aquatic context; and, (ii) investigate factors impacting young adults' attitudes towards participation in alcohol-influenced aquatic activity. Young adults from Australia and the UK participated, and were considered suitable for comparison because both countries: (i) are island nations; (ii) recorded inland waterways as prime locations for drownings; (iii) recorded comparable rates of alcohol-influenced drownings among those aged 15-24 years old; and, (iv) have produced alcohol-themed drowning prevention campaigns (Royal Life Saving Society - Australia, 2018a, 2020; Royal Life Saving Society - UK, 2018; The National Water Safety Forum, 2019; The National Water Safety Forum Strategy Working Group, 2015). An investigation into both nations is warranted to facilitate deeper understanding of alcohol-related drownings among young adults to enable more targeted prevention in both Australia and the UK.

Materials and Methods

Study Design

This project utilised a mixed methods approach which allowed deeper investigation of alcohol-influenced aquatic activity than possible using just one method of data collection (Green & Thorogood, 2018; Tariq & Woodman, 2013). The quantitative project within this study adopted a positivist epistemology to obtain evidence of young adults' knowledge and attitudes towards alcohol-influenced aquatic activity. Accordingly, a self-report survey, underpinned by the TPB, was developed for this purpose. Alongside obtaining quantifiable evidence, this study also sought to explore young adults' interpretations and experiences of alcohol-influenced aquatic activity and how their attitudes were formulated. A constructionist approach using phenomenology and sociocultural theoretical perspectives guided and underpinned the qualitative project, adopting one-to-one and small group interviews (Gibbs, 2012; Krueger & Casey, 2009; Morgan, 1997) to expand and confirm the quantitative findings, and facilitate open-ended discussions about individual experiences and personal perspectives of alcohol-influenced aquatic activity (Lupton, 2006; Smith, 2013). As both phenomenology and the TPB recognize behaviour results from intention (Ajzen, 1985; Sokolowski, 2000), triangulation of the positivist quantitative results with the richness of the qualitative results strengthened the rigor and trustworthiness of the findings (Denzin, 2015; Flick, 2018; Patton, 2002a). Further, methodological triangulation was also achieved as the outcomes of the quantitative project (conducted first), informed the qualitative project.

Survey Development

Survey development and question style were underpinned by a comprehensive and critical review of relevant literature within the drowning prevention, alcohol, TPB

and risk domains, as well as surveys which measured alcohol-related attitudes to adapt to the current study (Delcher et al., 2013; Driscoll et al., 2003; Hamilton & Schmidt, 2014; Midford et al., 2000; Moran, 2008a; Moran et al., 2012; Perrine et al., 1994; Petrass & Blitvich, 2018; Petrass et al., 2012; Sinkinson, 2014; Thadani et al., 2009; Ulleberg & Rundmo, 2003; Weatherwax-Fall, 2008; Weber et al., 2002; Wood et al., 2009). Where questions referred to alcohol consumption guidelines or health effects, government recommendations current at the time of survey development and implementation, and reliable health resources, informed the content (e.g., National Health and Medical Research Council, 2009; UK Government, 2018). Supplementary File Table 21 (Appendix N) provides further detail. Whilst the ‘Australian guidelines to reduce health risks from drinking alcohol’ was being updated while this manuscript was under-review, survey content and relevance remain appropriate (National Health and Medical Research Council, 2020). The survey content was also underpinned by the TPB concepts: attitude; perceived behavioural control (PBC); subjective norms; intentions; and, behaviour (Ajzen, 1988). The TPB was applied based on its effective use in injury prevention research and interventions involving young adults, such as texting while driving (Bazargan-Hejazi et al., 2016) and alcohol use and swimming (Hamilton & Schmidt, 2014), and because meta-analyses have confirmed this model’s effectiveness in predicting intention and behaviour (e.g., Armitage & Conner, 2001; Hagger & Chatzisarantis, 2009).

The survey contained eight sub-sections (demographic and background information; attitudes; knowledge; past behaviour; intention; subjective norms; PBC; and influencers), with 45 closed-ended multiple-choice questions (n = 25), Likert Scale (n = 15) or open, short answer response (n = 5; see Supplementary File Table 21 in Appendix N for additional measure details). Two versions of the survey were created to account for

contextual differences between the UK and Australia, specifically relating to terminology and legal alcohol limits.

Item Description and Manipulation

Ten multiple-choice questions measured alcohol-related knowledge, five assessed general alcohol knowledge (e.g., ‘Which of the following is one standard drink?’), and five measured aquatic-specific alcohol knowledge (e.g., ‘Which of the following is an effect that alcohol can have on someone in the water?’). The overall knowledge score reflected the number of correct responses (maximum score 10; mean = 4.72, SD = 1.66), and this score was split into equal quartiles for analysis—very poor (0-2), poor (3-5), adequate (5-7) and good (8-10).

An attitude score, which indicated an individual’s level of acceptance of alcohol-influenced aquatic activity, was calculated from 19 statements measured on a 5-point Likert Scale (e.g., ‘It is safe for me to get drunk in aquatic settings’). Number values were assigned to categories ‘strongly disagree’ (1) through to ‘strongly agree’ (5), with a maximum possible score of 95. Higher scores reflected a more accepting attitude towards alcohol-influenced aquatic activity. Total attitude scores were initially quintile split, however, the disparity in group sizes required extreme responses to be combined with the subsequent level to create three equal groups to ensure even distribution of scores for the statistical test (Sheskin, 2011). A score of 38 or lower indicated a negative attitude towards combining alcohol and aquatic activity, a score of 39-57 indicated a neutral attitude and a score of 58 or higher suggested an accepting attitude.

Survey Validity

To assess construct and content validity, 15 individuals (including drowning prevention experts and practitioners; academics experienced in survey research; and a

psychology researcher) were purposively selected to review the draft survey. Feedback resulted in the removal of three questions due to interpretation difficulties, and 14 questions were reworded to enhance clarity.

Face validity was assessed by 10 participants aged 18-24 years educated in Australia (n = 5) or the UK (n = 5), considered representative of the sample population. Participants provided feedback and recommendations on survey clarity. Incentives (the chance to win gift vouchers—further details in data collection and analysis) enhanced the recruitment of these participants. Feedback resulted in the amendment of three questions. Once amendments were finalised, reliability testing was conducted.

Survey Reliability: Test Retest

To enable test retest reliability measurement, a convenience sample of 87 individuals, aged 18-24 years, from the UK and Australia was sourced through social media, email, and in person and invited to undertake the survey. Forty-two participants completed the initial test. These participants were emailed 10-14 days later and asked to complete the survey again, with three reminder emails sent over the subsequent two weeks. Thirty-one participants (mean age = 21.35 years \pm SD = 2.29; response rate 74%) completed the retest. Gender balance was relatively even (54.8% female), approximately two-thirds reported completion of an undergraduate degree or higher (67.8%), and about two-thirds had completed their education in Australia (65%). Reasons for dropout included not meeting age requirements, withdrawal of consent, or not responding. To determine reliability, Cohen's Kappa analysis was conducted on categorical data, and Linear Weighted Kappa for ordinal data (Altman, 1991; McHugh, 2012). The reliability scores for each survey subsection are provided in Table 9. As most of the reliability scores were of at least moderate strength, the survey was deemed acceptable without further amendments.

Table 9

Survey test-retest reliability scores using interpretations by Altman (1991).

	Number of Questions/ Statements	Mean level of agreement	Interpretation
Demographic and Background Questions	21	.662	Good
Attitude Questions	19	.394	Fair
Knowledge Questions	13	.562	Moderate
Behaviour Questions	14	.613	Good
Intention Questions	4	.519	Moderate
Subjective Norms Questions	5	.431	Moderate
PBC Questions	4	.482	Moderate
Influencers Questions	15	.429	Moderate

Interview Schedule Development

The semi-structured interview schedule was informed by: results from the self-report survey; previous research of young adults' involvement in alcohol-influenced aquatic activities (Hamilton & Schmidt, 2014; Sinkinson, 2014); research and knowledge gaps identified by Australian, and global, drowning reports (Royal Life Saving Society - Australia, 2018d, 2019; World Health Organization, 2014a); and, research exploring young adults' water safety and risk-taking behaviours (Moran, 2008a, 2008b, 2019; Moran et al., 2012; Petrass et al., 2012). The interview schedule was underpinned by sociocultural and phenomenological theoretical approaches (Lupton, 2006; Smith, 2013) and designed to elicit in-depth information about young adults' knowledge of alcohol and its effect on aquatic activities (e.g., 'What risks, if any, are involved with drinking alcohol

in aquatic settings?’), as well as their personal attitudes, experiences and decision making in terms of alcohol use in aquatic contexts (e.g., ‘When do you think it is okay to drink alcohol in aquatic settings?’).

The combination of one-to-one and small group interviews enabled participants to select their most comfortable preference, one of the steps taken to minimise any perceived power imbalance between researcher and participants. Small group interviews were limited to 2-4 people to facilitate discussion among participants, ensure manageable groups, and encourage contribution from less-confident speakers (Krueger & Casey, 2009; Onwuegbuzie et al., 2009). Semi-structured discussion offered the freedom to explore experiences of alcohol-influenced aquatic activities while providing structure to remain focused (Longhurst, 2010).

Interview Schedule Validity

A pilot small group interview, lasting 45 minutes, was conducted with one male and one female participant (both aged 24 years) to establish the validity and appropriateness of the interview schedule. This resulted in the removal of one question due to interpretation difficulties. No other issues arose and the interview schedule was approved for implementation.

Data Collection and Analysis

Survey

Following establishment of validity and reliability, the survey was hosted through the online platform Lime Survey. The web link was promoted through social media, email lists and university platforms to build a purposive sample of young adults aged 18-24 years, who had received most of their education in Australia or the UK. Power analysis for studies assessing the relationship between variables indicated a sample of 84

was required with an alpha level 0.05, power of 0.80 and effect size 0.50 (Cohen, 1977). Only some participants knew the researchers personally, professionally, or in a student-teacher capacity. All participants were informed survey completion was voluntary and (if applicable) participation would not affect any relationship/grades/employment/ongoing assessment. To enhance participant numbers, hard copies of the survey were distributed at university lectures, tutorials and events. As survey participants were predominantly recruited online, the response rate is unknown.

Survey completion took approximately 30 minutes, with consent implied through completion and return of the survey (detailed in the plain language information statement). Shopping vouchers (four in AUD, four in GBP) were offered as incentives and those who completed the survey and provided an email address were entered in a draw for these. Institutional clearance from the Human Research Ethics Committee was confirmed prior to data collection.

Data were extracted from the Lime Survey platform and imported into IBM Statistics 24. Survey responses from hard copies were manually entered and data cleaning was conducted to ensure input accuracy. Partially completed surveys were included but missing data was deleted listwise during the analysis, as is the default in SPSS. Shaapiro-Wilk tests established data normality prior to analysis. Results for all variables showed $p < 0.05$, indicating non-parametric data. Descriptive statistics (means, medians and standard deviations [SD]) summarised the data. Mann-Whitney U tests determined significant differences between two independent groups (e.g., country educated), and Kruskal-Wallis tests assessed data with three or more independent groups (e.g., self-reported swimming competence). Significant effects were assumed if $\alpha \leq 0.05$.

Interviews

The qualitative project sought a purposive sample of Australian educated 18 to 24-year-olds and continued until data saturation, in accordance with suggestions by Onwuegbuzie and Collins (2007). Participants were recruited for one-to-one or small group interviews through posters located at cafes, libraries and university campuses, advertising the research and inviting interested participants to contact the lead researcher (HC), therefore it is unknown how many prospective participants did not volunteer. Participants were invited to bring friends and/or colleagues to the interview, hence snowballing occurred. All participants were asked to complete a brief demographic survey prior to commencing the interview. This survey replicated the demographic component of the quantitative project survey.

The interviews were conducted by the lead researcher (a female PhD candidate) and took place in reserved rooms on university campuses or sports facilities convenient to participants. Venues, where participants felt comfortable, were selected to help address any potential power imbalance between the researcher and participants (Elwood & Martin, 2000). To further address the power relations, initial questions were framed to support participant confidence and to establish a positive atmosphere for the interview. Additionally, the researcher: used appropriate, tailored language with participants; invited participants' honesty and criticisms throughout the research process; confirmed the nature of the research throughout the interview; safeguarded participant privacy by anonymising responses and requiring other group interview participants to sign agreements to maintain the anonymity of others; and, established rapport with participants through introducing themselves, actively listening, and seeking participant comments on data analysis prior to finalisation (Blackstone, 2012; Karnieli-Miller et al., 2008).

Each interview lasted 30-60 minutes, depending on the experiences and amount of information the interviewees were comfortable disclosing, and the number of people in the small group interview. On completion, participants were offered a supermarket voucher. With participant written consent, interviews were recorded on a mobile phone and later transcribed verbatim.

Thematic analysis was conducted, following the recommendations of Braun and Clarke (2006), to establish themes within the data. Interpretative phenomenological analysis was also undertaken, enabling further exploration of the data to produce results reflective of participants' personal experiences (Smith & Osborn, 2009). Interpretation and critique of these experiences provided insight into young adults' perceptions of alcohol-influenced aquatic activity and an understanding of how attitudes were constructed. Analysis involved the researchers familiarising themselves with the data; generating initial codes; searching for and reviewing themes; and defining and naming themes. The entire dataset was systematically coded, and themes emerged following repeated reviews of the transcripts and discussions among the researchers (all were female, with 3, 13 and 32 years' in the water safety and drowning prevention research field, two have achieved PhDs in this field, the third is working towards one). Analysis progressed as additional insight was obtained in a non-linear process, as transcripts, coding and themes were consistently revisited and amended. Once results were established, member checking allowed some participants to review the themes, enhancing the credibility of the findings through analytical triangulation (Patton, 2002a).

Results

Demographics

Demographic information for the quantitative and qualitative samples is presented in Table 10. Survey postcode data indicated Australian-educated participants lived in Victoria, the Australian Capital Territory, New South Wales and Queensland. UK-educated participants lived in locations from the Southeast, London Boroughs, East and West Midlands, Northeast, Northwest and Scotland. Postcodes were predominantly from inland locations.

The qualitative project consisted of three one-to-one interviews and eight small group interviews, and 26.1% of interview participants had already completed the survey. All qualitative participants were educated in Australia, lived in Victoria at the time of the study, but some had grown up in New South Wales.

Table 10*Demographic details of the quantitative and qualitative samples.*

Demographic Information	Quantitative Sample			Qualitative Sample Australian
	UK	Australian	Total	
Sample size (N)	37	145	182	23
Age (years) as Mean (SD)	21.86 (1.93)	20.35 (1.87)	20.66 (1.97)	20.65 (2.19)
Gender (%)				
Male	37.8	40.7	40.1	39.1
Female	62.2	57.2	58.2	60.9
Other/ Prefer not to say	-	2.1	1.7	-
Highest Education Level (%)				
Secondary School	2.7	16.7	13.8	43.5
Trade/Diploma	13.5	9	9.9	4.3
University	83.8	74.3	76.3	52.2
Employment Status (%)				
Full-time	48.6	14.2	21.3	-
Part-time/Casual	5.4	37.6	30.9	56.5
Student	43.2	44.7	44.4	43.5
Unemployed	2.7	3.5	3.4	-
Previous water safety education? (%)				
Yes	97.3	97.9	97.8	95.7
No	2.7	2.1	2.2	4.3
Aquatic qualification? i.e., pool/beach lifeguard, swim teacher, or lifesaving qualification (%)				
Yes	29.7	32.4	31.9	17.4
No	70.3	67.6	68.1	82.6
Swim Ability (%)				
Poor	21.6	36.9	33.7	52.2
Moderate	32.4	29.8	30.3	30.4
Good	45.9	33.3	36	17.4
Previous involvement in alcohol- influenced aquatic activity? (%)				
Yes	40.5	51	48.9	60.9
No	59.5	49	51.1	39.1

Knowledge

Knowledge scores across the sample were poor (mean = 4.72, SD = 1.66). Table 11 provides quartile distributions for total knowledge score and distribution split by gender and country educated.

Table 11

Overall knowledge scores split by gender and country educated.

Variable	% Total Sample (n = 176)	Gender (%)		Country Educated (%)		
		Male	Female	Australia	UK	
Knowledge Score						
Very Poor	9.9	12.4	8.5	6.2	24.3	
Poor	58.2	49.3	63.2	56.6	64.9	
Adequate	28.6	34.2	25.5	33.1	10.8	
Good	3.3	4.1	2.8	4.1	-	

Mann-Whitney *U* tests indicated participants educated in Australia, and those who self-reported: completion of alcohol and water safety education; and/or participation in alcohol-influenced aquatic activity; and/or higher levels of swimming competence achieved significantly higher knowledge scores (Table 12). Australian participants (71.9%) were significantly more likely than UK participants to have received alcohol and water safety education ($U = 3468, p < 0.001, r = 0.32$), although a univariate analysis of variance demonstrated this was not due to an interaction effect between country educated and level of education ($F(1, 178) = 0.076, p = 0.784$).

Table 12

Demographic variables that had a significant influence on total knowledge and attitude scores.

Variable	Groups	Mdn ^a	SD ^a	N	χ^2 -Value	r-Value	p-Value
Knowledge scores: Overall knowledge score							
Country Educated	UK	4	1.37	35	U = 1520	-0.29	< 0.001
	Australia	5	1.66	142			
Received alcohol and water safety education	Yes	5	1.62	109	U = 4682	0.23	0.003
	No	4	1.60	68			
Previous participation in alcohol-influenced aquatic activity	Yes	5	1.62	86	U = 2838	-0.22	0.004
	No	4	1.63	91			
Splitwise Comparisons							
Self-reported swimming competence	Poor	3	1.81	8	Moderate (p = 0.022, r = -0.20) and good swimmers (p = .009, r = -.22) had significantly higher knowledge (H (2) = 8.75, p = 0.013) than poor swimmers.		
	Moderate	5	1.57	52			
	Good	5	1.63	117			
Knowledge scores: General alcohol knowledge score							
Country Educated	UK	2	1.04	35	U = 1195.50	-0.37	0.001
	Australia	3	1.09	142			
Attitude Scores							
Previous participation in alcohol-influenced aquatic activity	Yes	50	11.08	89	U = 2191.50	0.41	< 0.001
	No	37	12.82	93			

^a Abbreviations: Median (Mdn); Standard Deviation (SD)

Gender, employment status, level of education, previous water safety education, consuming alcohol in aquatic settings with friends and/or family, and holding an aquatic qualification had no statistically significant effect on knowledge score. However, a small number of interviewees felt their aquatic qualification/s contributed to their (perceivably adequate) awareness of risks associated with alcohol-influenced aquatic activity: *“I think because of my education around being a swim teacher. I know the dangers [of water] without the added alcohol in, but then you add in alcohol and it heightens it”* (22-year-old female). Others attributed their knowledge of alcohol and awareness of associated risks to their upbringing. For many, information from family and/or significant others was the main form of alcohol-related water safety education they had received. For example, these participants had observed their parents’ approach to combining alcohol use and aquatic activities, and indicated this influenced their mindset and knowledge of risks:

“My parents aren't willing to take risks like they [friends] are, which is a very good thing. I think that's where I got my common sense from. Because my friends - like I said, they'll do anything without thinking of the consequences. Whereas my parents, even when they're drunk, they're like, is this a good idea?” (22-year-old female).

Other identified sources of education regarding alcohol-influenced aquatic activity included: the media; and, transferring knowledge from drink driving education. There was also a general perception that individuals older than the participant had more awareness and knowledge of the risks. Some participants felt safer when consuming alcohol and aquatically recreating with an older demographic, or felt these individuals would put a stop to the risky behaviour, *“someone who is a couple [of] years old [older] than you, who is a bit smarter about the water, would try to put a stop to it as soon as possible”* (21-year-old male).

Many interviewees discussed transferring their knowledge from a drink driving context to construct how much alcohol they considered 'safe' to consume when taking part in aquatic activities; *"One to two and then one every [hour] after, whatever the car rules are...you can have a nice time, but still be able to do most things"* (24-year-old male). The awareness of the impact of alcohol on aquatic abilities appeared independent of swimming ability (i.e., poor, moderate or good) and previous experience in alcohol-influenced aquatic activity. For example, a 19-year-old female who reported being a poor swimmer and never having participated in alcohol-influenced aquatic activity stated, *"just the fact that drinking - you can't move properly, so why would you expect to be able to swim, let alone - if you can't walk, why can you swim?"* Another 19-year-old female lifeguard reported being a good swimmer and having previously participated in alcohol-influenced aquatic activity, stated, *"Realistically if you do it [alcohol-influenced aquatic activity] you're putting yourself at risk and other people at risk. I don't really think there's ever a good time [to do it]."*

Attitudes

The overall distribution of attitude scores is presented in Table 13.

Table 13

Attitude scores for the total sample, split by gender and country educated.

Attitude ^a	% Total Sample (N = 182)	Gender (%)		Country Educated (%)	
		Male	Female	Australia	UK
Disagree	33.5	31.5	34	35.2	27
Neutral	47.8	41.1	52.8	47.6	48.6
Agree	18.7	27.4	13.2	17.2	24.3

^a Responses suggest a disagreeable (opposing) /neutral/agreeable (favourable) attitude towards alcohol-influenced aquatic activity.

A Mann-Whitney *U* test (Table 12) indicated survey participants who had previously participated in alcohol-influenced aquatic activities (*n* = 89) had a significantly more accepting attitude of the behaviour (Mdn = 50) than those who had never been involved in such activities (*n* = 93, Mdn = 37), ($U = 2191.50$, $p < 0.001$, $r = 0.41$). No other demographic variables had a statistically significant impact on attitude score. Interviewees reported previous negative experiences of aquatic activities, not necessarily involving alcohol, resulted in a more cautious attitude. For example, a 21-year-old female stated,

“I think all of us [referring to a mixed gender small group interview] have had an experience where we've been like well I'm going to die by water now. So I think that kind of makes us a bit more respectful of it”.

Most interviewees' attitudes towards alcohol-influenced aquatic activity depended on how much alcohol was consumed—the more alcohol consumed, the more risky it was to be participating in aquatic activities:

“I think a lot comes down to how many drinks you've had. If you've only had one or two, I wouldn't - yeah, I mean go into the pool, I feel like that's fine. If you start to have more than that, you start to feel the effect of the alcohol a bit more, it's not as smart to get in.” (18-year-old male).

Activity and context also influenced attitude, for example, static, non-submersed activities on or around the water (e.g., standing or sitting) were perceived safer to combine with alcohol than being in the water or using powered crafts: *“wading or just sitting on the water edge would have to be safest”* (24-year-old male), *“by the water, you're not necessarily going to be in the water. You're not going to necessarily be putting yourself in a dangerous situation”* (21-year-old female). It is noteworthy that alcohol consumption was associated with fun, for example: *“everything is fun when you're drunk”* (22-year-old female), particularly when combining it with aquatic activities *“if you went on a party boat, or went out on the water sailing, it would be quite enjoyable to have a beer, or something”* (24-year-old male).

Discussion

Previous aquatic research considering the role of alcohol in youth drownings has often been retrospective, reviewing coroners' reports to examine Blood Alcohol Concentrations (BAC) of drowned casualties (e.g., Peden et al., 2017). Survey and breathalysing work has also been conducted with young people in aquatic contexts (e.g., Peden et al., 2018a; Watt et al., 2012), but without a focus on knowledge and attitudes towards alcohol-influenced aquatic activity. The triangulation of quantitative and qualitative methods through this study enabled an increased depth of investigation and facilitated the identification of (i) young adults' level of general and aquatic-specific alcohol knowledge; and (ii) factors impacting young adults' attitudes towards participation in alcohol-influenced aquatic activity.

Young adults in this study generally demonstrated low knowledge levels regarding alcohol and its impact in aquatic contexts. There was a lack of awareness of the physiological effects of alcohol on aquatic abilities. Knowledge of drink driving limits in the UK was also very poor—only 8.1% of UK educated participants correctly identified the legal BAC for driving, compared with 85.8% of the Australian cohort who answered the equivalent question correctly.

The phenomenological approach underpinning the qualitative project facilitated the exploration of how the young Australian adults applied this drink driving knowledge to aquatic settings. Some Australian interviewees transferred their understanding of drink driving limits to construct what they perceived as ‘safe’ consumption levels when participating in aquatic activities. Peden et al. (2017), however, cautioned the BAC that significantly affects an individual’s aquatic abilities has yet to be established, particularly considering the influence of individual differences in alcohol tolerance. Perrine et al. (1994) demonstrated diving ability and perceptions can significantly decrease at 0.04% BAC, while Smith et al. (2001) reported any measurable level of alcohol can increase risk of death while boating, with higher BAC associated with higher risk. Peden et al. (2018a) found Australian river goers reported greater tolerance towards drinking alcohol whilst boating or swimming than whilst driving. Similarly, Ridge and Nimmo (2018) reported young adults perceived a 0.05% BAC when driving a car was equally, or more dangerous than when swimming or driving a boat. The current results demonstrate while the samples’ safety considerations towards alcohol-influenced aquatic activity were constructed from their experiences with driving education, the collective findings from the literature suggest young adults have an inadequate understanding of alcohol-associated risks in aquatic environments when compared to driving contexts. Therefore,

drowning prevention practitioners should consider addressing such knowledge discrepancies in prevention campaigns.

The poor level of alcohol knowledge demonstrated in this study contrasts previous research where Australian school leavers identified at least one risk of consuming alcohol in aquatic contexts, leading the authors to claim knowledge was high among the sample (Enkel et al., 2018). However, this specific conclusion was based on one question with forced choice responses (Enkel et al., 2018; Ridge & Nimmo, 2018), which may explain the difference to the current results where 10 questions were used to assess knowledge. Findings related to level of knowledge in the current study support those of Moran (2008b) who reported low water safety knowledge among young New Zealand males, and recommended additional lifesaving and aquatic education for young adults to improve this knowledge deficit. Despite this fitting recommendation, the results from the current study indicated no significant effect of general water safety education on knowledge score. In contrast, engagement in alcohol-specific water safety education (i.e., from swimming lessons, educational institutions, the media, lifesaving or other external organisations) resulted in higher knowledge scores. Consequently, it may be of benefit for practitioners to incorporate alcohol-specific education into water safety/education programs to enhance knowledge of alcohol and its effect in aquatic contexts.

According to Ajzen et al. (2011), knowledge may actually reflect the individual's attitude towards the phenomena under study. For example, Baur (2000) found drink driving offenders and non-offenders had comparable knowledge of legal drink driving limits and gender differences in alcohol effects, despite differences in their behaviour. Therefore, practitioners should consider a combined focus on attitudes and knowledge in prevention efforts, instead of addressing these factors separately. Whilst low levels of knowledge evident in the current study are concerning as they may suggest an

unfamiliarity with risks associated with alcohol-influenced aquatic activity, attitudes may serve to better explain/predict whether individuals will combine alcohol consumption and aquatic activities.

In this study, participants typically demonstrated a neutral attitude towards alcohol-influenced aquatic activity, and their attitude appeared to be influenced by their awareness of associated risks and their interaction with the environment: when more risks were identified within the context and/or behaviours, attitudes were disapproving. Attitudes and knowledge were also constructed from and influenced by a range of determinants, such as previous experiences and education, and some participants perceived alcohol-influenced aquatic activity as fun, a finding which mirrors earlier research (Abercromby et al., 2020; Hamilton & Schmidt, 2014; Lupton & Tulloch, 2002; Sinkinson, 2014). In other literature investigating risk-taking behaviours, Hunt et al. (2007) suggested that young adults reflected on drug taking as pleasurable and fun, perceived it to facilitate social benefits, and considered it a norm among their social groups, with their perceptions of associated risks constructed from official sources, but also their own and friends' experiences. Likewise, Lupton and Tulloch (2002) noted Australian interviewees who participated in risk-taking behaviours expressed camaraderie with others involved, and experienced pleasure in risk-taking and feeling in control. It has also been stated in some social contexts, risk-taking is encouraged to break the confines of norms and comfort zones (Lupton, 2013a). It may be the participants in this study, and in similar research, have felt in control of the risks when participating in alcohol-influenced aquatic activity (perhaps due to their perceived attitudes and knowledge levels), and considered the personal benefits (either consciously, or as part of a habitual response) to outweigh the costs (Lupton, 2013a).

Recommendations within the literature have suggested practitioners avoid criticising the ‘fun’ element in alcohol-focused drowning prevention campaigns, and encourage safe behaviours (Abercromby et al., 2020; Hamilton & Schmidt, 2014; Sinkinson, 2014). Lupton (2013b) suggested practitioners design campaigns which incite more negative emotional responses to dissuade young adults from participating in risky behaviours and to encourage their compliance with public health prevention messages. Furthermore, Rimal and Real (2003) recommended campaigns addressing a group with indifferent attitudes include efficacy and risk information. Practitioners should therefore provide factual information of risks associated with alcohol use in all aquatic scenarios, and incorporate more information about aquatic risk identification, appropriate behaviours and alcohol effects within water safety programs to enhance young adults’ awareness of risks, promote safer attitudes and assist individuals to make informed behaviour-related decisions. Mitchko et al. (2019) also recommended practitioners collaborate with traditional (e.g., health organisations) and non-traditional (e.g., social media) partners and stakeholders to disseminate public health messaging to young adults. The current authors advocate for practitioners to consider these methods when developing future campaigns.

Despite the small sample, this study is one of the first to determine UK young adults’ knowledge and attitudes towards alcohol-influenced aquatic activity. The corresponding results for this subgroup provide some evidence this demographic may lack an understanding of safe aquatic behaviour. Accordingly, UK drowning prevention practitioners should consider adapting current campaigns to incorporate information about driving BAC limits, the corresponding effects in water, and additional facts about risks and safety strategies when consuming alcohol in aquatic environments specific to the UK. Further international research is also required to provide an understanding of the

extent to which attitudes affect behaviour in aquatic settings, and to identify other influencing factors on involvement in alcohol-influenced aquatic activity that could be specific to age group, nationality or gender.

A limitation of this study is that knowledge was assessed through a small number of questions. Whilst findings align with previous studies, further research, using more diverse question concepts and formal concept analysis is recommended to provide more extensive accounts of aquatic-specific knowledge (Škopljanač-Mačina & Blašković, 2014). Further, representativeness of the purposive quantitative sample is uncertain as participants were drawn from computer literate groups, or from those attending higher education campuses. Many participants held an aquatic qualification and/or were enrolled in higher education, and this is likely not reflective of the overall 18-24 year age group and may have influenced knowledge and/or attitudes. An absence of participant socioeconomic status and cultural data means such comparisons were not possible—where achievable, these demographic variables should be obtained in future studies, as findings may allow practitioners to focus new interventions in the most relevant locations. A further limitation is the transferability of the qualitative results. As the qualitative sample was purposive and included participants predominantly from one geographical region in Victoria, Australia (due to time and cost limitations), it is unknown whether responses were typical of this age group, or comparable to those in other HICs. While measures were taken to develop a trusting environment in the group settings, some participants may have responded in socially desirable ways (King & Bruner, 2000), and responses may not have been in accordance with participants' actual perceptions away from the research context (Smithson, 2000).

Conclusion

In conclusion, this study produced a valid and reliable survey applicable to future investigations of alcohol-influenced youth drownings. It also identified a low level of alcohol and aquatic-specific knowledge in young adults, with significant differences in knowledge scores between the UK and Australia. Further, it highlighted young adults' attitudes towards alcohol consumption in aquatic settings, and identified several personal, contextual and situational variables that influence attitudes. The increased understanding of young adults' knowledge and attitudes towards alcohol-influenced aquatic activity developed through this study offers an evidence-base to support practitioners in developing effective, targeted prevention.

SECTION TWO

Publication Four Outline

Title: Predicting young adults' intentions and involvement in alcohol-influenced aquatic activity.

This publication aimed to:

- i. Determine the predictors of young adults' intention to participate in alcohol-influenced aquatic activities.
- ii. Determine the predictors of young adults' self-reported participation in alcohol-influenced aquatic activities.

This study was submitted to the International Journal of Aquatic Research and Education in November 2020. A copy of the original manuscript is provided here. For consistency throughout this thesis, this manuscript is presented as a Word document and the references are in the style of APA 7th Edition and presented in the thesis reference list. The author contribution details for this manuscript (in agreed order of author listing) are:

Full Name	Share of contribution (%)	Signature	Date
Hannah L. M. Calverley	75		07/12/2020
Lauren A. Petrass	15		07/12/2020
Jennifer D. Blitvich	10		07/12/2020

CHAPTER SIX

Qualitative Research

Chapter Outline

This chapter details the two qualitative publications (Five and Six) that reported the outcomes from the one-to-one and small group interviews conducted for this PhD. These qualitative discussions aimed to expand the quantitative results from this PhD, by providing more clarity as to the influences on young Australian adults' involvement in alcohol-influenced aquatic activity and their perceptions of this behaviour. The discussions also sought to gain the young adults' perspectives of some Australian alcohol-focused drowning prevention campaigns, and obtain information as to what they distinguished as safe behaviour in aquatic settings when consuming alcohol. This project addressed the following research questions of this PhD:

2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?
4. What factors influence young adults' involvement in alcohol-influenced aquatic activity in Australia and the United Kingdom (UK)?
5. To what extent have young people in Australia developed their knowledge, perceptions, attitudes and behaviours regarding alcohol-influenced aquatic activity?

Details of the two resulting publications are presented at the beginning of the corresponding sections within this chapter: Publication Five is presented in Section One, Publication Six is presented in Section Two.

SECTION ONE

Publication Five Outline

Title: “They don’t think it will ever happen to them”: Exploring factors affecting participation in alcohol-influenced aquatic activity among young Australian adults.

This publication aimed to:

- i. Ascertain young Australian adults’ perceptions of alcohol use in aquatic contexts.
- ii. Determine the influencers on young Australian adults’ alcohol-related behaviours in aquatic contexts.

This is the accepted manuscript of the article published by Wiley Online Library in Health Promotion Journal of Australia in December 2020, available online <https://onlinelibrary.wiley.com/doi/10.1002/hpja.451>. For consistency throughout this thesis, this manuscript is presented as a Word document and the references are in the style of APA 7th Edition and presented in the thesis reference list. The reference (in APA 7th Edition style) for this publication is as follows:

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“They don’t think it will ever happen to them”: Exploring factors affecting participation in alcohol-influenced aquatic activity among young Australian adults.

Abstract

Issue addressed: Young adults are overrepresented in alcohol-related drownings in high-income countries, however little research has investigated their behaviours and decision making to inform prevention efforts. **Methods:** Semi-structured interviews were conducted with 23 young Australian adults (aged 18-24 years). Questions, informed by previous research, inquired about behavioural practices in aquatic contexts and influencers on involvement in alcohol-influenced aquatic activity. Interviews were transcribed verbatim. Thematic and interpretative phenomenological analysis followed. **Results:** Two main themes: personal and contextual awareness, and the impact of other people, affected perceptions and involvement in alcohol-influenced aquatic activity. Perceived control of situations and self-confidence affected how these influences impacted individuals’ involvement. Participants acknowledged some young adults likely overestimate their aquatic abilities. This awareness was not discussed in relation to their own capabilities. **Conclusion:** Drowning prevention efforts should inform young adults of the dangers of combining alcohol and aquatic activities, and make risks appear more immediate and applicable. Attention should be drawn to perceived and actual aquatic abilities in all aquatic environments, to minimise discrepancies, contributing to more realistic understanding of personal capacities. The influence of alcohol should also be highlighted. Steps are required for a positive shift in Australian norms of alcohol use in

aquatic settings and the social and cultural attitudes towards this. **So what?** This study provides new insight into young adults' perceptions and involvement in alcohol-influenced aquatic activity. It enhances the evidence-base for drowning prevention and health promotion practitioners and should inform more focused campaigns to prevent alcohol-related drownings among young Australian adults.

Introduction

Worldwide, injury has been identified as a leading cause of death for young adults aged 15-29 years (World Health Organization [WHO], 2018b). In Australia, injury is a prevalent cause of mortality among young adults (aged 12-24 years), and increased independence, enhanced decision making capacity, and opportunities for risk-taking are identified as likely causes (Eldridge, 2008; Pointer, 2014). The extent and seriousness of risk-taking behaviours and subsequent exposure to injury among young Australian adults is often enhanced with increased autonomy that comes with increased age (Eldridge, 2008; Pointer, 2014). Risk-taking behaviours have been defined as “those behaviours, undertaken volitionally, whose outcomes remain uncertain with the possibility of an identifiable negative health outcome” (Igra & Irwin, 1996, p. 35).

Injury and death among young adults as a consequence of risk-taking behaviour is of global concern (WHO & UNICEF, 2008), and incidence is shown to be exacerbated by alcohol consumption (Gardner & Steinberg, 2005; WHO, 2017b). A considerable body of Australian and international research has examined the role of alcohol in young adults' risk-taking behaviours (e.g., Johnston & White, 2003; Lindsay, 2003; Rivis et al., 2011; Scott-Sheldon et al., 2016). To assist in the understanding of why young adults engage in risky activities, research studies have drawn on theoretical approaches, such as the Health Belief Model; the Theory of Planned Behaviour; and the Transtheoretical model (Gielen & Sleet, 2003; Graham et al., 2017). Whilst sound evidence is available to explain young

adults' risk-taking behaviours and the corresponding influence of alcohol (WHO & UNICEF, 2008), there is a dearth of research investigating young adults' risk-taking behaviours in aquatic settings.

In high-income countries, young adults (aged 15-24 years) are overrepresented in drowning statistics, with alcohol consumption identified as a key risk factor for this age group (WHO, 2014a; WHO & UNICEF, 2008). However, very few studies have investigated determinants of young adults' alcohol use in aquatic contexts (e.g., Abercromby et al., 2020; Hamilton & Schmidt, 2014). Coronial records of alcohol-related drownings in Australia demonstrated that purposefully jumping into the water was the most common activity of young adults (aged 18-24 years) prior to drowning (Peden et al., 2017). This data led Peden et al. to suggest further work is required to investigate young adults' risk awareness, and other contributory factors (such as peers) that influenced them to jump into the water (Peden et al., 2017). To further explore alcohol use in aquatic settings, research has surveyed and breathalysed individuals in Australian aquatic environments, finding: those most likely to record an alcohol reading over the drink driving limit (BAC 0.05%) at a river were aged 18-34 years (Peden et al., 2018a); and, over a quarter of an 18-24 year old sample reported swimming at a beach within two hours of consuming alcohol in the preceding 12 months (Watt et al., 2012). Likewise, young school leavers reported consuming alcohol in aquatic contexts during a leavers festival in Western Australia (Enkel et al., 2018), but underestimated the risks associated with combining alcohol consumption and swimming (Ridge & Nimmo, 2018). Hamilton and Schmidt (2014) investigated predictors of Australian young adult males' intentions to swim after consuming alcohol, finding subjective norms and attitudes were contributory factors.

Despite this evidence clarifying that young adults consume alcohol in aquatic contexts, previous studies have neglected to qualitatively explore young adults' behaviours, attitudes and knowledge associated with alcohol use in aquatic contexts. More recent qualitative work has indicated that young Australians regularly mix alcohol and aquatic activity and cite this as a cultural norm, despite acknowledging and demonstrating awareness of the risks (Abercromby et al., 2020). While this information is insightful in identifying a problem and contributes to the development of knowledge associated with understanding reasons for involvement, gaps remain regarding what young adults perceive as risky and what factors contribute to their involvement in alcohol-influenced aquatic activity (defined as activities in and on the water following/during the consumption of alcohol, and while alcohol effects could be influential on the individual). The addition of this information would enable health promotion and drowning prevention practitioners to be better informed when designing prevention campaigns.

As such, the current study aimed to: (i) ascertain young Australian adults' perceptions of alcohol use in aquatic contexts, and (ii) determine the influencers on young Australian adults' alcohol-related behaviours in aquatic contexts.

Method

Design

To elicit detailed responses from participants regarding their experiences with alcohol-influenced aquatic activity, a constructionist epistemology using the phenomenological and sociocultural theories, underpinned the study design (Lupton, 2006; Smith, 2013). Accordingly, the semi-structured interview schedule, for use in one-to-one and small group interviews, was designed to address individuals' personal

experiences, their subjective views of alcohol-influenced aquatic activity (Smith, 2013) and social and cultural influences on their actions (Lupton, 2006). The questions were also designed alongside alcohol-focused drowning prevention research (Hamilton & Schmidt, 2014; Peden et al., 2017; Sinkinson, 2014) and, Australian drowning reports (Australian Water Safety Council, 2016; Royal Life Saving Society - Australia, 2018d, 2019). A validated and reliable survey collected participants' demographic information, including gender; age; self-reported swimming capability (based on self-reported ability, and confidence to deal with several aquatic scenarios, e.g., "*You are walking on coastal rocks and a wave knocks you into deep, rough water [waves 1 m]*"); and, previous involvement in alcohol-influenced aquatic activity. Institutional ethical approval was received prior to participant recruitment.

Once the interview schedule was established, it was trialled in a small group interview with two 24-year-old participants, one male and one female, to confirm validity. These trial participants encountered difficulty interpreting one question, which was subsequently removed from the interview schedule. Following this amendment, the interview schedule was finalised and approved for data collection.

Participants and Procedure

The main form of recruitment was posters, which advertised the research on notice boards in public areas (e.g., gyms and restaurants) and university campuses throughout a regional Victorian city in Australia. These advertisements invited a purposive sample of young adults aged 18-24 years, who had received most of their education in Australia, to email the lead researcher (HC, a female PhD candidate). In this email exchange, participants were encouraged to inform the researcher as to their preference to partake in either a small group or one-to-one interview, and to select the interview location. This ensured participants felt at-ease within the research setting and

countered any perceived power imbalance between the interviewer and participant/s (Elwood & Martin, 2000). Incentives (supermarket voucher) were provided in recognition of the time the participant committed.

On arrival at the interview location, participants received: a plain language information statement that outlined the study; the demographic information survey; and a consent form detailing the audio recording of the discussion and requirements to maintain the anonymity of others in the group (if applicable). Following completion of the demographic survey and consent form, and answering participant questions, the interview commenced. Interviews lasted 30-60 minutes dependent on group size and extent of experiences. At the conclusion of the discussions, vouchers were distributed, and participants were given debrief forms with further information on alcohol-related drowning prevention. Interviews continued until data saturation, exceeding the minimum of 12 participants, to align with best practice suggestions (Onwuegbuzie & Collins, 2007).

Data Analysis

Verbatim transcripts of the interviews were thematically analysed, to systematically code the data and establish themes (Braun & Clarke, 2006). This was alongside interpretative phenomenological analysis, which facilitated deeper examination and scrutiny of data to determine participants' experiences and perceptions of alcohol-influenced aquatic activity, and corresponding emerging themes among the entire sample (Smith & Osborn, 2009). Analysis involved: repeated familiarisation with the transcripts; identification of initial codes and possible themes; continual search and review of themes; deliberation of codes and themes among all authors (published drowning prevention researchers with 3, 13 and 32 years experience); and, revisiting and revising themes, definitions and consensus on data saturation. Each step of the analysis was revisited

throughout to ensure reflective and credible themes. Member checking followed the finalisation of themes to increase rigor and trustworthiness of the outcomes—some participants viewed the themes and provided feedback as to the accuracy related to their initial input, in line with recommendations by Creswell (2014). This method was selected rather than viewing transcripts, as most of the data were collected through small group interviews and the de-identified transcripts, with input from a range of participants, may have caused confusion.

Results

Demographics

Twenty-three young adults, aged 18-24 years (mean age = 20.65, SD \pm 2.19), participated in one-to-one interviews (n = 3), or one of eight small group interviews, with naturally occurring groups (i.e., peer groups) of 2-4 individuals. All except one had received water safety education, with 91% receiving this during primary education and 65% in secondary education. Table 17 provides a summary of participant demographic information.

Table 17*Demographic information of participants.*

Demographic Variable	Percentage (n)
Gender	
Male	39% (9)
Female	61% (14)
Highest level of education	
Undergraduate	48% (11)
Secondary school	44% (10)
Vocational/ trade/ diploma	4% (1)
Postgraduate	4% (1)
Employment status	
Student	44% (10)
Casual	39% (9)
Part-time	17% (4)
Participated in alcohol influenced aquatic activity	
Yes	61% (14)
No	39% (9)
Held an aquatic qualification e.g. pool lifeguard	
Yes	17% (4)
No	83% (19)
Had received water safety education	
Yes	96% (22)
No	4% (1)
Self-reported swimming capability	
Good	52% (12)
Moderate	44% (10)
Poor	4% (1)

Two primary themes that influenced young adults' perceptions of, and actual, alcohol-influenced aquatic activity were identified through analysis of transcripts. First, personal and contextual awareness, defined as the individual's own acknowledgement and understanding of risks and considerations associated with this behaviour; and, second, the impact of other people, defined as the approach others use to explain/justify alcohol use in aquatic contexts.

Personal and Contextual Awareness

Personal and contextual awareness encompassed participants' alcohol consumption and interactions within aquatic environments. Participants perceived the risks associated with combining alcohol and aquatic activities were more strongly linked with the amount of alcohol consumed, rather than drinking whilst aquatically recreating. Some participants demonstrated a basic awareness of the effect of alcohol on aquatic abilities, and mentioned drink driving limits as a guide for responsible alcohol consumption in aquatic settings. Alcohol consumption was however considered typical behaviour in aquatic contexts, particularly during summer and on public holidays such as Australia Day (the official national day of Australia). Cultural, familial and group norms impacted participants' involvement and consideration of the associated risks.

“But like having a casual drink among friends, like a beer or two, I don't think that in and of itself is particularly dangerous. It lowers inhibitions but it's not particularly - and if you're following safety up to that point then a little bit isn't too dangerous. It's when you start drinking amounts to start disregarding safety that it could get dangerous. Like if you're on a boat you should be wearing a life jacket regardless of how many drinks you're having.” (22-year-old male).

The environment and aquatic conditions were voiced as major considerations regarding the aquatic context where participants might consume alcohol. Environmental unpredictability was a concern, and participants identified factors such as currents and rips, depth and visibility, accessibility, presence of aquatic wildlife, and the waterway size to be common considerations. Enhanced familiarity and feelings of control within the setting were reported to incite more risky behaviours, particularly when water conditions were considered safe. For example, pools were perceived safest to consume alcohol as they were regarded as a predictable environment:

“I reckon if we'd had a few drinks and we were in a pool, there would be a lot more kind of, we'll call it chaos; but like, mucking around and like, throwing tennis balls and catching them off the side of a pool and, you know, all those types of things I think would happen in a pool setting...Probably because it's, like, it's easy to do it in terms of like, you have a side of a pool and it's easy to do it, like it's controlled. You know, like you don't have to fight against whatever else is in the water.” (24-year-old female).

Awareness and respect for alcohol-related rules in aquatic locations was often a deterrent for participants, regardless of whether the rules were formal (e.g., government drink driving laws and restrictions on alcohol consumption in public places) or informal (e.g., rules imposed by parents for a backyard pool). Some participants, however, indicated they enjoyed the thrill of breaking rules and therefore participated in alcohol-influenced aquatic activity in restricted settings. In open water environments (e.g., a river), the likelihood of getting caught breaking aquatic-related rules was perceived to be more probable in metropolitan areas. Accordingly, this behaviour was reported to be more likely in regional contexts, where there would be less chance of witnesses. Implications for flouting rules, alongside the predictability of the aquatic environment and confidence within the aquatic setting, appeared to mediate participants' likelihood of adhering to or breaking alcohol-related rules in aquatic contexts. A small group interview discussed this concept:

19-year-old female: “I guess people are a bit more worried about getting caught drinking at the beach and so I wouldn't expect it [alcohol-influenced aquatic activity] to happen there. But I guess if we go camping somewhere, people might have been drinking. Those are the situations I can think of that we would possibly partake in...I know that as I was growing up and we would drive to beaches with

Dad, you'd see all the signs saying that it's illegal to drink in public and on the sidewalk and bits and pieces like that...if there's more of that there, you're probably more worried that you're going to get caught drinking, so you're less likely to [drink alcohol].”

22-year-old male: *“Yeah, at least with the beach, yeah, okay, you've got all of that there [signs stating alcohol-related rules] but with a private pool, you see that you're probably going to be like - ignore it anyway because - I don't know, it's just a pool. It's not going to run around and try and kill you and smash you with giant waves.”*

Self-confidence influenced how participants' personal and contextual awareness transpired into action. Many participants said they would not have the confidence to stand up to strangers if they felt the aquatic setting or group behaviours was risky, but would with close friends. When discussing confidence in aquatic abilities, participants suggested other people their age likely overestimate personal aquatic abilities, particularly when already intoxicated, and this confidence influences their involvement in alcohol-influenced aquatic activities because they perceive themselves as aquatically capable. However, no participants commented on the accuracy or otherwise of their opinion of their personal aquatic ability.

“I think also people's confidence could have an impact. Because often with alcohol confidence becomes cockiness. So yeah if you're like oh I can swim, that's no worries. Then it turns out you can't quite handle this while you're drunk then you know...” (21-year-old female).

Those with aquatic qualifications demonstrated a deeper awareness of the risks in aquatic contexts than did their unqualified peers. However, participants typically reported

a lack of opportunities to engage in alcohol-related aquatic education, and thought receiving education similar to that of drink driving campaigns would be valuable. Entertainment media (such as television and films) were considered to influence their familiarity and awareness of alcohol consumption in aquatic contexts, as this behaviour was prevalent in media specifically addressing young age groups and mostly portrayed in a positive way:

“...movies and just TV shows and stuff like that, because if you look at ones that are surrounded by the party scene, they usually have a pool there or something or they go swimming in a river and they make it look fun as hell. I think that's why a lot of people do it, just for the experience, more than anything” (22-year-old female).

Impact of Other People

The second theme related to other people and their approach to alcohol use in aquatic contexts. Two subthemes emerged, the general influence of other people on the participants, and the influence of family and friends.

Other People, their Behaviours, Abilities and Intentions

The aquatic abilities of others, combined with their intentions for alcohol use and alcohol-related behaviours in aquatic settings, affected participants' personal involvement. Most of the sample reported concern for the safety of others drinking in aquatic settings, because participants did not have control or knowledge of others' abilities, actions, behaviours or reactions. Participants also voiced concern regarding how much alcohol others would consume, and how their behaviour would be affected, and this influenced their own alcohol consumption.

“It's a general feeling of control, I would think, about, well, I know my condition, I know how I feel, I know my own swimming ability. I don't know how good of a swimmer my friend is, or how many they've had, or how alcohol affects them in this specific context.” (24-year-old male)

The presence of lifeguards or other supervisors was suggested to make alcohol consumption safer and more likely, particularly if those supervising were sober. The responsibility of supervising others also influenced participants to limit their own alcohol consumption, especially if they wanted to be a role model, *“Maybe if you had kids around or - that you'd probably be more sensible in a pool setting”* (24-year-old male).

The number of people present was another factor influencing participants' likelihood of drinking alcohol in aquatic settings. All who discussed this topic agreed they would only drink with others, not alone. Larger groups with fewer external onlookers were associated with more dangerous behaviours than smaller groups and activities in more populated aquatic locations.

“But I think too the risk of it, with a smaller group if it was to happen [alcohol-influenced aquatic activity], I couldn't imagine people jumping, doing back flips and jumping off to impress. Whereas if it's a bigger group, I can imagine more people doing back flips and doing whatever and jumping off, because they're trying to impress a crowd” (22-year-old female).

The gender of the group was also discussed, with differences identified between single-gender and mixed groups. Gender-based differences in alcohol use in aquatic contexts addressed five areas: alcohol consumption; aquatic behaviours (e.g., swimming, flips, diving etc.); susceptibility to persuasion; risk awareness; and, attitudes. Most participants felt males consume more alcohol, participate in riskier behaviours, are less

risk aware and have more accepting attitudes towards alcohol-influenced aquatic activity than females. In mixed-gender groups, several participants indicated males could show off more to impress females, and females could be more easily persuaded to participate in risky activities when males are present. However, in some situations with friends and family, females were suggested to moderate the behaviour of males. In single-gender groups, females indicated their behaviours would not be as risky, but males implied some individuals would continue to try and impress or outdo their friends with or without encouragement.

“In a peer group, I don't know, it can go either way I think. If there's girls there it would be very tame, or there will be people trying to do stuff to impress girls, so it goes the other way...Oh, if they're trying to impress someone they might try and do something stupid, which is probably consistent across, not just like an aquatic environment, but every setting. But then other times if it's kind of like, there's obviously no one's interested in you doing a stupid backflip into some water; then everyone's just like, oh, that's stupid, we're just going to sit and hang out a bit.”

(24-year-old male).

Family

Generally, participants stated their family's approach to alcohol was different to friends, as family: do not drink to get drunk, as it is not the intention of the aquatic event; have rules associated with drinking and/or participating in aquatic activities; and, do not pressure or encourage risky behaviours. Family were considered to have relaxed behaviours around water and were likely to stop any dangerous behaviours due to being risk aware:

“My family is not as crazy. We're really chill with it. We don't go out of our way to try and impress people or something, which is what I feel like the blokes do in my friend group. Not to impress but to look superior or something.” (22-year-old female).

As a result of this perceived risk awareness, participants trusted their family to intervene if situations became unsafe, and felt accountable for their actions around family, which made them limit their behaviours and act more maturely out of respect, or to avoid embarrassment. Several participants also commented on how their upbringing affected their perceptions towards alcohol-influenced aquatic activity, referencing their parents' behaviours, approaches and values as correct. This influence was stated to either encourage or dissuade young adults from participating in alcohol-influenced aquatic activity, depending on their family's involvement and whether it was considered the norm.

“I grew up on a farm, and we were taught from an early age just to be safe around water. So, that's an influence. Yes, as we got older and living on the farm as well, we were never allowed to even think about drinking around the dams and stuff. I guess that influenced me to when I'm older, and that's just my family's belief.” (22-year-old female).

Friends

The influence participants attributed to their friends was dependent on the specific group they were with. Several participants referred to having safer and riskier groups of friends in terms of behaviours and alcohol use, and this affected their own involvement in such activities. If the participant felt comfortable and trusted the group, they felt safer combining alcohol and aquatic activities, as they believed those friends would look after

them. Among some of the riskier peer groups, there was a sense of behaviours snowballing into more dangerous activities, and this could involve the participants if peer pressure was prevalent.

Participants considered peer pressure as positive or negative in persuading involvement in alcohol-influenced aquatic activities, and this seemed to align with the characteristics of the friendship group. Positive peer pressure was associated with friends who were more responsible and there was a pressure, from a safety perspective, not to be involved in alcohol-influenced aquatic activities, especially if a large amount of alcohol had been consumed.

“We were pretty - quite intoxicated and I barely even remember this happening, but I’ve got a video on my phone of my friends asking me ‘do you want to come for a swim’ and then everyone just like ‘no’. That was just obviously the end of that. We moved on to the next conversation.” (19-year-old female).

Negative peer pressure emerged more frequently in the discussions, and this becomes more apparent the more alcohol is consumed. This pressure coincided with a fear of missing out and the participants wanting to fit in with the group’s behaviours. Likelihood of the individual succumbing to peer pressure to participate was enhanced if: they did not feel they could refuse; there was high persistence of the peer pressure; they perceived few risks and consequences of their actions; and/or, upheld an ‘invincible’ trait (perhaps due to alcohol consumption).

“You could [say] – ‘no, I would never do that’ when [you’re] sober, but you might have a few drinks and someone might - everyone might be egging you on to do it. You might have a few drinks in you, you think ‘oh yeah, this won’t be that bad’.” (18-year-old male).

Discussion

This study contributes to understanding (i) young Australian adults' perceptions of alcohol use in aquatic settings, and (ii) the influencers on young Australian adults' alcohol-related behaviours in aquatic settings. Young adults' decision making, perceptions of, and participation in alcohol-influenced aquatic activity were influenced by: their personal and contextual awareness, and the impact of other people. The control the individual perceived when alcohol was present was an underpinning factor. This finding may suggest that locus of control (LoC) influences young adults' involvement (Rotter, 1966). Where participants perceived they had internal control over the outcomes (because of their personal understanding of the situation and the way they interacted with others and the environment), consuming alcohol was considered more acceptable and safe. Alcohol-influenced aquatic activity was perceived more risky when the LoC became more external, specifically because of peer pressure, unpredictable water conditions, and when large quantities of alcohol were being consumed.

Previous research has indicated when consuming alcohol, those who perceive more internal LoC can be heavier drinkers than those perceiving more external LoC, as they could underestimate the alcohol-related risks and overestimate their ability to cope (Caliendo & Hennecke, 2020). Likewise, strong perceptions of personal control over the outcomes of an event has been shown to coincide with an optimism bias (i.e., perceive they will not experience negative outcomes), particularly in young adults, and these perceptions can affect their judgements of risk (Klein & Helweg-Larsen, 2002; Powell, 2007). This could suggest naivety among the participants, as while they felt in-control of their alcohol involvement in aquatic activity, this perception could place them at risk of experiencing an alcohol-related emergency incident because they may have an inaccurate perception of risk to themselves, and inadequate abilities to identify, judge and cope with

dangers. Accordingly, future research should explore the accuracy of young adults' perceptions of alcohol-related aquatic risks and capabilities to deal with such dangers.

Participants in this study demonstrated awareness of some aquatic risks, as evidenced through the identification of water conditions (e.g., currents, depth and size) as a factor that contributed to determining the safety or risk associated with an aquatic location. Further, increased risk was associated with higher levels of alcohol consumption. Several participants suggested the Australian drink driving limit (BAC 0.05%) was an appropriate guideline for safe alcohol consumption in aquatic settings—staying at or below this BAC was considered safe. However, negative effects of alcohol on aquatic ability have been shown at a BAC as low as 0.04% (Perrine et al., 1994), and drink driving literature has demonstrated that being under the legal limits does not guarantee safe and competent driving abilities, with participants not realising the extent of the effects of alcohol on their cognitive function until after they had driven (Cromer et al., 2010; Keatley et al., 2017). This research finding illustrates that perceptions can differ from reality when alcohol is involved. In this study, participants displayed awareness of aquatic risks, but may have underestimated the effect of alcohol consumption in aquatic settings, particularly when combined with their own aquatic capabilities and alcohol tolerances.

Earlier research has shown that, compared to older age groups, young adults display higher self-efficacy in aquatic contexts with males particularly likely to underestimate aquatic risks and overestimate their ability to cope (McCool et al., 2009). Young adults have been reported to misjudge their ability to perform some aquatic competency tasks, survival skills (e.g., motionless float and swimming distance) and the associated exertion to complete those tasks (Moran, 2019; Moran et al., 2012; Petrass et al., 2012). Of note, participants in the current study discussed aquatic ability by referring

to others in their age group rather than themselves. This result could suggest that young Australian adults are aware of the risks of aquatic contexts, alcohol consumption and the dangers with overestimating abilities, but disassociate themselves from experiencing any negative consequences (i.e., uphold an optimism bias). Disassociation has been shown previously where young smokers in New Zealand were familiar with the risks of smoking, but their uncertainty and denial of these risks, alongside their inexperience, short-term focus and impulsivity, affected their decision making (Gray et al., 2016). In situations involving alcohol, and where smoking was perceived a social norm, the young adults' smoking behaviour increased, and their consideration of risks reduced (Gray et al., 2016).

Such social influence on alcohol-influenced aquatic activity has been demonstrated in previous Australian research, where this behaviour was perceived a social (Hamilton & Schmidt, 2014) and cultural norm (Abercromby et al., 2020) among young adults. Likewise, participants in the current study reported a presence of negative peer pressure, and this influenced their involvement in alcohol-influenced aquatic activity. Combining these social influences with a perception of internal control, a disassociation from experiencing negative outcomes (Gray et al., 2016), and the inhibiting effects of alcohol on risk and aquatic performance awareness (Perrine et al., 1994), could play an influential role in young Australian adults' participation in alcohol-influenced aquatic activity.

To address young adults' disassociation from risks, previous research has recommended that risks need to be demonstrated in a way that is relevant for young adults, and the negative affective reactions to involvement in the risky behaviour highlighted (Gray et al., 2016). Based on the findings of this study, these recommendations should be acknowledged when designing alcohol-focused drowning

prevention efforts. For example, the control factor identified in this study suggests practitioners could design campaigns to address how drinking alcohol in aquatic settings can reduce the control the young adults' have in that context, and this could affect their autonomy and independence. Counteracting the norms associated with alcohol-influenced aquatic activity identified in this, and other studies (Abercromby et al., 2020; Hamilton & Schmidt, 2014) will be more challenging, as it requires a shift in cultural attitudes.

To facilitate a shift in social and cultural attitudes towards safe aquatic behaviours, research has called for positive water safety attitudes and knowledge to be incorporated from the commencement of water competence training (Stallman et al., 2017). This recommendation is alongside the importance of experiencing a wide variety of aquatic environments (e.g., pools, rivers, beaches) and personal situations (e.g., in swimwear, in casual clothing, when tired) to enable the development of accurate perceptions of abilities (Langendorfer, 2015; Stallman et al., 2017). Experiencing different aquatic scenarios is crucial, as research has demonstrated consistencies in the activities which occur in, on, or around water prior to fatal or non-fatal drowning incidents, such as falls, using watercrafts and swimming (Hamilton et al., 2018; Peden et al., 2018c). Facilitating interaction with different aquatic environments and developing water competencies in accordance with the requirements of different personal and environmental conditions, would enhance understanding of own, and others, abilities, as well as safe behaviours in those contexts. Integrating alcohol-related water safety messages in this manner could enable a greater appreciation for the risks of alcohol consumption in different aquatic settings, and may encourage a shift in attitudes regarding this behaviour. The current authors advocate for those designing and delivering Australian water competence training to consider these combined recommendations.

Another suggestion coincides with those of health education literature, which have urged skills training in schools, for school-aged children to learn how to recognise and manage pressures to participate in risky behaviours (Duryea, 1991; Thom, 2017). Rather than encouraging complete abstinence, health promotion and education experts have advocated for young adults to learn how to adopt more alcohol-related harm reduction strategies, to become more resilient (Thom, 2017). Accordingly, the authors endorse intervention programs to provide young adults with strategies to recognise and reinterpret negative peer pressures, to maintain their safety in risky aquatic contexts. Further, as many participants in the current study referred to their drink driving education experiences, it is suggested drink driving programs highlight the transfer of safety information to other settings, such as aquatic environments. This approach could maximise the benefit of such programs and minimise exposure to variable and potentially conflicting alcohol-related material. Whilst the drink driving programs are evidence-based, research is necessary to determine whether other alcohol-related safety messages can be appropriately transferred between settings.

While this study provided an account of young adults' behaviour in aquatic settings, it is limited by a small, self-selecting sample. The attitudes and behaviours of participants could differ from those who did not volunteer, or a more heterogeneous, larger group. The characteristics of the sample influence the transferability of the results as most participants reported having received some form of water safety education, and were from one regional area in Victoria, Australia. A further limitation is that socioeconomic status was not reported. These sample characteristics are likely not reflective of the wider population; therefore, the trustworthiness is limited in applying these results to all Australian young adults. Finally, whilst an unbiased, inductive approach was implemented for analysis and frequent reviews by all authors ensured this

approach, some deductive interpretation may have occurred due to the researchers' knowledge and expertise of the drowning prevention field and current literature.

Conclusion

In conclusion, this qualitative study investigating the factors that contribute to young adults' perceptions and involvement in alcohol-influenced aquatic activities identified two major areas of influence: their personal and contextual awareness, and the impact of other people. The study findings contribute to the drowning prevention field through qualitative methodology used to examine, in-depth, the interpretations and opinions of a group of young adults in relation to alcohol-related behaviours of this age group in aquatic settings. It provides an insight into their decision making processes in such scenarios and highlights the factors that young adults' themselves feel affected by. With this information, future drowning prevention and health promotion efforts can be better informed, to create programs that are evidence-based to specifically address young adults' alcohol use in aquatic settings.

SECTION TWO

Publication Six Outline

Title: Respecting alcohol, respecting the water: Young adult perspectives on how to reduce alcohol-influenced drownings in Australia.

This publication aimed to:

- i. Review young adults' awareness and understanding of current Australian alcohol themed drowning prevention campaigns.
- ii. Determine what young adults perceived to be the most effective approaches for preventing alcohol use in aquatic settings among their age group.
- iii. Identify the strategies known to, and used by, young adults for personal safety in aquatic contexts if consuming alcohol.

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PUBLICATION SIX

Respecting alcohol, respecting the water: Young adult perspectives on how to reduce alcohol-influenced drownings in Australia.

Abstract

Issue addressed: Alcohol-influenced drowning among young Australians (aged 18-24 years) is a prominent health concern. However, effectiveness of targeted prevention campaigns for this age group is unknown, as this information is not typically published in peer-reviewed or easily-accessed grey literature. Accordingly, future campaigns cannot build on prior efforts to address this health problem. **Methods:** Semi-structured interviews ascertained young Australian adults' perspectives on preventing alcohol consumption in aquatic settings, and their awareness of appropriate safety strategies and Australian national and state drowning prevention campaigns. Discussions were transcribed verbatim and thematically analysed using an interpretative phenomenological approach. **Results:** Twenty-three individuals (mean age 20.65 years) participated in an interview. Participants had poor understanding of alcohol-focused drowning prevention campaigns and used logos and names to decipher key campaign messages. Education was recommended as the preferred method for prevention, and participants suggested preferences for delivery (e.g., social media, in schools, humour, shock tactics). The safety strategies discussed appeared to be transferred from strategies used in other contexts, rather than related to the specific risks of aquatic scenarios. **Conclusions:** Drowning prevention practitioners should ensure transparency and clarity of their campaign names and logos to enhance understanding of the messages. Practitioners should also consider

using audience analysis during campaign design, delivery and evaluation, alongside best practice recommendations from literature, to enhance campaign suitability and effectiveness. **So what?** Water safety practitioners and policy makers should acknowledge these findings when developing campaigns which address young adults' lack of awareness of safe aquatic behaviours, to encourage a sustained behaviour change.

Introduction

Risky consumption of alcohol among Australian youth has declined since the early-2000s, and a national household survey has indicated that more young people are delaying their initial consumption of alcohol, or abstaining completely (Australian Institute of Health and Welfare, 2020). Recent research has identified that decreases in Australian alcohol consumption are due to reductions by those considered less frequent consumers, and do not reflect consumption trends of self-reported heavy or binge drinkers (Caluzzi, 2019). Heavy drinking among some young adults aged 18-24 years is a health issue recognised in high-income countries (HICs), and is aligned with increased risk-taking behaviours, injuries and health implications, such as drink driving incidents, drownings and non-communicable diseases (World Health Organization, 2018c). As a result, many HICs have developed and employ alcohol policies, awareness activities, community programs and prevention strategies to reduce young adults' prevalence in alcohol-related injury statistics (World Health Organization, 2018c).

In HICs, interventions which focus on reducing young adults' substance use, including alcohol consumption, have used media campaigns as one medium for implementation (Stead et al., 2019). The benefits of media related campaigns include the ability to target large audiences, as well as ease in distributing prevention messages repetitively and at relatively low cost (Wakefield et al., 2010). There is, however, debate around the effectiveness of media campaigns. For example, Derzon and Lipsey's 2002

(Derzon & Lipsey, 2002) meta-analysis identified media programs may generate positive changes in young adults' attitudes, behaviours and knowledge relating to substance use, but these campaigns may not be as effective among those they described as 'vulnerable youth' (i.e., those considered at-risk of substance use). More recently, a 2018 systematic review examined the effectiveness of mass media campaigns on alcohol consumption (Young et al., 2018). Improvements in alcohol-related knowledge and attitudes were recorded among the 29 included studies, but there was little evidence that campaigns reduced actual alcohol consumption, despite participants displaying high campaign recall. A 2013 Cochrane systematic review also identified variable effectiveness of media campaigns in preventing illicit drug use among young people. Due to variations in the measures and evaluation methods used in the included studies, this review was unable to conclusively determine campaign effectiveness (Ferri et al., 2013).

Despite inconsistencies in the effectiveness of media campaigns in changing behaviour, their use is common for alcohol-focused drowning prevention campaigns targeting young adults. This age group (15-24 years) accounted for 14% of Australian fatal drownings in 2019/20 (Royal Life Saving Society - Australia, 2020), with their risk-taking behaviours in aquatic settings (e.g., alcohol use) identified to enhance their risk of drowning and encouraged as a focus for prevention efforts (Abercromby et al., 2020). Examples of Australian campaigns include the New South Wales-based '*Sinkers*' and the nationally focused '*Don't let your mates drink and drown*' (Royal Life Saving Society - Australia, 2014, 2018a). However, drowning prevention campaigns have been heavily dependent on the use of education for prevention, and have lacked robust and theory-driven intervention design and delivery (Leavy et al., 2016). Evaluation details, in peer-reviewed or grey literature, are also scarce, hence the relevance and applicability of the campaigns to the group of focus remain unconfirmed (Calverley et al., 2020; Enkel et al.,

2018; Leavy et al., 2016; Ridge & Nimmo, 2018). As a result, the effectiveness of these prevention campaigns in changing young adults' behaviour, knowledge and/or attitudes in relation to alcohol-influenced aquatic activity (defined here as activities in and on the water following/during the consumption of alcohol, and while alcohol effects could be influential on the individual) is currently unknown.

Accordingly, the current study was undertaken with Australian young adults to: (i) review their awareness and understanding of current alcohol-focused drowning prevention campaigns; (ii) determine what they perceived to be the most effective approaches for preventing alcohol use in aquatic settings among their age group; and, (iii) identify the strategies known to, and used by, these young adults for personal safety in aquatic contexts if consuming alcohol.

Method

Design

An extensive review of alcohol-focused drowning prevention literature (e.g., Hamilton & Schmidt, 2014; Sinkinson, 2014) and drowning prevention reports (e.g., Royal Life Saving Society - Australia, 2019) identified a gap in the literature related to young adults' perceptions of safety regarding alcohol-influenced aquatic activity. A constructionist epistemology, employing phenomenology and sociocultural theory, was adopted to investigate young adults' perceptions of safe aquatic behaviours and their perspectives on alcohol-focused drowning prevention efforts (Lupton, 2006; Smith et al., 1999). This theoretical perspective guided and underpinned the interview schedule development, with questions designed to: determine participants' awareness and perspectives of Australian alcohol-focused drowning prevention campaigns (e.g., '*Don't let your mates drink and drown*'); address participant perceptions of how future aquatic

prevention efforts could target alcohol use in their age group (e.g., ‘How do you think drowning prevention organisations could target your age group to reduce the number of alcohol-related drownings?’); and, gain participant perspectives on appropriate safety strategies to use in aquatic situations if consuming alcohol (e.g., ‘What strategies do you use to keep yourselves safe in this situation?’). Semi-structured, in-depth interviews, were selected to allow for flexibility in discussions and for participants to provide personal explanations (Frey & Fontana, 1991; Longhurst, 2010). This study was nested within a wider project, which sought to understand young adults’ knowledge, attitudes and behaviours in relation to alcohol-influenced aquatic activity.

A brief demographic survey, comprised of 21 forced-choice demographic questions (extracted from a longer validated and reliable questionnaire by the same authors), accompanied the interviews. The survey addressed age; gender; self-reported swimming ability based on the number of laps of a pool they could swim continuously; aquatic qualifications; and, previous water safety education. It also invited participants to indicate their familiarity with five alcohol-focused drowning prevention campaigns (identifiable through images and campaign logos), and to provide details of any other relevant campaigns not listed. The included campaigns were the five Australian campaigns identified through an audit of alcohol-focused drowning prevention campaigns in HICs (Calverley et al., 2020), and had a national focus (*Don’t let your mates drink and drown, Respect the River*) or a specific state focus (Victoria-based *Play it safe by the water*, and New South Wales-based *Swim safe swim sober, Sinkers*).

To confirm validity of the interview schedule and ensure the questions were appropriate and correctly interpreted, a 45-minute trial group interview was conducted with two participants (one male, one female, both aged 24-years). One question was

poorly understood and removed, but no further concerns were raised so it was deemed suitable for data collection.

Participants and Procedure

Institutional ethical approval was established prior to participant recruitment and data collection. Posters were used as the main form of recruitment: they provided an overview of the research project, and invited a purposive sample of young adults (inclusion criteria: aged 18-24 years old and received most of their education in Australia) interested in the study to contact the principal researcher (HC; a female PhD student). Posters were displayed at university campuses, community libraries, sports facilities and cafes in a regional city in Victoria, Australia. Recruitment also encompassed snowballing, as participants were encouraged to bring other individuals matching the participant criteria to the meeting. Due to this sampling method, the response rate is unknown.

Prospective participants indicated their preference for a one-to-one or small group interview and their preferred meeting location (i.e., university or sports facility). Where possible, preferences were accommodated as ensuring participants were comfortable in the interview setting, and with the researcher, was one strategy implemented to address any possible power imbalance. Some of the participants were known to the principal researcher in a professional or peer capacity, and were informed their involvement was voluntary, confidential and would not affect the pre-existing relationship. Prior to commencing the interview, participants were provided further study details and asked to complete consent documentation and the demographic survey. The interviews were conducted in Spring 2019, lasted 30-60 minutes and, with participant consent, were audio recorded using the voice-recording feature on a mobile phone. Incentives (supermarket vouchers) were offered to assist in recruitment, and these were provided to each participant on completion of the interview. Data collection continued until saturation and

exceeded the minimum of 12 participants, recommended by Onwuegbuzie and Collins (2007).

Data Analysis

All interviews were transcribed verbatim, and thematically analysed using an interpretative phenomenological approach to critique the data. This process facilitated: synthesis of participants' understanding of alcohol-focused drowning prevention campaigns and their thoughts regarding suitable approaches to delivery; and, appraisal of strategies known to, and used by young adults for personal safety in aquatic contexts (Braun & Clarke, 2006; Smith et al., 1999). Themes were established following the authors' systematic, continual and non-linear review and coding of the transcripts in NVivo software. Confirmability was ensured through regular discussions among all authors (all female and experienced drowning prevention researchers with 3, 13 and 32 years research experience in this field) for consensus on codes and themes. A variation of member checking also took place to further enhance credibility and thus, trustworthiness: some participants viewed finalised themes instead of verbatim transcripts. This method was chosen, because of concerns regarding the ability of participants to interpret meaning from transcripts of multiple speakers, and to ensure participant anonymity was maintained (Creswell, 2014).

Results and Discussion

Demographics

Twenty-three participants aged 18-24 years (mean = 20.65 years, SD \pm 2.19) completed either a one-to-one interview (n = 3) or engaged in one of eight small group interviews of 2-4 people (n = 20). All participants reported currently living in Victoria at the time of interview, 22 reported growing up in Victoria and one participant stated they

grew up in New South Wales. More than half the participants identified as female (60%), all defined their nationality as Australian but no participants identified as Aboriginal and Torres Strait Islanders. Other cultural, ethnic or religious information was not sought as part of this research. Participants reported being either high school or university students (43%) or employed in a casual (39%) or part-time (18%) role, and almost half of participants were studying towards or had completed an undergraduate degree (48%). Few participants (17%) held a current aquatic qualification, such as a pool lifeguard certificate. Few participants reported their swimming ability to be good (17%), approximately one-third reported their ability moderate, and slightly more than half reported having poor swimming ability. In total, 61% reported previous participation in alcohol-influenced aquatic activity.

What do young adults know and think about alcohol-focused drowning prevention campaigns?

Participants discussed each of the campaign images that were included in the demographic survey. Details of the included campaigns, alongside participants' recognition and their comments, are provided in Table 18.

Table 18

Details of alcohol-focused drowning prevention campaigns, participants’ familiarity (percentage) and comments.

Prevention campaign	Campaign context and background ^a	Comments from participants	Participants familiar with the campaign
<p>Don’t let your mates drink and drown Royal Life Saving Society - Australia (2018a)</p>	<p>History: Released in 2017 following high incidence of Australian male drownings involving alcohol.</p> <p>Aim: Reduce alcohol-related drownings in males.</p> <p>Campaign Delivery: Predominantly a media campaign, promoted annually by the Royal Life Saving Society Australia and media outlets nationwide, particularly around summertime. These include YouTube videos, television advertisements and online news articles.</p>	<p>18-year-old male: <i>“So seeing pictures of the cans and then seeing a manly bloke with an axe, it stands out a little bit more. I’d lean towards the ones with the pictures and the ones that look a bit more upbeat.”</i></p> <p>21-year-old male: <i>“I’d probably remember ‘Don’t let your mates drink and drown’ if I saw it because it has a more memorable look to it rather than, you know, just titles and words and the alcohol ad.”</i></p> <p>21-year-old female: <i>“The most standout or the one that speaks to me the most is the one that’s ‘Don’t let your mates drink and drown’ because it...everybody cares about their mates.”</i></p>	35%

Prevention campaign	Campaign context and background ^a	Comments from participants	Participants familiar with the campaign
<p>Play it safe by the water Victoria State Government & Life Saving Victoria (2019)</p>	<p>History: Longstanding campaign since 1998 promoting water safety to reduce Victorian fatal and non-fatal drownings in all waterways.</p> <p>Aim: Reducing drowning across Victoria, with a current focus on toddlers, older Victorians and males, particularly in coastal and inland waterways.</p> <p>Campaign Delivery: Drowning prevention campaign and awards conducted under the campaign banner all year round. These include: water safety programs in schools; online resources for community members and those involved in the campaign’s activities; and, training initiatives for those over 55 years old. The campaign has also partnered with other organisations, such as YMCA Victoria, to deliver programs and ensure content aligns with curriculum and government objectives.</p>	<p>24-year-old male: <i>“I recognised the ‘Play it safe by the water’. I think that’s because it’s the oldest one and it might have been used at the aquatic centre where I learnt to swim.”</i></p> <p>22-year-old male: <i>“The one that hits me the most just visually amongst these ads is the ‘Play it Safe on the water’ because I’ve had a couple of near drownings I suppose you’d call it...The imagery of the under the water personally...frightens me.”</i></p>	100%
<p>Respect the River Royal Life Saving Society - Australia (2018c)</p>	<p>History: Developed following a 15-year retrospective study that identified rivers as a common location for Australian fatal and non-fatal drownings.</p> <p>Aim: Reduce drowning rates in Australian rivers in all States and Territories.</p>	<p>24-year-old male: <i>“when you first look at it if you didn’t read ‘Saving Lives’ at the bottom you would think maybe this is about cleaning up, like an environmental thing.”</i></p>	13%

Prevention campaign	Campaign context and background ^a	Comments from participants	Participants familiar with the campaign
Sinkers Royal Life Saving Society - Australia (2014)	<p>Campaign Delivery: Supported by the Federal government to educate communities about the risks of rivers. This occurred through: media releases and community service announcements; community engagement by partnering with local stakeholders to develop and deliver strategies; risk assessments of blackspot locations and developing associated action plans; and, community education through attending local events.</p> <p>History: Released in 2014 in New South Wales after data indicated alcohol as a factor in many drownings involving young adults.</p> <p>Aim: Adolescents and young adults aged 15-29 years.</p> <p>Campaign Delivery: In a collaborative partnership, Royal Life Saving Society NSW, the New South Wales government and an advertising company designed and delivered this social media-based campaign. Media personalities featured in campaign videos on platforms including Instagram, Twitter, YouTube and Facebook.</p>	<p>22-year-old female: <i>“when I see ‘Respect the River’, I think that’s good, don’t just respect yourself, but also respect the river. I like that.”</i></p> <p>22-year-old female: <i>“it’s a play on words, and it’s what’s going to happen to you if you drink and go near the water...you could be in sea water, you could end up in yes, river water. I think that’s funny. It’s smart.”</i></p> <p>22-year-old male: <i>“I like the ‘Sinkers’ don’t drink and sink because it’s advertising alcohol the water flavours, but they’re definitely encouraging don’t have these when you’re swimming. Like yeah don’t drink and swim, it’s a bad combo.”</i></p>	4%

Prevention campaign	Campaign context and background ^a	Comments from participants	Participants familiar with the campaign
Swim safe swim sober Royal Life Saving Society - New South Wales (2013)	<p>History: Developed in 2013 to overcome the high numbers of alcohol-related drownings among adolescents.</p> <p>Aim: Targeting secondary school students in New South Wales to educate them about avoiding aquatic activities if they have been drinking alcohol.</p> <p>Campaign Delivery: Online program available to every secondary school in New South Wales. Media packs with videos also made available.</p>	<p>22-year-old female: “<i>Swim safe, swim sober</i>’ is a bit boring.”</p> <p>22-year-old female: “<i>the ‘Swim safe, swim sober</i>’, is - yes, relating - it’s kind of - swimming sober is kind of like, relating to driving sober, swim sober.”</p>	9%

^a These details were gathered from review of campaign websites and known information by the researchers. However, due to limitations in the information available, an up-to-date status of some of the campaigns is unknown.

The most recognised campaign of those presented was *Play it safe by the water*: a water safety campaign in Victoria with a broad focus (i.e. components cover safety at all waterways, and campaigns address toddlers through to older Victorians), and includes some alcohol-focused information. This campaign is incorporated into many water safety environments, facilities and delivered in schools (Victoria State Government & Life Saving Victoria, 2019). It was likely the most recognised both because it is a longstanding campaign and because most participants were Victorian. In comparison, the other campaigns had very low levels of recognition and, when asked, many participants were unable to detail any further programs or training which incorporated safety messages relating to alcohol-influenced aquatic activity.

A consistent feature of interviews was that most participants were unable to recall the campaign purpose or prevention message from those they recognised. Instead, participants interpreted meaning from the campaign logo or name, or from their awareness of similar campaigns in other contexts. This was consistent, even for those campaigns they did not recognise. For example, *Don't let you mates drink and drown* and *Sinkers* were only recognised by a small number of participants, but among those unfamiliar, most were able to determine the campaign focus and purpose. For example, an 18-year-old male stated:

“Well, the [Sinkers] one it has the cans and then it has rivers, sea, lake, pool. So I guess that's sort of saying that it doesn't matter where you drink near water, it can happen anywhere. That stands out a little bit.”

Likewise, *Swim safe swim sober* and *Don't let your mates drink and drown* were viewed positively by some because of their likeness to drink driving campaigns, as participants were able to draw on this prior knowledge when interpreting the drowning prevention

messages, *“The ‘Don’t let your mates drink and drown’, I remember that because it’s like don’t let your mates drink and drive”* (19-year-old female).

In contrast *Respect the River* had low recognition and participants were unable to clearly decipher the meaning behind the campaign name and logo. This was demonstrated by a 21-year-old male who, when asked about the take-home messages of the campaigns, provided: *“Basically don’t get drunk and swim, mainly, except for ‘Respect the River’, which seems more like doing wrong things to the river like dumping stuff.”* Similarly, a 24-year-old male stated:

“Without the context, the ‘Respect the River’ one seems more about environmental protection, than about drowning prevention. It seems to imply don’t litter in the river and don’t poison the river in any way, rather than the river can kill you, if you’re not careful.”

This is similar to previous research which evaluated, through surveys and focus groups, a campaign that aimed to change water recreationists’ behaviours to reduce the spread of aquatic invasive species (Seekamp et al., 2016). Participants misinterpreted campaign messages which ultimately resulted in their behaviours not aligning with the campaign suggestions. Accordingly, recommendations were for the campaign to include only three clear behavioural directions to enhance transparency, and to increase exposure by leveraging the influence from, and collaborating with, established organisations and groups (Seekamp et al., 2016). Other research by Gomberg, Schneider and DeJong (Gomberg et al., 2001) demonstrated that university students’ recognition of a social norms marketing campaign logo significantly corresponded with their accurate perceptions of alcohol-related norms ($p < .05$). Practitioners are therefore encouraged to consider this collective evidence which demonstrates the need for campaigns to have

clear logos and names and, if possible, to build on previous successful and recognisable campaign messages from other areas and apply these to alcohol-focused drowning prevention efforts.

Exposure to campaigns was another factor discussed in the interviews. Several participants commented on their familiarity with the *Play it safe by the water* campaign, based on their exposure to the campaign logo in public aquatic environments, such as at swimming pools and on aquatic-focused qualifications. Some detailed that this campaign was also incorporated within their schooling. Participants emphasised the importance of delivering aquatic-themed alcohol education in schools, stating that alcohol consumption commences during this period, and in contrast to the drink driving messages, alcohol-focused aquatic education was lacking and should be available: “*You always get spoken to about young car crashes, 18-year-olds and stuff, but we never really get spoken to about this topic [alcohol use in aquatic contexts].*” (18-year-old male).

Perhaps participant familiarity with the *Play it safe by the water* campaign was influenced by the multicomponent approach it implements in its program delivery, an evidence-based approach recommended for public health and health promotion addressing young adults’ substance-related behaviours (Hartz et al., 2008; Pentz, 2003). This approach is also in accordance with the injury prevention model—The Spectrum of Prevention, which details injury prevention should move away from education-only approaches, and incorporate interdisciplinary collaborations to involve more systems-based prevention efforts (Cohen & Swift, 1999). The *Play it safe by the water* campaign uses this approach in terms of delivery methods (e.g., practical skill development, interactive components, mobile applications); delivery environments (e.g., components are delivered in schools, aquatic environments and in communities); and through

collaboration with partners (e.g., Victorian YMCA; Victoria State Government & Life Saving Victoria, 2019).

As the *Play it safe by the water* campaign was successfully recognised by the current participants, practitioners could consider adopting similar approaches and styles for future prevention campaigns. Further, Victorian-based drowning prevention practitioners could use the *Play it safe by the water* campaign as a foundation program to underpin and support the development of alcohol-specific campaigns. Doing so would align with recommendations from literature for collaborations to bolster campaign exposure (Seekamp et al., 2016), and enable these alcohol-focused campaigns to be delivered on the same platforms, adopt similar delivery methods and benefit from collaborations already established through the *Play it safe by the water* campaign, which appears to have been successful in reaching at-risk populations, as evidenced by the current sample's recall. It is important to acknowledge that few participants remembered the specific details of this campaign's content, hence it is imperative for further work to build on the current results and establish the best methods of delivering alcohol-specific water safety education to young adults. This could then inform the enhancement of state-specific, national and international alcohol-focused drowning prevention campaigns.

When asked for recommendations for enhancing campaign effectiveness, participants suggested a wide range of delivery methods, such as: social media; streaming services; media outlets (e.g., radio and television); shops (particularly in aquatic settings and where alcohol is sold); aquatic-based signage; in classrooms; and, warning labels on alcohol. The foundation of these suggestions focussed on education as the preferred prevention strategy. Participants were lay-people, rather than specialists in health promotion, health education or injury prevention. Therefore, they may not have considered the active contribution required by the individual for education to be

effective—a limitation of education as a stand-alone injury prevention approach (Pearn et al., 2004). However, this preference for education aligns with Girasek and Gielen (2003), who found that a random sample of adults perceived safety education as the most effective countermeasure for drowning in the United States of America. The authors noted this may have been preferred as it was familiar, with most participants’ undertaking some form of education, or could reflect their higher socio-economic status in having education an accessible and obvious resource (Girasek & Gielen, 2003). In the current study, some participants based their preference for an educational approach on their perceived success of other education campaigns, *“if you think about road safety and stuff like that, education seems to work there”* (24-year-old male). This demonstrates their naivety and unawareness of other approaches which have far exceeded the effects of education for injury prevention, such as engineering and enforcement (Pearn et al., 2004). But, the explanations offered by Girasek and Gielen (2003) could be applicable for this study, as most participants were receiving some form of education at the time of data collection.

Participants indicated a preference towards those campaigns they perceived to be incorporating some level of humour and relatability, and recommended campaigns adopt these styles when addressing young adults’ alcohol consumption in aquatic settings:

“The ‘Don't let your mates drink and drown’, I think that one I think it brought not necessarily a little bit of humour into it. I think that's where with the fact that he was putting these signs next to [the river] - I think that was what got us talking about it, because we were like, imagine if they do, that sort of thing...I think if you stick a bit of humour or something like that in, people think about it more, and actually might have a conversation about it.” (22-year-old female).

“I think our age range responds a lot to relatable kind of - if you can see what it's going to do to your mate then potentially you're going to have more action - like I don't know. Have someone dragging their mate out of a river and doing compressions or something like that. If I saw that I'd be like holy crap. You know that hits you hard.” (21-year-old female).

Adding humour to a campaign is considered to assist in the dissemination of campaign messages, if utilised appropriately, as it can encourage sharing and discussion of the issue, particularly among young people (Campo et al., 2013). However, the use of humour is dependent on the advertisement and characteristics of the proposed audience (Yoon, 2015). It is also necessary to consider the forms of humour that can be used in campaigns (e.g., disparagement humour, arousal-safety humour), but which can invoke negative reactions, such as shame, from the audience (Martin & Ford, 2018). Further research is required to determine whether humour can be suitably and appropriately integrated into drowning prevention campaigns to strengthen the messages without negative emotional consequences from young adults.

Some participants indicated that inciting negative emotions through, for example, shock tactics, could be a focus of drowning prevention campaigns. A 24-year-old male summarised, *“I suppose the more shocking it is and the more, I suppose, relatable characters in the [piece] are, I think that's more effective”*. This finding contrasts with alcohol-related research which suggested inducing a fear-response would be ineffective, due to young adults comparing the messages to personal experiences and social norms. This could then result in them potentially dismissing the seriousness of the messages and questioning their believability (Wright et al., 2017). Similar conclusions were reported by Hamilton and Schmidt as they recorded young Australian adult males' risk perceptions did not significantly affect their intentions to drink and swim (Hamilton & Schmidt,

2014). Accordingly, they recommended prevention campaigns address the positive outcomes of not drinking and swimming, rather than the negative consequences of this behaviour. Findings from health education research have also demonstrated that young adults perceive facts as more accurate than shock tactics in smoking prevention campaigns (Lazard et al., 2018), and that shock tactics produce inconsistent effects in deterring substance use (Esrick et al., 2019). Arguments have been made that in prevention campaigns with well-designed content, shock tactics could be beneficial (Esrick et al., 2019). However, with regards to reducing alcohol use among young adults, a harm reduction approach appears to have more prospects for inciting behaviour changes (e.g., Marlatt & Witkiewitz, 2002; Thom, 2017). For young adults, promoting complete avoidance of alcohol could result in them dismissing the message and therefore, be counterproductive (Marlatt & Witkiewitz, 2002). This emerged within discussions, as participants suggested that rather than telling young adults not to involve themselves in alcohol-influenced aquatic activity, campaigns should raise awareness of the amount of alcohol consumed in aquatic contexts, particularly if the intention was to go into water.

“I don't know that you'd ever stop them from drinking, but I think you could get them to be smarter with I guess how much alcohol they consume before they go in the water and maybe reducing the risk. But I don't think you could - I think they're too stubborn to be like, oh, if I'm going to go to the water, I'm just not going to drink at all.” (24-year-old male).

Gaining a population's perspective (audience analysis) to understand their outlook on a health issue can facilitate the development of campaigns which are accessible to that group, and effective in changing undesirable behaviours (Lefebvre & Flora, 1988). These current findings demonstrate that while some recommendations can be unsuitable, the audience of focus can provide insightful and appropriate suggestions for the development

of campaigns to address issues relevant to their demographic, and that these suggestions can align with those of professionals and practitioners within health promotion and education. This study shows that audience analysis, when used alongside evidence-based recommendations from literature, could be valuable to drowning prevention practitioners and could offer a significant contribution towards the development of campaigns aimed at reducing alcohol-influenced drowning incidence. As a result, the authors advocate for drowning prevention practitioners to consider this approach when developing, implementing and evaluating future campaigns, to ensure they are suitable and incite desired changes in young adults' alcohol-related behaviours in aquatic contexts. This information should then be made accessible to a board range of stakeholders to ensure this knowledge is translated widely to improve subsequent drowning prevention efforts.

How do young adults keep themselves safe in aquatic settings when alcohol is involved?

This study also explored strategies young adults perceived would keep them 'safe' when participating in alcohol-influenced aquatic activity, to understand what this age group considers appropriate behaviours in aquatic contexts and how this could inform drowning prevention campaigns. Protective behavioural strategies associated with alcohol consumption can be taught or modelled, and campaigns promote the use of these strategies to encourage the responsible consumption of alcohol, and decrease harmful effects (Martens et al., 2005). Martens et al. (Martens et al., 2005p702) identified three of these strategies: limiting/stopping drinking; manner of drinking; and, serious harm reduction. Reported effectiveness of these strategies varies. For example, longitudinally, campaigns incorporating manner of drinking and serious harm reduction have demonstrated more desirable effects on young adults' alcohol consumption, than strategies involving limiting/stopping drinking (Napper et al., 2014).

Such protective behavioural strategies were evident in the current study, and participants demonstrated transferring their understanding of safe approaches to alcohol use in other scenarios, in particular when driving, to aquatic contexts. Obvious evidence of this was in the commonly discussed safety strategy of having a sober supervisor during alcohol-influenced aquatic activities: *“I reckon as long as there's someone that's sober. The same thing with having a designated driver; having someone that's confident with their swimming ability and have first aid training just in case if something does happen”* (22-year-old female). Other aquatic-focused research has mirrored this finding. Sinkinson (2014) used focus groups to investigate young adults' (N = 17) self-reported alcohol use in aquatic contexts. The New Zealand cohort perceived the presence of a sober person would increase the safety of the situation, as they could act as a minder and monitor the behaviours of those drinking alcohol, just like a designated driver. Likewise, results from Abercromby et al. (Abercromby et al., 2020) indicated young Western Australians perceived supervision as an appropriate measure to lessen the risks associated with consuming alcohol and participating in aquatic activities. These studies may demonstrate how alcohol-influenced aquatic activity and drink driving are deemed similar by young adults, which likely result in individuals adopting similar safety strategies for both scenarios (i.e., designated driver or sober supervisor), particularly if no alternative has been promoted.

The suggestion of the effectiveness of a sober aquatic minder (based on the designated driver strategy) by the current participants, and those involved in previous investigations, may be misguided. Firstly, previous drink driving research has suggested there are variations in the definition and use of designated drivers among those adopting this safety strategy (Ditter et al., 2005; Shinar, 2017). For example, the designated driver drinks alcohol, but less than their passengers. Without suitable enforcement to monitor

appropriate use of designated drivers, the success of this strategy (and presumably versions adapted to other contexts) cannot be evaluated, and campaigns promoting this safety method have been shown to lack effectiveness (Ditter et al., 2005; Shinar, 2017). Secondly, a consideration not discussed in previous literature, is the differences between a sober aquatic minder and a designated driver, and how this could vary, influencing the safety of the situation. The premise of the designated driver strategy is that alcohol consumers are removed from participating in the risky activity (i.e., driving), whereas in the sober aquatic minder scenario, they remain involved. This creates additional considerations for the supervisor, such as their own aquatic abilities, as well as the aquatic abilities and alcohol tolerances of those they are supervising. The success of a sober aquatic supervisor, therefore, is heavily dependent on external intervention and trust, and its usage should be cautioned.

Typically for female participants in this study, use of a sober aquatic supervisor coincided with trusting those they were with to look out for their own, and the group's safety. Females expressed concern about consuming alcohol in aquatic settings with peers who were unfamiliar and inexperienced with alcohol, or perhaps were unaware of the risks of drinking alcohol in aquatic contexts. This finding mirrors strategies discussed by young Australian females in an investigation of safety strategies they implement during their general alcohol consumption (Armstrong et al., 2014). The young women reported that more inebriated individuals would often be supervised by those less inebriated; that they considered larger groups to be safer; and that they trusted their friends to look after them (Armstrong et al., 2014). In contrast, research has demonstrated that young New Zealand males (aged 18-24 years) adopt more individualistic strategies for managing alcohol-related risks than females of the same age, and they lack awareness that safety can be associated with consuming alcohol in trusted groups (Dresler & Anderson, 2018).

Further, both males and females in this New Zealand study showed reluctance towards helping an unknown intoxicated male in a risky situation—demonstrating the vulnerability of intoxicated males (Dresler & Anderson, 2018). Among the safety strategies identified in the current study, males were more likely to discuss limiting the amount of alcohol they consumed than using a sober supervisor, with some referencing knowledge of their alcohol limits as guidance for this *“Just keeping to your limit, I guess. Knowing when to - you've had too many, or when not to go in the pool”* (18-year-old male).

Limiting alcohol consumption was the most common approach to safety discussed among the whole sample, and strategies included: monitoring how many drinks they consumed, *“I'd probably set a limit, I guess, just if I've had this much to drink, it's not a good idea to get into the water”* (19-year-old female); commencing alcohol consumption later in the event; having an excuse to not drink, such as driving responsibilities; and, arriving at the event later.

“One of the biggest things that I did was making sure I never went there at 12 o'clock, was the biggest thing. Because I knew that they'd be drinking from 12:00 'til 10 o'clock at night, and the amount of alcohol and the amount of sun that they've got, they would not be well.” (22-year-old female).

However, young adults' intentions of limiting alcohol consumption do not ensure adherence to their planned strategies. Linden-Carmichael et al. (2019) reported that young people recorded less frequent use of protective behavioural strategies during occasions of high-intensity and high-risk drinking. It is unclear whether their alcohol-related intentions of the event (e.g., to get drunk) led to disregarding these strategies, or the extent of their alcohol consumption impaired their implementation.

These collective findings may provide some insight into the higher incidence of alcohol-related drownings recorded among Australian males than females (Royal Life Saving Society - Australia, 2019). Despite males in the current study stating they would limit their alcohol consumption in aquatic settings to stay safe, their actual adherence to this intention could vary (Linden-Carmichael et al., 2019), particularly as males adopt more individualistic styles of safety and others may not intervene if the male was at risk (Armstrong et al., 2014; Dresler & Anderson, 2018). The *Don't let your mates drink and drown* campaign has attempted to address this concept, by encouraging males to look out for their friends (Royal Life Saving Society - Australia, 2018a). However, it seems from the current sample that refinements are required to make this campaign more applicable and accessible to young males, to encourage more group-based safety strategies when consuming alcohol in aquatic contexts.

The limited awareness of safety strategies, combined with a lack of understanding and exposure to aquatic specific education of participants in this study raises some concerns. Practitioners may need to consider providing more clarity to young adults regarding safe behaviours in aquatic environments, and promote strategies which will be accessible and adopted widely by this at-risk population. Prevention methods only heightening awareness of the risks associated with alcohol use in aquatic settings have been criticised in literature, and policy makers have been encouraged to incorporate environmental and social support within prevention efforts, alongside peer-focused cues to action, to incite desired behaviour changes (Abercromby et al., 2020). To maximise effectiveness of alcohol-focused campaigns addressing young adults, research has recommended campaigns incorporate personal feedback and include activities involving risk consideration and decision making, alongside the promotion of strategies which encourage risk avoidance and a change in drinking behaviours (Linden-Carmichael et al.,

2019; Napper et al., 2014). To align with these recommendations, and the current participants' suggestions, drowning prevention practitioners should consider promoting harm reduction strategies that encourage risk consideration and changes to drinking behaviours in aquatic settings. For example, for improved safety if consuming alcohol in aquatic contexts, drowning prevention campaigns could encourage consumption of drinks with reduced alcohol content, and endorse a buddy system that promotes getting your buddy home safely (Martens et al., 2005). These approaches avoid the promotion of complete abstinence of a behaviour possibly considered part of the Australian culture (Abercromby et al., 2020), but rather promote safer practice.

While the results from this study are important because they provide insight from a group of young adults, they may not be appropriate to all contexts involving this age group. This is because the findings are based on a small, educated sample of participants, more than half of which were female, predominantly from regional Victoria, Australia, and who did not identify as Aboriginal and Torres Strait Islander. This likely influenced the range of views and experiences discussed by participants, and may limit the transferability of the findings more generally. To expand the current findings, it is recommended that further investigations collect more extensive demographic information than was sought for this research (e.g., ethnic background), and incorporate more diverse groups who: represent the cultural, ethnic and religious diversity within Australia; incorporate more male participants; and, have different aquatic competencies. Despite the steps taken to ensure participants were comfortable in the research environment, and the encouragement for them to participate honestly in discussions, social desirability bias may have influenced participants' responses. Participants may have deduced from the research purpose that taking part in alcohol-influenced aquatic activity was a negative behaviour, and thus could have responded in a way they felt was more acceptable. In

addition, while the current participants' review of alcohol-themed drowning prevention campaigns is a unique contribution to literature from this study, due to time restrictions and fairness for campaigns reviewed, participants were only provided with still images of campaign logos and images to determine their recognition and perspectives of the campaigns. This could have restricted the extent of the views expressed towards those campaigns, and if more information of the campaigns were provided (e.g., video clips, written resources) participants' perspectives may have been different. It is therefore important future research utilises all available campaign resources when conducting audience analysis, to ensure participants' responses are well informed. Finally, it is acknowledged the young adults' perspectives described in this research are their opinions and are not grounded in hard evidence and theory. Therefore, it is imperative practitioners consider these results while also consulting with best practice information when designing campaigns, and that they conduct thorough and detailed evaluations to ensure campaign suitability.

Conclusion

This study identified that the young adult participants had a low level of familiarity with the Australian alcohol-focused drowning prevention campaigns presented, and used the logos and names to interpret meaning. Participants recommended education approaches as the best way of targeting young adults' involvement in alcohol-influenced aquatic activity, and made several suggestions for campaign developers to consider, such as humour, shock tactics and a harm reduction approach. Their lay-person opinions/recommendations should be considered in concert with health promotion/health education best practice (e.g., multicomponent programs), to achieve a successful intervention. Finally, the participants appeared to transfer their knowledge from other alcohol-related settings when determining safety strategies to use when consuming

alcohol in aquatic contexts. This is suggestive that the participants lacked awareness of how alcohol-related risks can vary between environments where alcohol is consumed, and is evidence campaigns are needed to promote appropriate protective behavioural strategies for aquatic contexts.

New insights provided by this study of young adults' awareness of alcohol-focused drowning prevention campaigns, their perspectives on prevention efforts, and approaches to water safety, can assist practitioners in developing more focussed content for intervention campaigns. Additionally, this study has demonstrated how using an audience analysis approach can benefit drowning prevention practitioners when developing campaigns, by providing crucial detail and insight previously overlooked. The authors encourage practitioners to use this process in the design, delivery and evaluation of campaigns, alongside the best practice recommendations from health promotion and health education literature. In doing so, Australian drowning prevention efforts could become more directed and therefore, successfully impact the incidence of alcohol-related drowning in this high-risk age group.

CHAPTER SEVEN

PhD Conclusions and Recommendations

Chapter Outline

Section One of this chapter will provide overall conclusions from this PhD, demonstrating how each separate project was nested within, and contributed to answering the PhD research questions. It will then progress, in Sections Two and Three, to detail a list of recommendations which resulted from the collective outcomes of the PhD projects, alongside limitations associated with the scope of the research. This PhD was designed to add to drowning prevention knowledge and inform research and practitioners; consequently, two sets of recommendations are detailed which apply to each beneficiary of these projects in Sections Two (practitioners) and Three (research). Finally, Section Four offers some final words of this PhD.

PhD Limitations

The publications that make up a major component of this PhD have each included relevant limitations. There are two further limitations pertinent to this PhD as a whole. The first is that it was completed within Australia and mostly using Australian participants. While the outcomes are unique and contribute to understanding alcohol-related drownings and enhancing prevention efforts within Australia, care must be taken when applying the findings to other high-income countries (HICs), and directly transferring findings is not recommended. For these PhD outcomes to be used to assist drowning prevention in other countries, research will firstly have to establish whether the

current PhD results reflect the knowledge, attitudes and behaviour of young adults in those nations.

Secondly, components of this PhD relied on young adults' self-reports. While efforts were made to encourage honest responses (e.g., requesting participants completed the survey alone), the participants may have altered their answers to align with what they perceived to be the socially desirable responses to survey or interview questions. If time permitted, observational research could have been used to verify and complement the self-report projects of this PhD, to establish more comprehensive detail surrounding young adults' involvement in alcohol-influenced aquatic activity. Therefore, such observations are recommended for future research to establish the accuracy of these PhD results.

These limitations should be kept in mind when reviewing the PhD outcomes and subsequent recommendations, to ensure they are interpreted within the accurate context.

SECTION ONE

PhD Conclusions

Alcohol has been established as a significant contributor to drowning among young adults globally (Ahlm et al., 2013; Driscoll et al., 2003; WHO, 2014a), and in some HICs, drowning prevention organisations have provided recommendations for research and practice to reduce the impact of alcohol on drowning (Australian Water Safety Council, 2016; RLSSA, 2019, 2020; The National Water Safety Forum Strategy Working Group, 2015). Work has commenced in an attempt to address the rate of alcohol-influenced drownings, with investigations, based on coroners' reports and empirical research, aimed at understanding possible predictors of young adults' intentions to participate in alcohol-influenced aquatic activity, their perceptions of associated risks, and corresponding knowledge, attitudes and behaviours (Abercromby et al., 2020; Ahlm et al., 2013; Enkel et al., 2018; Hamilton et al., 2018; Hamilton & Schmidt, 2014; Peden et al., 2018a; Ridge & Nimmo, 2018; Sinkinson, 2014; Watt et al., 2012). While these studies have provided new information and assisted in determining that young adults are at risk of drowning as they consume alcohol in aquatic locations, limitations with sample demographics, study designs and measures have restricted the applicability and transferability of these findings. To date, research has lacked consideration of young adults' awareness and perceptions of alcohol-focused drowning prevention campaigns, the influencers on their actual involvement in alcohol-influenced aquatic activity, and their alcohol-specific aquatic knowledge. Much of this previous research has been conducted in Australia and New Zealand, with few investigations from other HICs which

also record high rates of alcohol-related drownings among young people, such as the United Kingdom (UK).

Identified gaps in the literature provided the focus for this PhD, these included: an absence of relevant intervention campaigns and evaluations of campaign effectiveness (Driscoll et al., 2004b); and, a dearth of literature regarding young adults' participation in, and attitudes towards alcohol-influenced aquatic activity. It was clear that a mixed-methods approach would be valuable to gain a comprehensive understanding of this issue that is not yet established in the literature, and in doing so, new knowledge of the field of drowning prevention would be provided. The four projects within this PhD were interlinked and completed sequentially, in order to answer the following research questions:

1. What does current evidence tell us about the effectiveness of alcohol education campaigns?
2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?
3. How have aquatic-focused alcohol education campaigns targeted behaviour change among at-risk groups?
4. What factors influence young adults' involvement in alcohol-influenced aquatic activity in Australia and the United Kingdom (UK)?
5. To what extent have young people in Australia developed their knowledge, perceptions, attitudes and behaviours regarding alcohol-influenced aquatic activity?

To answer research question 1, the systematic review within this PhD compiled 10 best practice quality criteria, from health promotion and education literature, for

education programs to successfully address young adults' alcohol-related behaviours, knowledge and/or attitudes (Cuijpers, 2002; Pentz, 2003; Thom, 2017). When alcohol education programs incorporated more of the quality criteria, desirable changes in young adults' alcohol-related behaviours were more likely to be recorded. However, in line with the program audit within this PhD, this systematic review identified that few studies reported effective evaluation techniques to determine the efficacy of the alcohol education programs. Therefore, the systematic review advocated for practitioners to include the 10 quality criteria, along with suitable evaluation methods (e.g., long-term follow up evaluations, the inclusion of control groups), to confirm steadfast and reliable outcomes of alcohol education programs.

The quality criteria and programs included in this systematic review were not context specific, rather, programs had been implemented in a variety of settings (e.g., secondary and tertiary educational institutions, communities), and the quality criteria developed were suitable for programs delivered across a range of contexts, instead of for one specific area. This ensured the results and recommendations from this systematic review could be transferred and applied to campaigns aiming to address young adults' alcohol-related behaviours in various contexts, including aquatics. In this way, the systematic review contributed towards answering research question 2: the quality criteria and recommendations should be considered by drowning prevention practitioners when developing alcohol-focused education campaigns, to ensure programs are evidence-based to enhance the likelihood of success. This methodology also set this systematic review apart from others which have evaluated alcohol education programs for young people (e.g., Lemstra et al., 2010; Teesson et al., 2012), but which have focused specifically on one context for program delivery, such as schools, thus practitioners cannot transfer or apply the results as simply to other contexts.

The outcomes from the quantitative and qualitative projects also contributed to answering research question 2, by addressing research questions 4 and 5. These projects investigated factors which influenced young adults' involvement in alcohol-influenced aquatic activity, highlighting specific areas for inclusion in drowning prevention campaigns to address young adults' alcohol-related behaviours. Examples include: the influence of friends; societal and cultural norms; self-confidence; and, their intentions.

Research question 3 was addressed through the program audit project. As the 10 quality criteria established for the systematic review were not context specific, the intention was to use this quality measure in the program audit to evaluate the identified alcohol-focused drowning prevention campaigns from HICs, and assist in determining recommendations for improvement—a unique addition to the drowning prevention field. The program audit identified 12 relevant alcohol-themed drowning prevention campaigns, but only two included accessible evaluations: a previous critique of alcohol-related drowning prevention programs (Blitvich, 2014; Driscoll et al., 2004b), and most had insufficient information to determine program details. This meant the quality and effectiveness of the campaigns could not be assuredly determined. The lack of available information is of concern, as it limits the extent that campaigns can be repeated or adopted elsewhere, because of uncertainty of the efficacy of the campaign to achieve objectives, and impact on the participants. Such concepts were discussed in the program audit publication, and evidence-based recommendations for improvements were provided, to facilitate enhanced program delivery in the future.

To address the absence of evaluations of alcohol-focused drowning prevention campaigns, the qualitative project adopted a method not previously used in this field, discussing the Australian campaigns identified in the program audit with participants, to obtain their perceptions and awareness of the prevention messages, and their suggestions

for improvements. Awareness of these campaigns was low, and participants highlighted the importance of clear campaign logos and names for correct interpretation of the prevention message, and expressed preference towards those campaigns involving humour, shock tactics, relatable scenes and harm reduction methods. This study demonstrated that an audience analysis approach can be useful for drowning prevention practitioners, by identifying strengths and weaknesses of campaigns. But importantly, this method should be supported by and used alongside evidence-based suggestions from health promotion and health education experts (such as those identified in the systematic review), throughout the design and evaluation of drowning prevention efforts.

The mixed-methods approach of this PhD is strongly evident in the way the qualitative and quantitative projects interlinked to comprehensively address research questions 2, 4 and 5. The quantitative project developed a valid and reliable measure for alcohol-focused drowning prevention research which can be adopted by others for future investigations. This survey identified predictors of UK and Australian young adults' intentions and past involvement in alcohol-influenced aquatic activity. The predictors of intention enhanced previous research, and supported earlier findings that attitudes and subjective norms are influential (Hamilton & Schmidt, 2014). However, the new knowledge generated through this study by identifying predictors of behaviour addressed a gap in the literature, particularly in the UK, as it determined that friends can significantly affect the frequency of young adults' involvement in risky aquatic behaviours. Previous research has not predicted this behaviour; hence, this finding provides a useful insight to help explain young adults' prevalence in alcohol-related drowning statistics in HICs. While new insights were provided by these quantitative findings, there was still a need to expand these findings, and qualitative research was used for further elaboration of the results.

The qualitative discussions revealed that peer pressure is prevalent among young adults in alcohol-related aquatic contexts and, aligning with previous research, determined that alcohol-influenced aquatic activity is considered a cultural behaviour that is accepted among young Australians (Abercromby et al., 2020). The current project added to present understanding of young adults' reaction to this peer pressure in aquatic contexts, as participants stated that their response differed depending on their relationship with, and characteristics of, the peer group. For many, self-confidence and perceptions of risk, as well as the nature of the peer pressure (e.g., persistent), affected the likelihood of succumbing to the peer pressure and subsequently placing themselves at increased risk of aquatic-related harm.

Participants indicated that for other young adults, self-confidence influenced their perception of their aquatic ability particularly following alcohol consumption, and this could increase the likelihood of their involvement in alcohol-influenced aquatic activity. However, they only described this effect among others their age and did not refer to themselves, suggesting a disassociation from the likelihood of them overestimating their aquatic abilities and being at risk. Previous water safety research has determined that young adults lack awareness of their own aquatic abilities (Moran et al., 2012; Petrass et al., 2012), and smoking research has shown young adults are aware of, but deny associated risks, which affects their smoking behaviours (Gray et al., 2016). To the author's knowledge, this is the first study to suggest that young adults concede that individuals can misjudge their aquatic competencies, and that this is more likely with alcohol consumption, but do not associate themselves with experiencing this. Such a result could be fundamental for practitioners designing drowning prevention campaigns to ensure young adults recognise this issue.

The quantitative project indicated that young adults typically held a neutral attitude towards alcohol-influenced aquatic activity (that is, they felt it was neither good, nor bad) but results from the qualitative discussions determined attitude was dependent on the situation and context in which the alcohol-influenced aquatic activity occurred. The qualitative participants reported that when they felt capable of recognising risks and in control of their risk exposure, their attitudes were more accepting. However, this brings into question the accuracy of their perceived and actual abilities of recognising risky aquatic situations, as knowledge of alcohol and aquatic-related risks was lacking in both the quantitative and qualitative participant groups.

While alcohol-related water safety knowledge has been investigated previously (Abercromby et al., 2020; Enkel et al., 2018; Ridge & Nimmo, 2018; Watt et al., 2012), reliability and validity of measures have not been reported and the samples have been culturally limited. Thus, the current results, from a valid and reliable quantitative measure, offer additional understanding of this concept among young adults in HICs. Yet, as knowledge was only one component of the larger, comprehensive survey utilised within this PhD, it remains an area requiring further exploration.

A lack of alcohol-specific water safety education was further evident among the qualitative participants, who frequently referred to drink driving safety strategies as appropriate to use in alcohol-related aquatic scenarios: a finding which replicates results of previous qualitative drowning prevention research (Abercromby et al., 2020; Sinkinson, 2014). Transferring alcohol education from other scenarios to aquatic contexts demonstrates an absence of appreciation among these young Australian adults, and those in previous research, that alcohol-related risks differ between contexts, and suggests practitioners address this by providing aquatic-specific alcohol education concurrently with drink driving education.

To complement and close this section of PhD conclusions, the following brief summary of the PhD findings provides an overview of how each research question was answered:

1. What does current evidence tell us about the effectiveness of alcohol education campaigns?

This PhD identified 10 evidence-based, non-context specific quality criteria associated with successful alcohol education programs. It is recommended that these be considered when developing alcohol-focused drowning prevention programs to effectively change young adults' alcohol-related behaviours. Typically, articles included in the systematic review lacked information of campaign evaluation, and this limited the strength of the conclusions drawn regarding program effectiveness. Therefore, evaluation methods, such as including control groups and pre, post, and follow-up testing, should be incorporated into future prevention efforts and subsequent publications to certify effectiveness.

2. What components need to be considered and included in aquatic-focused alcohol education campaigns to facilitate positive alcohol consumption behaviours among at-risk young adults?

The 10 non-context specific quality criteria which aligned with successful alcohol education programs should be consulted when designing alcohol-focused drowning prevention education campaigns. The systematic review recommendations of appropriate evaluation methods (e.g., using control groups) should also be considered and applied where relevant to ensure steadfast program outcomes. Finally, the factors identified in research questions 4 and 5 as influencing young adults' involvement in alcohol-influenced aquatic activity should also be addressed in future education campaigns.

3. How have aquatic-focused alcohol education campaigns targeted behaviour change among at-risk groups?

The aquatic-focused alcohol education campaigns identified in this project appeared to have targeted behaviour change predominantly through media-based programs. However, specific detail of these campaigns and their development was unavailable, therefore complete clarity is lacking as to how behaviour was targeted. This project determined that alcohol-focused drowning prevention efforts are also often unevaluated within HICs, or that evaluations are not accessible in peer-reviewed or grey literature. The collective findings from the projects within this PhD recommend practitioners provide more detail of their campaign design, development and evaluation in order to determine effectiveness and facilitate replicability of the campaign. This is alongside recommendations from the systematic review (research questions 1 and 2), based on health promotion and health education research, on how alcohol-related behaviours can be addressed by campaigns.

4. What factors influence young adults' involvement in alcohol-influenced aquatic activity in Australia and the United Kingdom (UK)?

The following factors appeared to influence the participants' involvement in alcohol-influenced aquatic activity: pressure from peers, social norms and cultural activities; perceived predictability and control of the situation with regards to alcohol consumption, associated behaviours and the aquatic environment; absence of appropriate alcohol-focused water safety education; intentions to participate in alcohol-influenced aquatic activity; and, disassociation from experiencing misjudgements or overconfidence in own aquatic abilities and/or alcohol tolerances.

5. To what extent have young people in Australia developed their knowledge, perceptions, attitudes and behaviours regarding alcohol-influenced aquatic activity?

Alongside those influences mentioned for research question 4, the young adults lacked understanding of how to stay safe in alcohol-influenced aquatic scenarios. Often, they perceived that transferring alcohol-related knowledge, attitudes and behaviours from driving contexts to aquatic environments was appropriate, such as having a designated sober minder in the aquatic setting, and staying under the legal drink driving alcohol limits. While this does suggest they had some ideas for maintaining their safety in alcohol-influenced aquatic contexts, it was apparent limitations associated with these strategies had not been considered (e.g., the sober minder's aquatic competencies) and this would prevent the strategies from being consistently safe.

SECTION TWO

Recommendations for Practitioners

1. This project identified that information about current drowning prevention campaigns is not readily available in the peer-reviewed or grey literature. This is a concern, as practitioners seeking to enhance current knowledge and prevention efforts have only a limited foundation to build upon. As a result, it is a recommendation that practitioners publish information about their alcohol-focused drowning prevention campaigns on easily accessible platforms (e.g., the organisation's website, or open access journals targeting practitioners and researchers) to benefit future prevention efforts.
2. Improvement in the design, implementation and evaluation of alcohol-focused drowning prevention campaigns is required. To change behaviours, practitioners should design campaigns: incorporating best practice recommendations from the literature; underpinned by appropriate theories; and, guided by recommendations of health promotion and injury prevention experts, policy makers and the target demographic. This would ensure the content was evidence-based, specific to the target group and hence maximise the likelihood of success. Alongside this, practitioners should allocate time and resources to program evaluations at each phase, including during development and delivery. Evaluations of the programs should occur: prior to broad-based implementation, using samples from the targeted groups (audience analysis); during the delivery to ensure any problem issues are identified and rectified; immediately post-program to assess campaign effectiveness: and repeated over a longer period (minimum of 1 year) to monitor the

impact of the program over time. In this way, practitioners can make any appropriate changes to assure program effectiveness.

3. When choosing a method for prevention, practitioners should be mindful of the drawbacks of education-only approaches and consider other, perhaps more appropriate methods to their targeted demographic. However, without evaluations of alcohol-related drowning prevention programs, it is impossible to recommend which method is most suitable to target this issue until more relevant information becomes available. Practitioners could consult best practice information for education programs designed to change young adults' alcohol-related behaviours in other contexts, such as those identified in the systematic review of this PhD, to apply to drowning prevention efforts and assist in developing more focused campaigns.
4. This research identified that young adults transfer their knowledge from drink driving scenarios to inform their alcohol-related behaviours in aquatic contexts. Interview participants frequently cited the legal blood alcohol concentration for driving (0.05% BAC) as a 'safe' limit when participating in aquatic activities, and reported adopting similar safety strategies in aquatic contexts involving alcohol consumption as they would in driving scenarios (e.g., designated driver/sober aquatic minder). However, no mention was made of the additional considerations for consuming alcohol in aquatic scenarios compared to driving, such as in the aquatic scenario those consuming alcohol would remain involved in the dangerous activity whereas in the drink driving scenario they would be removed. Such factors could affect how suitable and 'safe' it is to transfer these drink driving strategies to aquatic contexts and how effective they can be at preventing harm. Participant perceptions could indicate a lack of water safety education regarding alcohol

consumption in aquatic contexts, and some participants within this PhD stated they had not received such education. In the quantitative project, those who had received alcohol-specific water safety education were more likely to record higher knowledge scores than those without this specific education. Consequently, it is recommended that practitioners provide young people with more alcohol-specific water safety education throughout their schooling, to complement the successful work already undertaken for drink driving prevention, and also to highlight the differences in safety considerations between alcohol use in aquatic and driving scenarios.

5. It is apparent from the findings of this PhD and other studies conducted on this topic (e.g., Abercromby et al., 2020; Hamilton & Schmidt, 2014) that young adults may feel influenced to take part in alcohol-influenced aquatic activity because of societal norms and pressures. Changing such norms is not a small task and by no means a viable recommendation of this PhD, particularly as the drink driving norms were slow to change. However, to make progress towards this societal adjustment, practitioners should adopt harm reduction approaches so that young adults become more aware of their behaviours in aquatic contexts, and provide them with knowledge and skills to make more informed decisions about their alcohol-related actions. Harm reduction would not advocate complete avoidance of the behaviour, particularly as this age group would likely rebel against such messages (Thom, 2017). Rather, it would promote informed decision making for safer practices regarding alcohol-influenced aquatic behaviour. Further, in conjunction with suggestions from other experts (Langendorfer, 2015; Stallman et al., 2017), water competence education should encompass alcohol-related information to enhance associated attitudes and knowledge. Such an approach should encourage safer use

of alcohol in aquatic contexts and ensure exposure to this message and appropriate safety strategies. Providing these messages before, or at a time when young people are likely to begin experimentation with alcohol, could eventually prompt a societal shift in the approach to alcohol use in aquatic contexts, and create a mindset that young people carry with them throughout their lifetime.

6. Likewise, findings of this PhD identified that friends can significantly influence the frequency with which young adults participate in alcohol-influenced aquatic activity. Accordingly, it is suggested that practitioners develop campaigns which provide young adults with clear and accurate information of the risks and dangers associated with alcohol-influenced aquatic activity, and encourage them to apply this information in situations where their friends' behaviours become risky. In doing so, campaigns could teach young adults how to recognise dangerous activities and how to confidently remain safe in those contexts. With these skills, informed decision making could contribute to a reduction of alcohol-related drowning among young adults.
7. The qualitative project of this PhD identified that when young adults were unfamiliar with a specific drowning prevention campaign, the campaign name and logo were important for interpreting the prevention messages. Consequently, it is recommended that drowning prevention practitioners design clear campaign names and logos for future campaigns to accurately reflect the safety messages.
8. To make use of established collaborations and familiar campaigns, drowning prevention practitioners could integrate alcohol-focused campaigns into current successful general drowning prevention efforts. For example, the Victorian-based *Play it safe by the water* campaign in Australia was recognised by the entire young adult group who took part in the qualitative project of this PhD. Victorian-based

drowning prevention efforts could use this foundational campaign and add alcohol-focused messages. This process could be applied across Australia and other HICs, and may enhance the success of the alcohol-focused prevention messages in reaching at-risk groups. However, in accordance with the other recommendations from this PhD, such an approach should firstly be trialled and evaluated prior to uptake.

9. This PhD was the first research (to the author's knowledge) that investigated UK young adults' knowledge, attitudes and behaviours relating to alcohol-influenced aquatic activities. Accordingly, the study results can inform UK drowning prevention organisations who can modify their campaigns in light of these findings. For example, this PhD identified that young adults in the UK had poor levels of alcohol- and aquatic-specific knowledge, and neutral attitudes towards alcohol-influenced aquatic activity. These factors should be addressed.
10. This PhD aimed to explore young adults' involvement in alcohol-influenced aquatic activity, as coroners' data, and investigative research, has indicated this age group is at-risk of experiencing an alcohol-influenced drowning incident. However, it is important to note that national drowning reports may not be completely accurate in depicting current drowning statistics due to the time it can take to close coroner cases, and because for some cases, a toxicity report is not provided. Accordingly, current estimates of alcohol-influenced drowning incidents are likely underestimated, and the effectiveness of prevention efforts remains unknown. To truly comprehend the effectiveness of alcohol-themed drowning prevention programs, and to obtain an accurate understanding of the actual rates of alcohol-influenced drownings to determine requirements for prevention efforts, practitioners should advocate for coroners' reports of drowned casualties to always

include information about the presence of alcohol when confirming drowning as the cause of death. Without this complete information, practitioners and researchers risk being misguided in their perceptions and focus on alcohol-influenced drowning incidents.

SECTION THREE

Recommendations for Research

1. This project identified that limited information about alcohol-focused drowning prevention campaigns is available in peer-reviewed literature. Collaborations between practitioners and researchers are recommended, to produce detailed reports of campaign designs, implementation and evaluations. These reports should be made readily available to a range of stakeholders as well as funding bodies, and if possible, these details should be included when reporting on the campaigns in peer-reviewed academic journals. This process is imperative for the improvement of alcohol-related drowning prevention efforts, as detailing campaign designs and corresponding effectiveness will highlight how future prevention attempts should be focused and which techniques to refine.
2. Future research should build on the results of this PhD. More clarity is required about the accuracy of young adults' knowledge of alcohol and its effects in aquatic contexts. How they obtain this information is also of importance. This would highlight the influential sources for young adults which could then be explored as a focus for prevention efforts.
3. Researchers should further explore prevention methods to determine those most effective for addressing alcohol-influenced aquatic activity among young adults. This PhD identified methods perceived by young adults as likely to be effective, as well as those recommended by health promotion and health education literature. Empirical studies are required to test these perceptions and evidence-based recommendations, to confirm what approaches are appropriate for an aquatic focus.

4. A consensus should be established regarding the blood alcohol concentration that impacts an individual's aquatic abilities, and therefore increases their likelihood of experiencing a fatal or non-fatal drowning incident. Currently, the disparity in available literature has led to an apparent underestimation of the influence of alcohol in drownings involving young adults (Pajunen et al., 2018; Peden et al., 2017), and consequently the extent of this issue remains unknown. Conducting research among individuals from a range of demographics would enhance current understanding of how alcohol affects different groups in aquatic contexts, and highlight how future prevention efforts could be refined.
5. In conjunction with recommendation 4, future research should expand the current limited information regarding perceived and actual aquatic abilities following alcohol consumption. Several participants in the current study reported 'knowing their limits with alcohol' and all were able to self-report their aquatic abilities, but little information is available of the impact of alcohol consumption on perceived and actual aquatic abilities. To the author's knowledge, one investigation has analysed the effect of increasing BACs on diving ability and perception (Perrine et al., 1994). Further research should explore perceived and actual abilities of other aquatic activities (e.g., survival skills) following alcohol consumption. This new information would provide an important insight for the drowning prevention community to understand how alcohol may influence aquatic perceptions, to then inform associated health promotion campaigns.
6. To follow on from recommendations 4 and 5, naturalistic observation of young adults in aquatic settings is recommended, to determine the amount of alcohol consumed, their behaviours and the actual risks to which they are exposed. This would facilitate collection of accurate information of young adults' alcohol-related

behaviours in aquatic contexts, and if comparing these observations to young adults' own perceptions of the risks, could provide a significant contribution to the drowning prevention field and prevention efforts.

7. To deepen the understanding of factors influencing alcohol-influenced drownings among young adults, researchers should consider adopting different theoretical models to obtain alternative perspectives on participation in alcohol-influenced aquatic activity. This could identify other possible influencers on this behaviour and/or confirm the results identified in this PhD and other previous drowning prevention research (e.g., Abercromby et al., 2020; Hamilton & Schmidt, 2014). To build on the current PhD, future research should be conducted among large, heterogenous groups of young adults, including those from different social and cultural backgrounds in HICs worldwide, to note whether the influencers identified are consistent or differ depending on specific factors. In this way, campaigns can be tailored to suit the cultural requirements of the young adult population of focus.

SECTION FOUR

Some Final Words

Under the influence, what does it mean?

Young adults' drink and which way do they lean?

Is it towards the pressure from peers, or away from society?

This PhD has tried to clarify this reliably.

A mixed-methods approach was used to answer the questions,

And the resulting research added to previous suggestions.

Reviews of literature, interviews and a survey were completed,

To understand how youth drink-drownings can be treated.

Peer pressure is prevalent and so are societal norms,

To which young adults can find it hard not to conform.

Such factors should be included in prevention efforts,

And informed decision-making encouraged among adolescents.

Accessible evaluations of drowning campaigns are lacking,

Meaning conclusions and prevention efforts do not have much backing.

Combining evaluation with criteria linked with program success,

Could help campaigns reduce alcohol-related drowning distress.

Whilst this poem is brief, this research is not,

And about young adult drownings it has taught us a lot.

I know future research is required to expand on this work,

But this PhD has enhanced current knowledge, and that is a perk!

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Appendix B

Translating Research into Injury

Prevention Practice Framework

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Appendix C

Publication One Supplementary File

This Appendix presents the Supplementary File for the systematic review publication (Publication One), which was published in Health Education Research in February 2021. When reading digitally, the following link will take the viewer back to the Systematic Review (Chapter Three Section Two) of this thesis: [Systematic Review](#).

Figure 7

Search strategy and screening stages implemented.

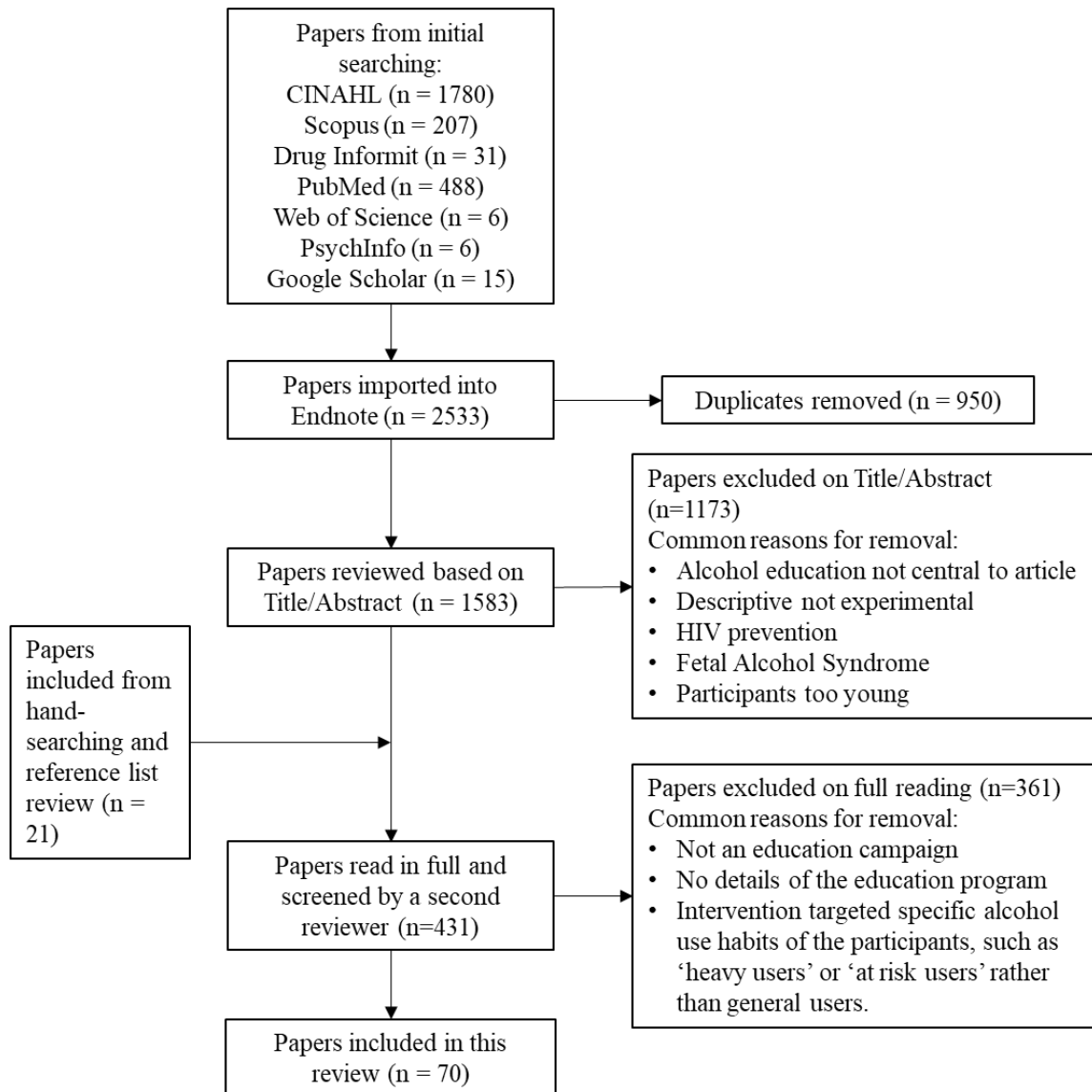


Table 19

Study details of all included studies, presented by corresponding Group (1-3) and quality score.

Reference	Date	Study design^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Shope et al. (1996)	1996	Cohort study	Alcohol misuse prevention study (AMPS) – included 5 x 45-minute sessions with content presented through role-play, class discussions and television advertisements. Focused on short-term effects of alcohol and risks of misuse. Control group completed standard school program. Follow up assessment at 2-years.	1,041 10 th grade students.	At post-test, control group reported significantly more occurrences of misusing alcohol than program group ($P<0.05$). Program group demonstrated significantly more prevention knowledge than control group ($P<0.001$). No significant influence on responses that related to self-reported driving after drinking.	8 (1, 2, 3, 4, 6, 7, 8, 10)	Group 1: Behaviour and attitude and/or knowledge change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Wodarski (1987)	1987	Cohort study	Teams-Games-Tournaments (TGT) alcohol education program. A 50-minute session per day for 4 weeks, which included: alcohol concepts/knowledge and application to own life; working in groups towards a quiz; and undertaking a tournament consisting of short answer questions. Control groups received a traditional one-week alcohol education course, or no instruction. Follow up assessment at 1 year.	526 sophomores, juniors and seniors, aged 15-18 years.	Significant increase in knowledge ($P<0.05$), reduction in drinking behaviour ($P<0.05$) and positive attitude change ($P<0.05$) in TGT program group compared to the control groups.	7 (1, 2, 3, 4, 6, 7, 8)	Group 1: Behaviour and attitude and/or knowledge change
Glider et al. (2001)	2001	Quasi-experimental longitudinal design	Media program with educational advertisements and radio announcements, and educational information pages in university newspapers presented over	1,500 undergraduates approached – return rate 20% to 28%.	Significant reductions over 4 years in binge drinking ($P=0.01$), recent alcohol use ($P=0.05$), and knowledge of	6 (1, 2, 5, 7, 8, 10)	Group 1: Behaviour and attitude and/or knowledge change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			4 years from 1995 to 1998. Program aimed to: (a) promote accurate alcohol-use norms on the university campus; (b) educate on misunderstood alcohol-related facts; and (c) change the conversation about alcohol use. Participants sampled once yearly for the 4 years. No control group.	All residence hall and fraternity and sorority members approached – return rate 15% to 25%.	negative effects of alcohol ($P<0.05$). Accurate perceptions of alcohol risks significantly increased ($P=0.01$) along with significantly more accurate perception of peer use of alcohol ($P=0.01$).		
Bingham et al. (2011)	2011	Matched Pairs	Michigan Prevention & Alcohol Safety for Students (M-PASS) – web-based, tailored, brief alcohol prevention program that encompassed 4 online sessions delivered over 9 weeks. 3-month follow up assessment. Control group completed surveys instead of online sessions and program-related assessments.	742 university freshmen aged 18-20 years completed follow up.	Overall results showed the program reduced the frequency of binge drinking ($P<0.001$) and improved attitudes towards related risk of alcohol consumption ($P<0.05$) when compared to control.	5 (1, 2, 4, 7, 8)	Group 1: Behaviour and attitude and/or knowledge change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Buckner et al. (2019)	2019	RCT	Brief event-specific web-based personalised normative feedback intervention for the Mardi Gras celebration. Random allocation to intervention or control group. Intervention group viewed two webpages, 1) typical Mardi Gras drinking day and 2) heaviest Mardi Gras drinking, which showed personalised feedback and norm information in relation to their alcohol use intentions for Mardi Gras. Control group received feedback on college behaviours, not alcohol use. 1 month follow up after Mardi Gras.	147 undergraduate psychology students aged 18 years and above.	No significant difference between intervention and control group in likelihood to drink during Mardi Gras ($p = .225$). At follow up, the intervention group reported lower normative beliefs than control. Heavier baseline drinkers estimated lower blood alcohol concentrations during Mardi Gras than lighter drinkers ($p < .0001$).	3 (2, 7, 8)	Group 1: Behaviour and attitude and/or knowledge change
Bernstein et al. (2018)	2018	RCT	Text message-based intervention to reduce alcohol use during 21 st birthday celebrations with	200 college students with an upcoming 21 st birthday.	No direct effect of the intervention was recorded for eBAC or alcohol-	4 (2, 6, 7, 8)	Group 1: Behaviour and attitude

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			personalised normative feedback and protective behavioural strategies. Randomised to intervention or assessment-only control group. Intervention group received a text message the day before and day of their 21 st birthday celebration. Pre and immediate post testing on estimated blood alcohol concentration (eBAC) completed.		related consequences. Participants in the intervention group improved their awareness of 21 st birthday alcohol use norms at follow up. Intervention was associated with lower eBAC for lighter drinkers who planned on heavily drinking during the celebration.		and/or knowledge change only for some subgroups
Doumas et al. (2020)	2020	RCT	Online intervention e-Check Up to Go (e-CHUG) with immediate personalised normative feedback. Demographic survey consisted of normative beliefs about peer alcohol use, positive alcohol expectancies, protective behavioural	High school seniors. 283 completed follow-up.	Intervention participants significantly reduced: perceptions of frequency of peer drinking ($p = .05$); perceptions of frequency of sex-specific peer heavy	4 (2, 7, 8, 10)	Group 1: Behaviour and attitude and/or knowledge change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			strategies and alcohol use. Follow up evaluation at 30 days. Randomised to intervention or assessment-only control group.		episodic drinking ($p = .02$); positive alcohol expectancies ($p = .04$); and, peak alcohol drinking ($p = .01$) compared to control. Only intervention females significantly reduced: perceptions of frequency of peer drunkenness ($p = .001$); and, alcohol use ($p = .04$). No difference between groups on protective behavioural strategies.		
Larimer et al. (2001)	2001	RCT	Motivational enhancement program with specific alcohol-related feedback. Program comprised 1 x 1-	Out of the total sample (N=159), 120	Significant decrease in alcohol use ($P < 0.05$) amongst the program group	9 (1, 2, 3, 4, 5, 6, 7, 8, 9)	Group 1: Behaviour change for

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			hour individually tailored feedback session and 1 x 1-hour university house-wide feedback program. Control group were assessment only/treatment as usual. Follow up evaluation at 1-year.	fraternity members (mean age 18.8 years) completed follow up.	compared to control. No significant differences in drinking related consequences.		all subgroups
Haug et al. (2013)	2013	Longitudinal pre-post study	Alk-Check – web and text messages (received over 12 weeks) with personalised feedback and social norms relating to alcohol use. Content of messages included personalised feedback about drinking habits and social norms information of those in similar situations and/or age groups. Follow up evaluation at 3 months. No control group.	367 students aged 16-21 years	Significant reduction in Risky Single Occasion Drinking (RSOD) ($P<0.001$), drinks per week ($P<0.01$) and alcohol related problems ($P<0.01$) at the 3-month follow up.	7 (1, 2, 5, 6, 7, 8, 10)	Group 1: Behaviour change for all subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Martinez-Montilla et al. (2020)	2020	Cluster RCT	Online intervention 'Alerta Alcohol' over 3 sessions at school, two booster sessions at home, a 'challenge' session to not drink alcohol at an upcoming event, evaluation of the 'challenge' session and follow-up session at school after 4 months. Each session lasted approximately 1 hour and consisted of short stories of a main character's previous binge drinking with tailored and personalised messages to reduce alcohol consumption and binge drinking. Randomly allocated students to intervention group or assessment-only control.	612 high school students completed the 4 month follow up.	At 4 month follow up the experimental group was significantly less likely to participate in heavy episodic drinking in the previous 30 days than the control group ($p = .04$). No significant differences between groups for binge drinking, weekly consumption or any consumption.	7 (1, 2, 4, 5, 6, 7, 8)	Group 1: Behaviour change for all subgroups
LaBrie et al. (2007)	2007	Cohort study	A 60- to 90-minute group program using adapted	120 freshman	Significant reduction in	6	Group 1: Behaviour

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			motivational interviewing approach for alcohol use. Follow up evaluation at 1 and 3-months. No control group.	male participants. 110 completed 1-month follow up, 90 completed 3-month follow up. Mean age 18.2 years.	drinking behaviour from pre-test to follow up at 1 and 3 months ($P<0.05$). Participants who reported a higher incidence of binge drinking at pre-test, demonstrated a higher readiness to change at follow up, other drinkers did not.	(2, 4, 6, 7, 8, 10)	change for all subgroups
LaBrie et al. (2008)	2008	RCT	Motivational enhancement program. Included 2-hour group sessions, and 10-week drinking diaries and discussions about alcohol effects specific to women. Assessment-only control group. Follow up surveys at 4 and 10 weeks.	218 female first-year college students. Mean age 18.10 years.	Program participants consumed less alcoholic drinks ($P<0.05$), reported fewer monthly binge drinking sessions ($P<0.01$) and had fewer consequences from alcohol than controls ($P=0.05$).	6 (2, 3, 4, 5, 7, 8)	Group 1: Behaviour change for all subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Bordin et al. (2003)	2003	Two-day program. On average 57 days between pre and post-tests.	'Every 15 minutes' – scripted alcohol-awareness program in classrooms. Involved student participation in real-life scenarios and an over-night retreat. No control group.	1,651 high school students. Aged 14-20 years old.	Participants reported less risky alcohol-related behaviours from pre- to post-test, $P < 0.01$. Parents reported being more confident their child would not drink and drive following the program.	5 (2, 4, 5, 7, 8)	Group 1: Behaviour change for all subgroups
Stahlbrandt et al. (2007)	2007	Cluster Randomised trial	Brief skills training program – one-off alcohol-focused lecture that included group discussions or, a 12-step influenced program involving a 3-hour didactic lecture or, a control group. 1 and 2 year follow up.	556 initial sample of students. 67% of students completed 2-year follow up. Mean age 23.3 years.	Both experimental groups significantly reduced scores on tests for alcohol dependence, consumption and harm ($P \leq 0.05$). High-risk students showed stronger reductions in score in Brief skills program compared to control group	5 (2, 4, 6, 8, 10)	Group 1: Behaviour change for all subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
					and the 12-step group ($P=0.06$).		
Hustad et al. (2010) ^b	2010	RCT	Analysed two separate programs: AlcoholEdu - online interactive alcohol education course. One-off course over one day, with an exam at the end. e-Check Up to Go (e-CHUG) – 15 minute web based program with immediate personalised normative feedback. One-off online program with 30 day follow up evaluation. Evaluation assessment only control group.	82 incoming college students. Mean age 18 years.	Program participants reduced alcohol use compared to control group ($P<0.05$) – no difference between two experimental programs.	AlcoholEdu 5 (2, 4, 6, 7, 8) e-CHUG 3 (2, 7, 8)	Group 1: Behaviour change for all subgroups
Borsari and Carey (2000)	2000	RCT	Motivational program – one-off individual interviews discussing personal feedback on alcohol use. 6-week	60 college students. Mean age 18.45 years.	Significant reductions of alcohol use ($P=0.001$) and binge drinking	4 (2, 4, 7, 8)	Group 1: Behaviour change for all subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			follow up evaluation. No treatment control group.		($P=0.04$) in previous month in the program group compared to control.		
Ganz et al. (2018)	2018	RCT	Randomized into e-CHUG for students (30 minute web-based electronic screening and brief program, receiving personalized feedback) or evaluation assessment only control group who only completed baseline and post-tests. Surveys on alcohol habits completed at baseline, 3 months and 6 months post-test.	346 university students completed 6 month follow up Mean age 23.29 years.	Significantly less drinks consumed over time for both groups ($P<0.01$). Significantly fewer drinks ($P\leq 0.01$) and significantly lower peak blood alcohol concentration (BAC) ($P<0.05$) for e-CHUG group, no significant differences for frequency of heavy drinking or alcohol related problems between groups.	4 (2, 4, 7, 8)	Group 1: Behaviour change for all subgroups
Norman et al. (2018)	2018	RCT	Web-based self-affirmation manipulation.	892 students completed 6-	Participants who read the binge drinking messages	4 (1, 2, 4, 8)	Group 1: Behaviour change for

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			One-off course involving self-affirmation tasks, shown messages on binge drinking at university and then completed a task relating to their intention to avoid binge drinking. One week, one month and six month follow-ups. Control groups did not view messages.	month follow up. Mean age 18.76 years.	reported significantly less binge drinking ($P=0.04$), units of alcohol consumed ($P=0.01$) and fewer positive thoughts about binge drinking ($P<0.01$) than control throughout the following 6-months.		all subgroups
Bewick et al. (2013)	2013	RCT	Unitcheck - Web based personalised feedback and social norms program. Participants had access to the online program material for 6 weeks. Four follow up evaluations over 24 weeks. Assessment only control group.	1,618 University students. Mean age 20.8 years.	Participants who completed the evaluations reduced alcohol consumption over the previous recorded week ($P<0.001$) after the program. A longitudinal regression coefficients model ($R^2=0.05$) predicted	3 (2, 7, 8)	Group 1: Behaviour change for all subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Kazemi et al. (2011)	2011	Cohort study	BASICS – Brief Motivational Interviewing relating to alcohol use. Program included 2 x 50-minute sessions with a 3-month booster, with programs tailored to individual needs of participants. No control group.	102 freshmen students aged 18-20 years.	<p>long-term significant differences between the groups, with program participants reporting less alcohol consumption than controls.</p> <p>Significant reductions in alcohol use from baseline to 3 months ($P < 0.01$). Average drinks per session reduced from 12.6 at baseline to 7.3 at 3-months. Rutgers Alcohol Problem Index measured risky drinking, significantly fewer participants at high</p>	10 (all)	Group 1: Behaviour change for all subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Sheehan et al. (1996)	1996	RCT	Plan a Safe Strategy (P.A.S.S.) – 12 sessions of varying duration (specifics absent in article), included focus on modifying students' attitudes towards alcohol influenced driving behaviours and increasing their perceived control over their own behaviour in drink driving and passenger settings. Use of role-play and interactive activities. 3-year follow up. Assessment only control group.	1,774 students completed 3 year follow up. Grade 10 high school students	risk ($P < 0.01$) at 3-months. Significant decrease in poor passenger behaviour at follow up ($P = 0.005$). No significant differences in drink driving behaviour. Those who did not drink and drive at either pre-test or follow up were significantly more likely to use alternative strategies than those who did report drink driving on both occasions.	7 (1, 2, 3, 4, 6, 7, 8)	Group 1: Behaviour change only for some subgroups
Haug et al. (2017)	2017	Cluster-randomised controlled	MobileCoach Alcohol – web and text messages (1 to 3 texts per week over 3 months). Follow up evaluation at 6 months.	1,041 students aged 16-19 years.	Risky single occasion drinking (RSOD) significantly reduced in the	7 (1, 2, 5, 6, 7, 8, 10)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			Same method as Haug et al. (2013). Assessment only control group.		program group and increased in the control ($P<0.01$). No significant differences between the groups for amount of alcohol consumed between pre and post-tests.		
Hallgren and Andreasson (2013)	2013	Repeated, cross-sectional	Community conducted prevention program over 4 years, with surveys each year. Six trial communities provided with a list of evidence-based programs to select from and run themselves and received training and support, for example; parent programs; school-based programs; and treatment strategies for drunk drivers. Six matched control communities received	8092 young people aged 15-19 years.	No significant influence on youth drinking or alcohol related hospitalisations. Less incidences of parents offering alcohol to their children in trial communities than control. Binge drinking amongst year 11 males reduced more significantly in trial communities ($P<0.01$), similar	6 (2, 3, 4, 5, 8, 10)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			standard government prevention work.		trend for year 9 females ($P=0.001$).		
Braitman and Lau-Barraco (2018)	2018	RCT	Alcohol101 Plus - 60 minute online alcohol education utilizing a virtual campus to navigate and 'experience' the consequences of the choices made during alcohol-related scenarios. Or Alcohol101 Plus and booster email with personalized feedback sent 2 weeks post program Or evaluation assessment only control group. Follow-ups at 2, 4 and 6 weeks, and 3, 6 and 9 months – an enhanced assessment from Braitman and Henson (2016).	537 college students, aged 18-24 years. Mean age 19.65 years.	No significant influence of the program alone or booster alone on alcohol consumption compared to baseline. No significant influence on alcohol harm reduction for program or booster. Being of legal drinking age whilst receiving the booster combined to significantly decrease alcohol consumption ($P=0.03$), compared to being under legal drinking age ($P=0.79$).	6 (1, 2, 4, 6, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Bedendo et al. (2019a)	2019	Three-arm pragmatic RCT	Additional analysis of the same results from Bedendo et al. (2019b) to record effectiveness of the different components of the intervention. Online personalised normative feedback intervention included: a) participant's drinking profiles (using the Alcohol Use Disorders Identification Test - AUDIT), b) gender-specific normative comparisons, c) costs of drinking alcohol (i.e., monetary, health), d) consequences of alcohol consumption, e) low-risk drinking limits and avoidance strategies. Three groups: complete personalised normative feedback (components a, b, c, d, e); normative feedback only (components a, b, e); and	Participants were college students aged 18-30 years. Sample of 2735 in the control group and 1725 in intervention group (consisted of those completing follow up at 1, 3 or 6 months).	The normative feedback only group and consequences feedback only group reported significantly lower AUDIT scores over the time period than the personalised normative feedback group ($p < .001$). Variable results demonstrated some differences between the groups in drinking frequency and alcohol consequences during the follow up period, however the authors stated there was no evidence that the different components contributed to	6 (1, 2, 6, 7, 8, 10)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			consequences feedback only (components c, d, e). Random allocation to one of the groups. Follow up at 1, 3 and 6 months.		intervention effects. Participant's motivation to receive the feedback moderated the effects of the intervention – less motivated participants reported less intervention effects.		
Bedendo et al. (2019b)	2019	RCT	Online intervention lasting 5-10 minutes. Based on personalised normative feedback and included: participant's drinking profiles (using the Alcohol Use Disorders Identification Test - AUDIT), gender-specific normative comparisons, costs of drinking alcohol (i.e., monetary, health), consequences of alcohol consumption, low-risk drinking limits and	Participants were college students aged 18-30 years. Sample of 2735 in the control group and 1725 in intervention group (consisted of those completing	Intervention group significantly reduced number of drinks at each follow up point, compared to control (1 month = $p = .002$; 3 months $p < .001$; 6 months $p = .016$). Alcohol related consequences increased in the intervention group at 3 months ($p =$	6 (1, 2, 6, 7, 8, 10)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			avoidance strategies. Random allocation to intervention or assessment-only control group. Personalised normative feedback provided after assessment and each follow up at 1, 3 and 6 months.	follow up at 1, 3 or 6 months.	.05) compared to control. Students highly motivated to receive the feedback significantly reduced AUDIT score at 6 months compared to control ($p \leq .05$). Low motivated students significantly increased AUDIT score at 6 months compared to control ($p < .001$).		
Mattern and Neighbors (2004)	2004	Cross-sectional study	Alcohol norming program included letters from the resident hall director, postcards, posters and a table tent over 5-weeks. Post-test completed immediately following. No control group.	342 students. Mostly freshmen and sophomores.	At post-test, participants showed a reduction in perceptions of typical student drinking ($P < 0.001$). Reductions in personal consumption were reported when the	5 (2, 7, 8, 9, 10)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Moore et al. (2005)	2005	RCT	Web-based or print-based alcohol program – covered five components including definitions and strategies for risk reductions. Four weekly newsletters either online or printed. 30 day follow up. No control group.	106 college students, aged 18-25 years old, completed post-test.	participants also perceived a reduction in peer consumption ($P<0.001$). Previous 30-day usage decreased significantly ($P=0.05$) for all program groups. Non-significant reductions between the experimental groups included binge drinking frequency and greatest number of drinks (no P values reported for non-significant results >0.05).	5 (1, 2, 6, 8, 10)	Group 1: Behaviour change only for some subgroups
Lovecchio et al. (2010)	2010	RCT	AlcoholEdu for College 8.0 – one-off online program completed in one day. The content was	1,288 first year college students aged 18	Program group had significantly higher knowledge ($P=0.04$) and	5 (2, 4, 6, 7, 8)	Group 1: Behaviour change only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			customized to the participant's reported drinking habits and gender. 30-day post-test survey. Assessment only control group.	years completed post-test.	reported significantly lower alcohol use than control ($P<0.01$). However, program group demonstrated fewer responsible drinking behaviours (e.g., pacing drinking, eating prior to drinking) than control ($P=0.006$). No significant difference on protective or high-risk alcohol behaviours.		for some subgroups
Schulte (2010)	2010	Cohort study	Project Options – based on motivational enhancement. Program offered online, individual or group setting - participants chose which to attend. Group sessions were 6 x 30-minutes and	2,055 high school students completed follow up. Aged 13-18 years.	Significant reduction in perception of peer alcohol use ($P<0.01$). Participants who demonstrated a reduction in their	5 (1, 4, 5, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			individual sessions were 4 x 30-minutes. Website available outside scheduled times. Content included normative feedback and society's expectations of alcohol use. Fall and spring school wide surveys for pre- and post-tests. No control group.		assessments of peer alcohol use were more likely to decrease their personal binge episodes ($P<0.01$), maximum number of drinks consumed per episode ($P=0.01$), and average number of drinks per episode ($P=0.001$).		
Jander et al. (2016)	2016	Cluster RCT	Web-based computer game. Three game scenarios based on participants' reported alcohol consumption completed over three sessions. The game presented questions and immediate feedback on personalised messages about social norms, modelling of alcohol use, attitude, pressures to drink	Adolescents aged 15-19 years. 456 in experimental group and 368 in the control group.	No differences in binge drinking, weekly drinking or excessive drinking between intervention and control groups for whole sample. Intervention effective for 15 year olds in reducing binge drinking ($p = .03$).	5 (1, 2, 4, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			alcohol and self-efficacy. Forth session participant indicated any upcoming drinking event and were challenged to drink less alcohol than normal and a reminder message was sent the day before this event. Two days post event, participant indicated if they met the challenge. Four month follow up. Assessment only control group.				
Neighbors et al. (2009)	2009	RCT	Web-based personalised feedback about alcohol use – emailed link to birthday card relating to 21 st birthday drinking. Emailed 2 days before birthday. Assessment only control group. 1 week follow up.	295 college students contacted on their 21 st birthday.	Significant reduction in estimated BAC on their 21 st birthday (d=0.33) when compared to control group. Program influential for those who anticipated reaching higher levels of inebriation.	4 (2, 6, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Hardoff et al. (2013)	2013	Within-group design	One-school-day program including: a lecture; discussions; enacted scenario; and meeting with a disabled person who was injured through an alcohol-associated road crash. Three to four month follow up post-test survey. No control group.	Students aged 16-17 years.	In the post-test survey, 47% reported consuming alcohol in moderation, and 24% specified a decrease in the number of alcoholic beverages, however this was not compared to pre-test data. No significant differences between males and females for any measure.	4 (2, 4, 5, 8)	Group 1: Behaviour change only for some subgroups
Braitman and Henson (2016)	2018	Cohort study	Alcohol 101 Plus – 60-minute online alcohol education utilizing a virtual campus. The participant navigated and ‘experienced’ the consequences of the choices they made during alcohol-related scenarios. Booster after week 2 for	213 students, aged 18-24 years.	Boosters reduced alcohol consumption and frequency, but not alcohol-related problems. Students reporting low protective behavioural strategies (PBS)	4 (2, 6, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			some participants. No control group. Follow up evaluation at 2 and 4 weeks.		relating to alcohol use showed significant reductions in alcohol consumption, compared to those with high levels of PBS.		
Caudwell et al. (2018)	2018	RCT	Online program with participants randomized to one of four conditions: autonomy support condition – responded to text prompts about pre-drinking ^c , implementation intention condition – responded to intentions for safe pre-drinking; combined condition – completed both autonomy and implementation conditions; or control condition – no program condition. Pre-test and 4-week follow up surveys	117 university students completed follow up. Mean age 20.86 years.	No significant interaction effect between alcohol consumption during pre-drinking and: the autonomy condition ($P=0.77$); implementation condition ($P=0.49$); both conditions ($P=0.16$). Significant reduction in pre-drinking alcohol consumption from baseline to follow up in all groups	4 (1, 2, 8, 10)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			about own pre-drinking behaviours.		($P < 0.001$) – a reduction of 3.81 standard drinks.		
Hausheer et al. (2018)	2018	RCT	Randomised into e-CHUG only (30 minute web-based program with personalised feedback) or e-CHUG and parental program (parents received a brochure detailing underage drinking) or traditional school education (45-minute lecture about alcohol and drugs). All completed a pre-test survey and follow up at 3-months.	175 (85%) students completed 3-month follow up. Aged 13-16 years (mean age 14.33 years).	No significant main effect for drinking status in the e-CHUG group ($P = 0.41$) or the combination group ($P = 0.21$). Females showed a significant main effect in both the e-CHUG group ($P < 0.02$) and the combination group ($P < 0.01$) for drinking status compared to the traditional education group. No significant alteration for males' drinking status.	4 (1, 2, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Doumas and Haustveit (2008)	2008	RCT	e-Check Up to Go (e-CHUG) – 15 minute web based program with immediate personalised normative feedback. Web-based education control group. 6 week and 3 month follow up evaluations.	52 collegiate athletes, 18-20 years old	Reduced drinking associated with reductions in peer drinking perceptions ($P<0.001$) in the e-CHUG group compared to control. Post program alcohol consumption significantly reduced for high-risk students in the e-CHUG group compared to control ($P<0.05$) but not for low-risk students.	3 (2, 7, 8)	Group 1: Behaviour change only for some subgroups
Doumas and Andersen (2009)	2009	RCT	e-Check Up to Go (e-CHUG) – 15 minute web based program with immediate personalised normative feedback. Evaluation assessment only control group. 3	80 students, mean age 21 years.	Post program significant reductions in alcohol use for high-risk drinkers in e-CHUG ($P<0.05$) compared to control high-risk	3 (2, 7, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			month follow up evaluation.		drinkers. No significant difference between groups for low-risk drinkers ($P>0.05$).		
Riordan et al. (2015)	2015	RCT	Ecological Momentary Intervention using text messages with health and social consequences of alcohol. Intervention messages and assessment messages (report alcohol consumption on the previous day) sent to participants every day of their Orientation week activities. Assessment messages also sent once a week during their first academic semester. Assessment only control group.	130 first year undergraduate students.	No significant differences between intervention and control groups on alcohol consumption during Orientation week or first semester. Females in intervention group consumed significantly less alcohol during Orientation week ($p < .05$) and on weekends during the first semester ($p < .05$) than females in the control group.	2 (2, 8)	Group 1: Behaviour change only for some subgroups

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Kessler and Kurtz (2019)	2019	2-year longitudinal independent -samples pre-test/post-test design	Nursing students developed a binge drinking mass media campaign for university students. Educational posters with norms messages and laws were distributed online, on campus and in the student newspaper. Outdoor binge drinking themed displays in a student communal area were developed and photographs of these were placed on social media. Educational sessions also conducted to Greek-life students.	1011 university students (mean age 20.6 years) completed post-tests.	Significant decreases in rates of binge drinking at post-test compared to baseline ($p < .001$).	9 (2, 3, 4, 5, 6, 7, 8, 9, 10)	Group 1: Some reports of behaviour change
Thadani et al. (2009)	2009	Quasi-random controlled trial	HeadsUp Program – aimed to modify alcohol knowledge and behaviours through 2-hr group session comprised of skills training, normative feedback and motivational interviewing. Follow up	285 female first year college students. Mean age 17.93 years.	Alcohol knowledge significantly higher in program group post-test compared with control ($P < 0.001$). Participation in the program did not	7 (2, 3, 4, 6, 7, 8, 10)	Group 2: Attitudes and/or knowledge changes only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			evaluation at 6-months. Control group completed assessments and 30-minute sessions not involving discussions.		influence the recorded maximum number of drinks, number of drinks per week or heavy episodic drinking when compared to control.		
Haleem and Winters (2011)	2011	Cross-sectional study	Sociodrama addressing college student drinking. Students attended a performance during which, at planned pauses, they were encouraged to reflect on the scene. Production delivered on two nights and participants attended one of the two performances. Pre-test survey given before the show, post-test survey provided on conclusion of the production. No follow up. No control group.	79 college students aged 18-21 years.	Significant increase in commitment to use harm reduction techniques when consuming alcohol, such as pacing drinks one per hour ($P<0.001$), alternating non-alcoholic and alcoholic drinks ($P<0.01$) and adhering to a predetermined number of drinks ($P<0.001$).	7 (1, 2, 4, 6, 7, 8, 10)	Group 2: Attitudes and/or knowledge changes only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Reis et al. (2000)	2000	RCT	Alcohol 101 - one-off online alcohol education program utilizing a virtual campus. The participant navigates and 'experiences' the consequences of the choices they make during alcohol-related scenarios. Pre- and post-test questionnaires completed on the same day. Control participants received either alternative education or no alcohol education.	643 undergraduates. Mean age 18.7 years.	No significant difference between experimental and control participants on alcohol education measures at post-test. Alcohol-101 participants had significantly more specific knowledge about alcohol overdose ($P<0.05$) than control participants.	6 (1, 2, 4, 6, 7, 8)	Group 2: Attitudes and/or knowledge changes only
Paschall et al. (2006)	2006	RCT	'College Alc' - an online course (3 hrs) covering topics such as harm prevention and college alcohol use. 1 month follow up. Assessment only control group.	370 freshmen students Mean age 18.06 years.	No significant differences between the experimental and control group in alcohol use or heavy drinking. Small to moderate effects sizes (0.21-0.41) on knowledge of ($P<0.01$) and	6 (1, 2, 4, 6, 7, 8)	Group 2: Attitudes and/or knowledge changes only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Harrington et al. (1999)	1999	Independent measures	“Talking about Alcohol and Drugs...Among Greeks” – programs designed specifically for the on-campus residents referred to as the ‘Greek system’ in the USA. Protocol-driven presentations delivered in 8-hours. One year follow up evaluations. Assessment only control group.	780 fraternity and sorority members, mean age 20.5 years completed pre and post surveys.	attitudes to alcohol use ($P<0.01$) for the program condition compared to control. Program showed no influence on the following measures: alcohol consumption; changes in alcohol attitudes and/or its associated problems when compared to control. Decreases in positive attitudes towards alcohol consumption were greater amongst experimental participants ($P<0.05$) compared to control.	5 (1, 2, 3, 8, 9)	Group 2: Attitudes and/or knowledge changes only
Hallgren et al. (2011)	2011	RCT	PRIME for Life – A 2-day (10hr) risk reduction	734 high school	Short-term significant increase	5	Group 2: Attitudes

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			program with education and persuasion features. The program was based on theories that acknowledged the influence of biological, social and psychological elements on alcohol use. Age-matched control group had no program. Follow up evaluation at 5 and 20-months.	students aged 18-19 years.	for program participants on knowledge from baseline to 5-month follow up (effect size $d=0.81$), these effects reduced over time (i.e., to the 20-month follow up). No significant differences between groups for reducing high risk drinking ($P=0.43$).	(1, 2, 3, 4, 8)	and/or knowledge changes only
Doumas et al. (2017)	2017	RCT	e-Check Up to Go (e-CHUG) – 15 minute web based program with immediate personalised normative feedback which included information relating to quantity and frequency of alcohol use amongst their age group, calorie equivalent of alcohol and comparing	346 high school students, aged 15-18 years.	Females in the program group significantly decreased perceptions of peer drinking and beliefs about alcohol ($P<0.001$) compared to control. No significant	5 (1, 2, 7, 8, 10)	Group 2: Attitudes and/or knowledge changes only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			own data to normative statistics. A 4-6 week follow up evaluation. Assessment only control group.		influences for males ($P<0.99$). No difference between groups in protective behavioural strategies for alcohol use.		
Lalonde et al. (1997)	1997	Cohort study	Television, radio and storybook novellas with story lines relating to alcohol use. Aired locally and shown to school students in their classrooms. Program aired between May and October. Total time to complete pre-survey, program and post-survey was 25 days. No control group.	Hispanic adolescents in the USA. 642 completed pre-surveys, 646 completed post-surveys. 273 interviews with youth. Participants aged 11-19 years.	Small but significant improvement in alcohol attitudes for females ($P=0.04$). No other significant changes or willingness to discuss an alcohol problem with family, friends or counsellor.	4 (1, 2, 6, 8)	Group 2: Attitudes and/or knowledge changes only
Croom et al. (2009)	2009	Randomised trial	AlcoholEdu for College – online interactive alcohol education course. One-off	1,906 incoming freshmen.	Program group demonstrated higher alcohol	4 (2, 4, 8, 10)	Group 2: Attitudes and/or

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			course with exam at the end. Follow up evaluation after 4-6 weeks. Assessment only control group.	19% aged 17 years, 75% aged 18 years 6% aged 19+ years	knowledge ($P<0.001$), but no significant behavioural differences reported between groups.		knowledge changes only
Doumas et al. (2014a)	2014	Quasi-experimental ¹	e-Check Up to Go (e-CHUG) – 15 minute web based program with immediate personalised normative feedback. Follow up evaluation at 3 and 6 months. Control group received the usual alcohol and drug education.	410 high school students aged 13-16 years.	At follow up, program group significantly reduced their expectancies of positive alcohol effects ($P<0.01$). Control group had a significantly greater increase in positive beliefs about alcohol ($P<0.01$). No significant differences for weekly drinking.	4 (1, 2, 7, 8)	Group 2: Attitudes and/or knowledge changes only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Wood et al. (2009)	2009	Quasi-experimental	‘Common Ground’ – environmental management and media program run for three years. Informed students about initiatives and laws and promoted on-campus programs such as a safe ride program and workshops. Sampled participants using 30-minute phone surveys. No control group.	Full time undergraduate students sampled over 3 years (sample size not reported). Mean age 19.9 years.	Significant increase in students’ awareness of alcohol control efforts ($P<0.001$), and a decrease in perceptions of student alcohol use at parties ($P<0.001$). Large reductions in police disturbance complaints. No influence on personal use or impaired driving.	3 (2, 8, 10)	Group 2: Attitudes and/or knowledge changes only
McCarty et al. (1983)	1983	Quasi-experimental	Direct mail program. Letter sent to participants living in university residence, which gave the answers to the survey and provided tips to assess if someone is too drunk to drive. Surveyed at the beginning and the end of the semester. Control	176 males, predominantly first year students.	Significant increase in some alcohol-related knowledge for both control and program groups ($P<0.001$). No significant differences on alcohol use.	2 (2, 8)	Group 2: Attitudes and/or knowledge changes only

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Lane et al. (2012) ^d	2012	RCT	<p>group received a letter about the alcohol use in the residence area and the reasons for prevention programs.</p> <p>Comparison of e-Check Up to Go (e-CHUG) or participants assigned to a peer-led self-management skills training program, or assessment only control group. e-CHUG was a 90 minute online program with immediate personalized feedback. Self-management program was a 90-minute session and included: a discussion of the effects of alcohol; BAC calculation; and consumption goal setting. Self-reports on alcohol use for the following 5 weeks.</p>	103 first year college students. Mean age 18 years.	No significant influence of condition on alcohol use. Heavier drinkers benefitted more from e-CHUG, lighter drinkers benefitted more from the self-management session.	<p>Self-management 5 (2, 3, 4, 8, 9)</p> <p>e-CHUG 4 (1, 2, 7, 8)</p>	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Bremberg and Arborelius (1994)	1994	Quasi-experimental	‘It’s your decision’ – small group discussions with individual counselling. Included 6 x 1-hour sessions: 3 were group sessions, and 3 were individual sessions. Assessment only control group.	108 students, aged 16 years.	No changes found following the program.	5 (1, 2, 4, 5, 8)	Group 3: No change
Murphy et al. (2001)	2001	RCT	BASICS – 1 x 50-minute individual Brief Motivational Interviewing session relating to alcohol use. Tailored program to individual need of participants. 3 and 9-month follow up. Assessment only control group.	84 college students. Mean age 19.60 years.	BASICS participants presented greater reduction in drinks per week than control at 3-months ($P \leq 0.05$). No significant differences between groups at 9-month follow up.	5 (2, 4, 6, 7, 8)	Group 3: No change
Peleg et al. (2001)	2001	Quasi-experimental	A 3-day alcohol misuse prevention program. Included: workshops; lectures; and role-plays. 1 and 2-year post-	1,000 10 th grade students aged 15-16 years.	Control group had significantly higher alcohol use than program group at both post-tests	5 (1, 2, 4, 6, 8)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			assessment follow up. Assessment only control group.	760 completed 2 year follow up.	($P<0.001$). Control group spirit use rose significantly at both post-tests ($P<0.001$) while spirit use stayed the same in the program group.		
Hallgren et al. (2009)	2009	Quasi-experimental 1	PRIME for Life – A 2-day (10hr) risk reduction program with education and persuasion features. The program was based on theories that acknowledged the influence of biological, social and psychological elements on alcohol use. Age-matched control group had no program. Follow up evaluation at 5 and 20-months.	872 male military conscripts. 18-22 years old.	Improved attitudes after five months, but returned to baseline at 20-month follow up. No significant long-term reductions in alcohol use, binge drinking or attitudes.	5 (1, 2, 4, 7, 8)	Group 3: No change
Zamboanga et al. (2019)	2019	RCT	Web-based alcohol intervention ‘myPlaybook’ which	2449 college athletes (41%	No effect of the intervention was recorded on	5 (2, 4, 5, 6, 8)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			targets social norms, alcohol expectancies and protective behavioural strategies among college athletes. Delivered through 3 x 12 minute sessions using personalised feedback and quizzes, animations. 1 and 4 month follow-up assessment. Control group received access to introduction lesson only and assessments.	female), mean age 18.8 years.	avoidance of drinking games or 'pregaming' (drinking before a drinking event).		
Werch et al. (2000)	2000	RCT	Psycho-educational prevention program. Students received three greetings cards over one semester with information about alcohol use and binge drinking. 1-month follow up with a 20-minute phone survey. Control received usual prevention program.	634 students. Mean age 18.1 years.	No significant differences for alcohol use or risk measures – reported results remained the same in both groups or worsened.	4 (3, 7, 8, 9)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Gmel et al. (2012)	2012	Quasi-experimental	Group sessions (2 x 45 mins) based on Motivational Interviewing to reduce alcohol use. Discussions included: defining the issue of alcohol use; drinking behaviours, and; drinking advice. 6-month follow up assessment. Assessment only control group.	668 secondary school students. Mean age 16.9 years for program and 17.5 years for control.	No significant change on RSOD, drinks per week or maximum drinks on one occasion.	4 (2, 4, 8, 10)	Group 3: No change
Doumas et al. (2014b) 6 month follow up of Doumas, Esp, et al (2014)	2014	Quasi-experimental	e-Check Up to Go (e-CHUG) – 15 minute web based program with immediate personalised normative feedback. Follow up assessment at 6 months. Control group received usual alcohol and drug education.	358 high school students aged 13-16 years.	No significant difference in alcohol consumption ($P=0.32$) or alcohol related consequences ($P=0.94$) between the control or program group at follow up.	4 (1, 2, 7, 8)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Palfai et al. (2014)	2014	RCT	Web-based personalised feedback based on responses to alcohol-related questions. One-off 15-minute program. Control group received other feedback such as for nutrition and sleep.	705 first year college students Mean age 18.21 years.	No significant influence of program on heavy drinking episodes or alcohol-related consequences compared to control.	4 (2, 7, 8, 10)	Group 3: No change
McKay and Dunn (2015)	2015	Cohort study	Western Alcohol Reduction Program – community involvement in a school-based program delivered over one day. Sessions included: presentations; a DVD; talks from medical staff; and interactive activities. No control group. One-month post-test.	78 students completed post-test, mean age 15.4 years.	No significant differences in alcohol use, experiences of alcohol-related harm or awareness of risk behaviours.	4 (2, 4, 5, 7)	Group 3: No change
Brannon and Pilling (2005)	2005	RCT	Three public service announcements targeting college-drinking customs. Participants exposed to one of the announcement for four minutes. Three	133 undergraduate students, aged 18-20 years.	The only public service announcement that significantly reduced drinking intentions ($P<0.04$),	3 (1, 2, 7)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			announcements were used, these were: promoting alternative drinking behaviour; encouraging a drinking buddy to monitor consumption; awareness of the negative habit of escapist behaviour through alcohol. Immediate survey post-test about their thoughts on the messages and their own drinking habits. Control group received no message.		for the experimental group compared to the control group, was the 'order message' that promoted alternative drinking behaviours.		
Geshi et al. (2007)	2007	RCT	Alcohol health education session for 90-minutes that included demonstrations, videos and lecture. 2 month follow up survey. Control group received education relating to smoking.	71 junior female college students, aged 18-24 years.	Alcohol awareness significantly increased for the program group compared to control ($P<0.04$). No significant differences between groups for knowledge, drinking frequency or quantity.	3 (2, 4, 8)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
Bewick et al. (2010)	2010	RCT	Unitcheck - Web based personalised feedback and social norms program. Access to the online program material for six weeks. Four follow up assessments over 24 weeks. Participants assigned to immediate or delayed program groups or assessment only control group.	293 University students completed whole study. Mean age 21.45 years.	Alcohol consumption decreased over time in program groups compared to control group ($P<0.01$) but findings were not consistent across all program groups ($P=0.24$).	3 (2, 7, 8)	Group 3: No change
Gilbertson (2018)	2018	RCT	Alcohol-Wise – personalized web-based alcohol program. Provided personal information relating to alcohol use and given specific feedback. Control – participants put on a waiting list to receive the program. Random allocation to program or control group, with follow up surveys at 10- and 24-weeks post program. Survey questions	167 (82%) first year students. Mean age 18.02 years.	At 10 week follow up, no significant difference between the groups on alcohol consequences ($P=0.05$), consumption and expectancies ($P>0.05$). At 24 week follow up program participants gained higher grade-point	3 (2, 7, 8)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
			about alcohol consumption and alcohol consequences.		averages than control ($P=0.02$). No significant difference between groups on alcohol measures ($P>0.05$ in all cases).		
Jewell and Hupp (2005)	2005	RCT	Use of Fatal Vision Goggles to influence attitude towards drunk driving. Four groups of participants: the experimental group wore the goggles and performed sobriety tests; one control group watched an unrelated video; one group watched a drunk driving video and; one group were the audience for the experimental group. One-off program with 4-week follow up.	251 college students. Mean age 19.5 years old.	No significant effects of using the goggles or watching others use them on alcohol use or behaviours at the 4-week follow up. Attitudes significantly changed about drunk driving at immediate post-test, but disappeared at the 4-week follow up.	2 (2, 4)	Group 3: No change

Reference	Date	Study design ^a	Program details	Sample size and age	Summary of results	Quality score / 10 (criteria included)	Group
van Leeuwen et al. (2013)	2013	Non-experimental between-subjects study	Televised education entertainment program entitled 'Roes'. Eleven single story episodes focused mainly on alcohol and its risks. Pre-test, program and post-test over 4-month period. 1-year follow up survey. No control group.	282 Dutch youth, mean age 16 years.	Significant short-term changes in alcohol use and intentions to decrease use ($P<0.01$). Viewing the episodes did not predict these changes. At the one-year follow up, those that viewed the program and were less educated were significantly more likely to intend to reduce alcohol use ($P<0.01$). No other long-term impacts observed.	1 (2)	Group 3: No change

^a Study design is as described by the authors of the articles.

^b Hustad et al (2010) analysed two separate programs within their article and these have been reported separately for this review.

^c Pre-drinking is defined as consuming alcohol prior to an event that often continues alcohol consumption (Wells et al., 2008).

^d Lane et al (2012) analysed two separate programs within their article and these have been reported separately for this review.

Appendix D

Publication Two

**Published peer-reviewed paper: Alcohol-Focused Drowning Prevention Campaigns:
What Do We Know and What Should We Do Now?**

This Appendix entry is the version of record of the Program Audit which was presented in this thesis in Chapter Three, Section Three. This research was published in peer-reviewed literature, with the reference:

Calverley, H., Petrass, L., & Blitvich, J. (2020). Alcohol-focused drowning prevention campaigns: What do we know and what should we do now?

International Journal of Aquatic Research and Education, 2(2).

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4-15-2020

Alcohol_Focused Drowning Prevention Campaigns: What Do We Know and What Should We Do Now?

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Alcohol_Focused Drowning Prevention Campaigns: What Do We Know and What Should We Do Now?

Cover Page Footnote

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Abstract

Alcohol and drugs have been identified as key risk factors for youth (aged 15-24 years) and adult drownings in high-income countries (HIC). Whilst alcohol specific drowning prevention education programs have been developed and implemented, youth continue to be over-represented in drowning statistics, including those linked with alcohol. Therefore, this project aimed to: (i) review and assess all alcohol themed drowning prevention campaigns within HICs; (ii) determine whether the campaign had undergone evaluation for effectiveness; and (iii) provide recommendations to improve the effectiveness of future interventions. For each of the eighty-one HICs identified for the 2019 fiscal year, searches of peer-reviewed literature (through academic databases) and grey literature (through webpages and emails to organisations) were conducted. Twelve alcohol focused campaigns were identified, with only two providing limited information about program evaluation. For most campaigns identified, there was a dearth of information available and therefore assessment of campaign quality was unfeasible. This brief report highlights a lack of alcohol themed drowning prevention campaigns in HIC, and an absence of evaluations on their effectiveness. Implications associated with a lack of program evaluation are discussed and adoption of the recommendations from this brief report should enhance the quality of future research in this area.

Keywords: alcohol, drowning prevention, campaigns, program evaluation

Introduction

In High Income Countries (HIC), drowning is one of the top five causes of death for people aged 1 month to 24 years, with over 17% of all drownings in these nations involving this age group (World Health Organisation, 2014). To date, research has typically focused on identifying the overall drowning problem, and the implementation and evaluation of drowning prevention strategies for children aged under five years (for example Leavy et al., 2016), however there remains a lack of understanding of how best to prevent drowning in the later age groups.

Risk factors for youth drowning are dependent on several variables, including: age; gender; aquatic location; country of residence; and frequency of exposure to aquatic settings (Quan, 2014). Alcohol and drug use has been identified as a key risk factor, influencing 25-50% of drownings amongst youth (aged 15-24 years) and adults (Howland & Hingson, 1988; Quan, 2014; Quan & Cummings, 2003). In the UK between 2013-2017, 451 drowning fatalities were found to have involved alcohol and/or drugs: representing 29% of all unintentional drownings (Royal Life Saving Society UK, 2018). In Australia, alcohol was shown to be involved in 21% of all fatal drownings (Royal Life Saving Australia, 2018a), and 24% of all male drownings, with 67% of males who tested positive for alcohol recording a blood alcohol concentration of greater than 0.05% (Royal Life Saving Australia, 2018a). Despite the

development and implementation of alcohol specific drowning prevention programs in HICs, young people continue to be over-represented in drowning statistics, including those with alcohol involvement.

When analysing effective methods to deliver health education to young people, previous research has indicated variable success of media, including social marketing media campaigns (Glider et al., 2001) and public service announcements (Brannon & Pilling, 2005) to incite behaviour change. Previous publications have indicated that for a youth alcohol education campaign to be successful, it should comprise several elements, including: a theoretical underpinning; specificity to the target group, including culturally and context sensitive and developmentally appropriate information; comprehensive interactive training for the program providers; interactive and multicomponent delivery, including peer leaders; skills training for high pressure situations involving alcohol; provision of information relating to peer behaviours and social norms; and effective resources to reinforce prevention messages (Cuijpers, 2002; Foxcroft et al., 2002; Pentz, 2003; Thom, 2017). However, it is unclear if any alcohol themed drowning prevention campaigns align with such recommendations for effective practice.

No peer-reviewed literature is available on the evaluation and/or effectiveness of alcohol influenced drowning campaigns (Quan et al., 2008; Ramos et al., 2015). It is important to note that not all published research appears in peer-reviewed publications, with grey literature also providing an avenue for disseminating research of potential high quality (Bailin & Grafstein, 2010): however, the quality can vary considerably as it does not undergo a peer review process. Further, as grey literature may be distributed privately within organisations, or published outside the traditional academic publishing channels, searching is more time consuming and information can be difficult to discover and access (Osayande & Ukpebor, 2012).

Therefore, the primary aim of this paper was to search comprehensively both the peer-reviewed and grey literature to (1) identify all available information about alcohol themed drowning prevention campaigns in HIC; (2) identify and assess the information provided to the targeted groups to maximise the likelihood of success; and (3) identify whether campaigns had undergone evaluation for effectiveness. Finally, the paper provides recommendations to improve practice, with the explicit goal of enhancing the effectiveness of future interventions.

Method

A comprehensive search was conducted for literature on alcohol-focused drowning prevention campaigns in HIC. A list of HIC were identified from The World Bank Group (2018) for the 2019 fiscal year, and for the purpose of this study, drowning campaigns were defined as campaigns or information made

available with a direct focus of preventing death by drowning. The inclusion criteria required campaigns to specifically focus on the role of alcohol in drowning and heavily incorporate this within the prevention and education messages. Campaigns were excluded if their prevention messages did not provide details about alcohol and its involvement in drowning risk. The age focus of the campaigns were recorded to identify commonly targeted age groups, but no age restrictions were applied within the inclusion criteria due to the infrequency of alcohol themed drowning prevention programs.

Search Strategy

The search strategy logic is outlined in Figure 1. We began by reviewing drowning prevention webpages for each of the identified HIC and used The International Life Saving Federation (2018) Member Federations webpage to assist in finding websites for drowning prevention and/or lifesaving groups and organisations within each of the 81 HIC. Where a webpage was provided and accessible, if necessary, it was translated into English, and searched for references to ‘alcohol’ or equivalent. If no page was listed, the country, along with the terms “drowning prevention” and/or “water safety”, were searched using Google. All identified and relevant webpages were searched for references to ‘alcohol’ or the equivalent translation. If no relevant sites were found, the country was referred to as ‘unable to find information’ (n=23). In total 71 websites were analysed and records on these pages were reviewed from the earliest available through to 1st November, 2018.

Academic databases were also comprehensively searched for any peer-reviewed literature containing information relating to alcohol themed drowning prevention campaigns and evaluations. PsycINFO; PubMed; Scopus; CINAHL; SPORTDiscus; ScienceDirect; Medline; Cochrane Library; and Web of Science databases were searched from the earliest records available to the 1st November, 2018. These databases were selected as they have been used previously to inform drowning prevention systematic reviews (Hamilton et al., 2018; Peden et al., 2016). Search terms included combinations of the following: “alcohol”; “drowning”; “campaign”; “initiative”; “program”; “prevention”. The social media platform ‘Twitter’ and the Google and Google Scholar search engines were also explored using the same terms, for references or promotional material for any alcohol focused drowning prevention programs.

Email addresses (n=65) for relevant drowning prevention organisations in 49 countries were identified through some of the analysed websites, and these were used to request information relating to alcohol themed drowning prevention campaigns or information within the respective country. Four emails rebounded due to a fault in the advertised email address. Five organisations responded; four stated there were no relevant campaigns or materials, and one provided appropriate information. After one month, follow-up emails were sent to organisations in the 40 countries that had not responded. This resulted in a

further seven responses, four stated no relevant campaigns existed, and three provided information relating to appropriate campaigns or relevant promotional material.

Subsequent analysis excluded ten of the retrieved campaigns or references based on: insufficient detail being available that confirmed alcohol was a significant part of the campaign; and/or webpage references to alcohol were inappropriate to be referred to as a 'prevention message' due to an inadequate level of information provided about the risks of combining alcohol and aquatic activity. A total of 12 campaigns were reviewed and assessed on the level of information available about alcohol and water safety, the group the information targeted and any evaluation on its effectiveness.

Results and Discussion

Following extensive searching through various methods, 12 campaigns, relevant materials or information were retrieved from five predominantly English-speaking Western nations (Table 1). As alcohol use is related to cultural norms (Brown et al., 2001; Patock-Peckham et al., 1998) and legal restrictions (Moller, 2002), it was acknowledged this may explain the lack of alcohol specific campaigns in some nations. For example, there is a strong Muslim culture in Brunei and alcohol is prohibited (GOV.UK, 2018), consequently this nation is unlikely to produce alcohol themed campaigns.

The majority of the campaigns and information was aimed at targeting the public about the risks of combining alcohol and aquatic activity and how to keep safe around water, however there was considerable variation in the level of detail available (Table 1). Due to this lack of information and the small number of campaigns retrieved, the aim to assess the programs against pre-determined criteria to maximise success was unable to be fulfilled. As alcohol influenced drownings are prominent amongst young people in all HIC (World Health Organisation, 2014), it is concerning that so few prevention campaigns were discovered in this audit. Of further concern, evidence of program evaluation was available or provided for only two campaigns, hence the effectiveness of campaigns is unknown. None of the three campaigns that focused on young people provided any evaluation of effectiveness.

Figure 1. Search strategy for identifying alcohol themed drowning prevention campaigns.

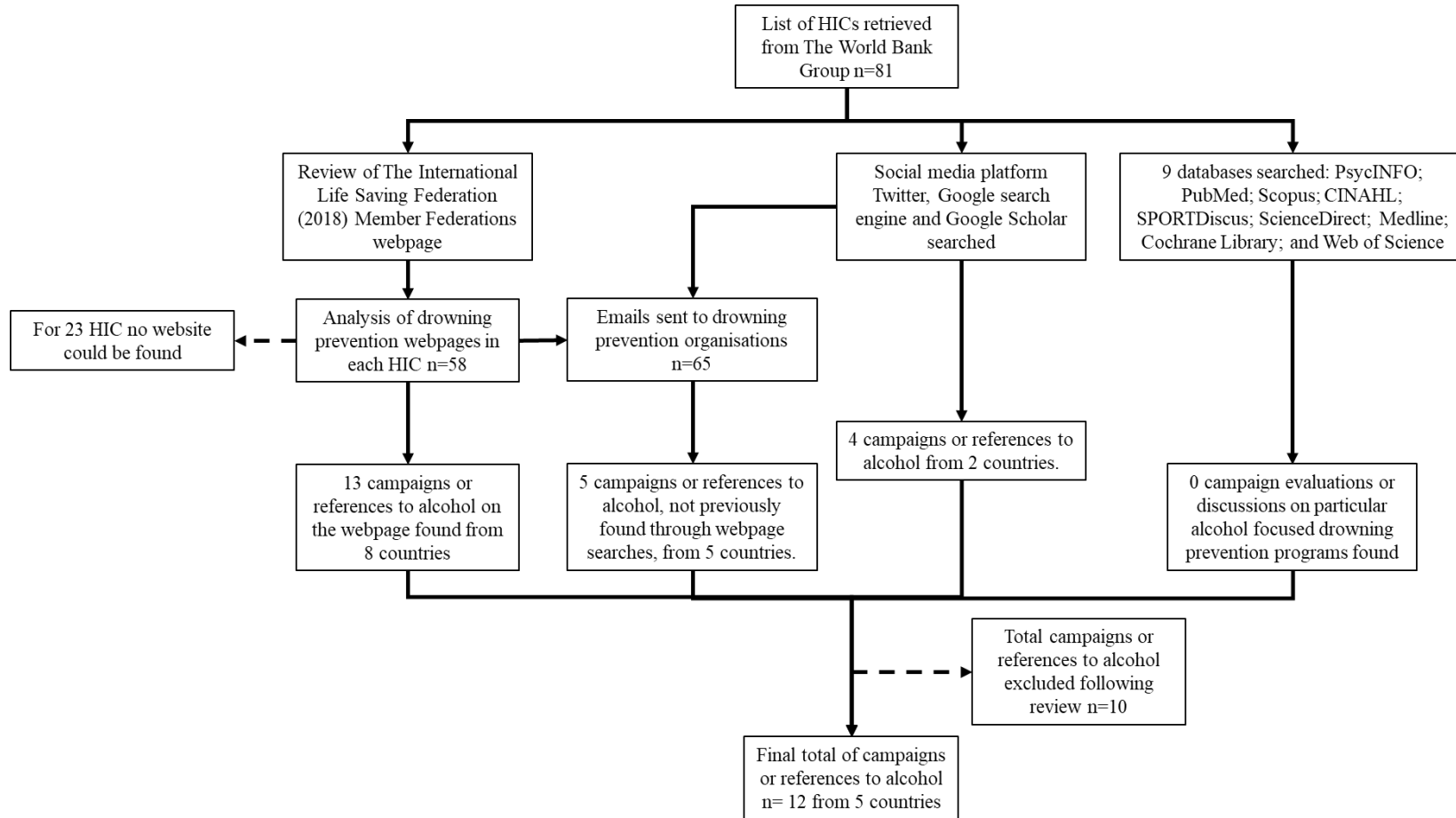


Table 1

Alcohol-focused drowning prevention campaigns and general information provided in High Income Countries (HIC).

Country	Campaign/s, program/s and any other relevant material	Details	Evidence of evaluatio
Australia	Sinkers #DontDrinkAndSink Royal Life Saving Australia (2018e)	Focused on young people and their alcohol use around water using celebrity endorsement. The campaign had videos of celebrities drinking from premixed cans of alcohol which were called, for example, 'Vodka and Sea Water'. They then spat out the contents and the campaign message followed 'Drinking and swimming don't mix'.	No
	Don't let your mates drink and drown – focused on all ages but mainly men Royal Life Saving Australia (2018b)	Mainly focused on men aged 25-34 and informing them to look out for their mates around water. Messages encouraged men to stand up against risk taking behaviour around water, including alcohol consumption. The campaign encouraged men to 'Be like Dave' who is a fictional risk aware character and is the face of the campaign.	No
	Respect the River Royal Life Saving Australia (2018d)	Targeted all river users and informed about the dangers of inland waterways, including alcohol use around the river. This campaign followed research that indicated Australian rivers as a prime location for drownings.	No
	Swim safe swim sober Royal Life Saving New South Wales (2013)	An online program for school leavers in New South Wales, encouraged them not to drink alcohol and swim. The program was provided through secondary schools and was described as 'an innovative online education experience' (Royal Life Saving Australia, 2013).	No
	Play it safe by the water Victoria State Government & Life Saving Victoria (2019)	A campaign throughout the state of Victoria. The aspect of this campaign relevant to alcohol focused on men and informing them of the risks of alcohol consumption in, on and around water. The campaign linked to messages from 'Don't let your mates drink and drown' and recommended standing up to friends who want to swim after drinking.	No
Canada	Operation Dry Water	Targeted boat users and encouraged them to learn the legal blood alcohol limits of driving a boat. The campaign also increased enforcement on	Yes

	National Association of State Boating Law Administrators (2019)	waterways over public holidays to monitor intoxicated boat users and publicised messages about alcohol awareness leading up to those days.	
	Boat Sober Lifesaving Society (obtained through personal)	Targeted boat users and encouraged them to learn the legal blood alcohol limits of driving a boat. This campaign also included information about the effect of other recreational drugs on ability to drive a boat.	Yes
Ireland	Beer mats with alcohol drowning messages Irish Water Safety (obtained through personal)	Targeted people drinking in bars or pubs informing them of the dangers of alcohol use and aquatic activity. The beer mats contained statistics about drownings in Ireland, the risks of alcohol and swimming, and encouraged lifejacket use and learning swimming and lifesaving skills.	No
New Zealand	The Swim Reaper Water Safety New Zealand (2019)	Social Media campaign targeting young people, particularly males, with a caption of 'swim dumb and you're done' (Water Safety New Zealand, 2019). The campaign involved pictures of the Grim Reaper in different aquatic settings and posting comments on social media encouraging young people to be foolish by, for example, swimming whilst intoxicated.	No
United Kingdom	Don't drink and drown Royal Life Saving Society UK (2018)	Targeted drinkers of all ages and informed them of the dangers of combining alcohol and aquatic activity as well as walking near water when intoxicated. This campaign followed a sequence of student drownings, therefore targeted young people with some of the messages and videos.	No
	#Safe_And_Dry Kent Search and Rescue (2019)	Targeted drinkers of all ages and informed them of the dangers of combining alcohol and aquatic activity as well as walking near water when intoxicated. One feature of the campaign included promoting to people going on nights out to stay away from the river.	No
	Be Water Aware National Fire Chiefs Council (2018)	Targeted runners and walkers, drinkers and people away from home. Activities conducted through fire and rescue services. Of particular prominence was encouraging people to be vigilant whilst on holiday and in unfamiliar surroundings.	No

In the current analysis, campaigns conducted in Australia and Canada contained the greatest level of detail. Canadian and Australian agencies (Royal Life Saving Australia and the Life Saving Society) also provided information about press releases and webpages detailing several of the programs. Within the designated time period, Canada was the only country that provided, via email, an unpublished evaluation of one of the campaigns relating to boating safety and the messages it was promoting. The evaluation considered the percentage of those questioned who recalled advertised safety messages, their reactions to the campaigns, and compared these statistics to previous years. However, the evaluation lacked rigour in that they did not detail the level of evaluation that was conducted, for example how many participants were contacted, the time between the program being publicised and the evaluation taking place, and any qualitative results. Therefore, the scant information provided in the evaluation did not strongly support the claims made of the program's success.

For Australia, through the Royal Life Saving Australia website, yearly drowning reports provide descriptive statistics, including the role of alcohol, and compare these rates to previous years (Royal Life Saving Australia, 2018c). Further, there are numerous evaluation reports which have appraised certain campaigns and messages provided to the Australian public (Royal Life Saving Australia, 2018c). On review, three of these reports detailed alcohol use and drowning risk amongst the target groups, such as the New South Wales Grey Medallion program evaluation report which detailed that those surveyed identified alcohol as a high risk factor for drowning in their age group (Royal Life Saving Society - New South Wales, 2014). However, no reports solely focused on evaluating any of the country's alcohol themed drowning prevention programs.

Program evaluation can occur at different times for different purposes (Green & Kreuter, 2005). For example, evaluation should occur in the diagnostic and implementation phases to document program fidelity (Helitzer & Yoon, 2002) and ensure programs are making a positive difference (Posavac, 2015). Also, program evaluation at these stages typically entails assessment of program delivery and uptake to enable appropriate amendments if implementation quality reduced (Helitzer & Yoon, 2002). Further evaluation should also be conducted in the follow-up phases of the program, to monitor how it is received and ensure the organisation can remain aware of its progress in changing behaviours and facilitate prompt action to correct any arising issues as they occur.

The lack of program evaluation evident within the results of this study is of concern as questions remain unanswered about: how well each of the drowning prevention programs met their stated objectives; the impact on the participants and the community as a whole; and whether there were any planning and implementation issues. This lack of evaluation also inhibits the

repeatability of the programs as details of the development, implementation and execution are lacking and therefore future attempts at delivering similar campaigns will be unable to build from the efforts previously undertaken.

Recommendations for Effective Intervention and Future Research

The findings of this audit clearly demonstrate that the effectiveness of current alcohol focussed drowning prevention campaigns is largely unknown, as intervention details are lacking and program evaluation is largely absent. For best practice and to support effective program outcomes, sound program design, incorporating thorough, evidence-based planning, along with process, impact and outcome evaluation, is required ((Green & Kreuter, 2005; Helitzer & Yoon, 2002; Posavac, 2015); or other relevant sources). To address the evaluation vacuum, it is recommended that organisations allocate time and resources to program evaluation at each stage of program delivery: prior to program commencement to provide a baseline; during program delivery, to enable any necessary amendments if required; immediately post evaluation to confirm whether change has actually occurred; and at a time period after the implementation, to determine the long-term effect of the program. Effective evaluation is a cost that needs to be considered at the planning stage, and funding applications should ensure that sufficient resources are requested for this purpose.

It is also important that practitioners and researchers share both their programs and the evaluations of these. The generation of publicly available reports and/or peer-reviewed publications containing this information, i.e. the development and implementation of drowning prevention programs and the results of evaluations, will contribute to increased program quality. Further, such results and publications could be used to highlight the importance of evaluation and advocate for the expansion and/or continuation of the program.

Research is also required to provide an evidence base to underpin future campaigns that investigate youth attitudes, perceptions, knowledge and influencers on behavioural practices relating to alcohol use in aquatic settings. The Royal Life Saving Society Australia highlights this, calling for more thorough research of drowning risk factors, such as alcohol, along with behavioural research into the decision making processes of at-risk groups to aid in the development of evidence-based prevention programs (Mahony & Peden, 2016). Doing so would ensure that campaigns were current and targeted the cause of the problem instead of analysing drowning statistics and promoting unevaluated and unsupported programs.

Conclusions

Despite previous reports calling for more campaigns and research focused on youth alcohol use in aquatic contexts (Clemens et al., 2016; Peden et al., 2017), this work highlights a substantial lack of such campaigns in all HIC, as well as

an absence of any evaluations of program effectiveness. Bringing program evaluation and behavioural research to the forefront of drowning prevention practice and disseminating this information widely should enable both researchers and practitioners to build on previous work and enhance the progress in the prevention of alcohol influenced youth drownings.

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Appendix E

Quantitative Project Survey

This Appendix presents the survey from the quantitative project of this PhD discussed in Chapter Four Section One. Both the United Kingdom and Australian versions are provided and labelled. If reading digitally, the following link will transfer the viewer back to the quantitative methodology section: [Quantitative Methodology](#).

Australian Version

To be able to identify your data should you wish to withdraw please enter the following information as a code in the text box; **your birth year as four numbers followed by the first four letters of your mother’s maiden name.**

For example if you were born in 1995 and your mother’s maiden name is Smith, your code will be 1995SMIT.

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Date of birth (dd/mm/yyyy)</p> <p>_____</p> <p>2. Gender</p> <p>a. Male</p> <p>b. Female</p> <p>c. Other</p> <p>d. Prefer not to say</p> <p>3. What is your nationality?</p> <p>_____</p> <p>4. Do you identify as Aboriginal or Torres Strait Islander?</p> <p>a. Yes</p> <p>b. No</p> <p>5. In which country did you receive most of your education?</p> <p>a. Australia</p> <p>b. UK</p> <p>6. Current residential postcode:</p> <p>_____</p> | <p>7. Postcode of where you spent most of your childhood (childhood defined as up to 18 years old):</p> <p>_____</p> <p>8. What is your employment status?</p> <p>a. Full-time</p> <p>b. Part-time</p> <p>c. Casual</p> <p>d. Student</p> <p>e. Not currently employed</p> <p>f. Other (please provide details)</p> <p>9. What is your highest level of education? If you are still in education, please indicate the level you are working at. If you are no longer in education, please indicate the highest level you achieved.</p> <p>a. Primary School</p> <p>b. Secondary School</p> <p>c. Vocational/ Trade/ Diploma Certificate</p> <p>d. Undergraduate Degree</p> <p>e. Post-Graduate Degree</p> |
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10. How confident are you in your ability to swim?

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

For the following questions, please indicate how confident you are in your ability to successfully deal with each aquatic situation

11. You are wearing street clothes whilst walking along a river bank where the river is flowing quickly and you accidentally fall in

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

12. You fall into the deep end (1.8m) of the local swimming pool

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

13. You are walking on coastal rocks and a wave knocks you into deep, rough water (waves 1m)

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

14. How many laps of a 25m swimming pool can you currently swim, using any stroke, without stopping or touching the bottom?

- a. Cannot swim
- b. Up to 1 lap (less than 25m)
- c. 1-4 laps (25m up to 100m)
- d. 5-8 laps (125m up to 200m)
- e. 9-12 laps (225m up to 300m)
- f. 13-16 laps (325m up to 400m)
- g. More than 16 laps (more than 400m)

15. Have you ever participated in aquatic activities after consuming alcohol?

- a. Yes
- b. No

If you answered 'Yes' to question 15, please move to questions 16 and 17. If you answered 'No', please move to question 18.

16. Approximately how old were you when you first consumed alcohol and participated in aquatic activities? _____

17. On this occasion who were you with (select all that apply)?

- a. Friends
- b. Parents
- c. Siblings
- d. Extended family (i.e aunt(s)/uncle(s); cousins; grandparents)
- e. Alone
- f. Other people (please give details) _____

18. Do you have any of the following aquatic qualifications? Please tick all qualifications that you hold which are **current**:

- a. Pool Lifeguard – e.g. training and qualification

- b. Beach Lifeguard – e.g. training and qualification
 - c. Swimming Teacher/Instructor – e.g. AUSTSWIM or the Swimming Teachers' Association.
 - d. Life Saving Qualification – e.g. bronze medallion
 - e. Other qualification (please provide as much detail as possible)
 - f. No current qualification/s
- 19.** Which of these qualifications also involved education about the effects of alcohol on water safety? Please tick all that apply
- a. Pool Lifeguard – e.g. training and qualification
 - b. Beach Lifeguard – e.g. training and qualification
 - c. Swimming Teacher/Instructor – e.g. AUSTSWIM or the Swimming Teachers' Association.
 - d. Life Saving Qualification – e.g. bronze medallion
 - e. Other qualification (please provide as much detail as possible)
 - f. No current qualification/s
- 20.** Have you received water safety education in any of the following settings (please select all that apply)?
- a. Private swimming lessons
 - b. Primary school education – such as classroom discussions on water safety
 - c. Primary school swimming lessons
 - d. Secondary school education – such as through Physical Education, Sport or Health classes, camps, or classroom discussions about water safety
 - e. Secondary school swimming lessons
 - f. University education – such as Physical Education, Sport or Health courses
 - g. Life Saving organisations
 - h. Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online
 - i. External organisations such as those providing education at carnivals, fetes or events
 - j. Other (please provide as much detail as possible)
 - k. No previous education about water safety
- 21.** Please indicate if any of the following included education about the effects of alcohol on water safety (please select all that apply).
- a. Private swimming lessons
 - b. Primary school education – such as classroom discussions on water safety
 - c. Primary school swimming lessons
 - d. Secondary school education – such as through Physical Education, Sport or Health classes, camps, or classroom discussions about water safety
 - e. Secondary school swimming lessons
 - f. University education – such as Physical Education, Sport or Health courses
 - g. Life Saving organisations

- h. Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online
- i. External organisations such as those providing education at carnivals, fetes or events
- j. Other (please provide as much detail as possible)
- k. No previous education about water safety

22. Please indicate your level of agreement to each of the following statements

a. It is safe for me to swim in open water, such as lakes, rivers and the sea, after consuming 1-2 alcoholic drinks	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. It is safe for me to swim in public swimming pools after consuming 1-2 alcoholic drinks	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. Consuming alcoholic drinks in and around a private pool is safe as long as everyone can touch the bottom	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
d. It is OK for me to be in and on the water after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
e. It is OK for me to be around the water after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
f. It is OK for me to participate in aquatic activities after consuming alcohol if one person remains sober	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
g. The likelihood (i.e. risk) of me being harmed when participating in aquatic activities is increased if I have consumed alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
h. I think about the consequences of drinking alcohol before going to an aquatic location to drink	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
i. Drinking alcohol makes aquatic activities more fun for me	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
j. It is safe for me to get drunk in aquatic settings	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
k. I am confident in my knowledge about how alcohol could impact my safety when involved in aquatic activities	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

23. Please indicate how risky you believe it would be for you to drink alcohol and participate in aquatic activities in the following contexts

a. Patrolled beach (with lifeguards/lifesavers) e.g. surfing,	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
---------------------------------------------------------------	-----------------	-------------	---------	----------------	------------------

swimming, wading, paddling, fishing					
b. Unpatrolled beach (without lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
c. Lake/dam/quarry e.g. swimming, fishing, paddling	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
d. River/creek/stream e.g. swimming, fishing, paddling	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
e. Private swimming pool e.g. backyard pool, spa	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
f. Public swimming pool (including spa)	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky

24. Please indicate your responses to the following questions

a. How worried are you about drowning when participating in aquatic activities if you have consumed alcohol?	Extremely worried	Quite worried	Neutral	Not very worried	Not at all worried
b. How worried are you that your friends may drown when participating in aquatic activities if they have consumed alcohol?	Extremely worried	Quite worried	Neutral	Not very worried	Not at all worried

Please circle your responses to the following questions:

25. Which of the following is 1 standard drink?

- a. 375ml of mid strength beer (3.5% alc.vol)
- b. 30ml of Spirits (40% alc.vol)
- c. 100ml of Red Wine (12% alc.vol)
- d. All of the above
- e. Don't know

26. Which of the following statements is the general definition of binge drinking for females and males?

- a. More than 3 standard drinks for females and males
- b. More than 4 standard drinks for females and males

c. More than 5 standard drinks for females and males

- d. More than 6 standard drinks for females and males
- e. Don't know

27. What is the legal blood alcohol concentration limit for driving a motor vehicle in Australia?

- a. 0.02%
- b. 0.04%
- c. 0.05%
- d. 0.08%
- e. Don't know

28. Which of the following is NOT a short-term effect of alcohol use?

- a. Some alcohol passes quickly into the bloodstream from the stomach
 - b. Nerves controlling involuntary functions are depressed
 - c. Fats build up in the liver, causing liver cells to die
 - d. Coordination and speech are impaired
 - e. Don't know
- 29.** If someone is experiencing alcohol poisoning (having consumed too much alcohol), which of the following is an appropriate treatment for them before calling the emergency services?
- a. Giving them some coffee
 - b. Letting them sleep it off
 - c. Putting them in a cold shower
 - d. Keeping them awake and sitting up
 - e. Don't know
- 30.** Which of the following is an effect that alcohol can have on someone in the water?
- a. Protects against hypothermia (condition of having abnormally low body temperature)
 - b. Increases coordination
 - c. Reduces swimming strength, power, stamina and speed
 - d. Improves reaction time (makes it better/ faster) to changes in the water environment
 - e. Don't know
- 31.** In a survival setting in water, which of the following will best prevent hypothermia (condition of having abnormally low body temperature)?
- a. Leaving on all clothing, including shoes, and remaining as still as possible
 - b. A small intake of rum
 - c. Using slow swimming strokes such as breaststroke or sidestroke
 - d. Being fit and slim
 - e. Don't know
- 32.** At what blood alcohol level has alcohol been found to influence a persons' ability in the water?
- a. 0.02%
 - b. 0.04%
 - c. 0.07%
 - d. 0.09%
 - e. Don't know
- 33.** For your age group (adults and adolescents), how many drowning deaths are thought to involve alcohol?
- a. Up to a quarter (0%-25%)
 - b. Up to half (25%-50%)
 - c. Up to three quarters (50%-75%)
 - d. Nearly all (75%-100%)
- 34.** Please select a physiological effect of alcohol which impacts an individual's swimming ability in water
- a. Alcohol makes you tired and less able to swim
 - b. Alcohol numbs the fingers making swimming difficult
 - c. Alcohol can affect the fluid in the ear which disrupts balance – up can become down
 - d. All of the above

If you have never participated in aquatic activities having consumed alcohol, please skip to Q39.

- 35.** Who are you most often with when you have consumed alcohol and participated in aquatic activities? (select all that apply)
- a. Friends
 - b. Parents
 - c. Siblings
 - d. Extended family (i.e aunt(s)/uncle(s); cousins; grandparents)

- e. Alone
- f. Other (please provide details) _____

36. In the past 12 months, how often have you participated in aquatic activities in each of the following contexts?

a. Patrolled beach (with lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
b. Unpatrolled beach (without lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
c. Lake/dam/quarry e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
d. River/creek/stream e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
e. Private swimming pool e.g. backyard pool, spa	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
f. Public swimming pool (including spa)	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)

37. How often have you consumed alcohol and participated in aquatic activities in the following locations in the previous 12 months?

a. Patrolled beach (with lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
b. Unpatrolled beach (without lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
c. Lake/dam/quarry e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
d. River/creek/stream e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)

e. Private swimming pool e.g. spa/ pool	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
f. Public swimming pool e.g. spa/ pool	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)

38. On average, how many standard drinks would you consume when participating in aquatic activities (see standard drinks information)?

- a. 0
- b. 1-2
- c. 3-4
- d. 5-6
- e. 7-9
- f. 10+



39. Will you be in an aquatic setting in the next 12 months?

- a. Yes
- b. No

If you answered 'Yes' to Q39 please move to Q40. If you answered 'No' please move to Q41.

40. Please read the following statements and select your level of agreement

a. In the next 12 months I intend to swim after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. In the next 12 months I intend to participate in other aquatic activities e.g. snorkelling, wading or paddling (e.g. canoe), after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. In the next 12 months it is likely that I will swim after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

41. Please read the following statements and select your level of agreement

a. Most people whose opinions I value would approve of me taking part in aquatic activities after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. Most people who are important to me think that I should participate in aquatic activity after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

c. When participating in aquatic activities I feel pressured to drink alcohol if others I am with are drinking alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
d. Most of my friends/ mates will participate in aquatic activities, after consuming alcohol, in the next 12 months	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
e. Most of my friends/mates will think that participating in aquatic activities after consuming alcohol in the next 12 months is a bad thing to do	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

42. Please read the following statements and select your level of agreement

a. I have complete control over whether I participate in aquatic activities after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. It is mostly up to me whether I participate in aquatic activities after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. It would be easy for me NOT to drink alcohol and participate in aquatic activities if the rest of my group were drinking alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
d. I am confident that I could participate in aquatic activities without negative outcomes after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

43. Please indicate to what extent each of these sources has influenced your **attitude** towards combining alcohol and aquatic activities (i.e. how you think and feel about alcohol use when taking part in aquatic activities e.g. if you think it is a good/bad/fun thing to do).

Family	Not at all	Low	Moderate	High	Very High
Friends	Not at all	Low	Moderate	High	Very High
External groups/ organisations/ institutions (such as school)	Not at all	Low	Moderate	High	Very High
The Media (TV/ Newspapers/ magazine)	Not at all	Low	Moderate	High	Very High
Social Media	Not at all	Low	Moderate	High	Very High
Other (please describe) _____	Not at all	Low	Moderate	High	Very High

44. Please indicate to what extent each of these sources has influenced your **knowledge** about the risks of combining alcohol and aquatic activities (i.e. the level of facts, information and understanding you have about the risks of combining alcohol and aquatic activities).

Family	Not at all	Low	Moderate	High	Very High
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Friends	Not at all	Low	Moderate	High	Very High
External groups/ organisations/ institutions (such as school)	Not at all	Low	Moderate	High	Very High
The Media (TV/ Newspapers/ magazine)	Not at all	Low	Moderate	High	Very High
Social Media	Not at all	Low	Moderate	High	Very High
Other (please describe)	Not at all	Low	Moderate	High	Very High

45. Please indicate to what extent each of these sources has influenced your **involvement** with combining alcohol and aquatic activities (i.e. your actual participation in consuming alcohol and taking part in aquatic activities).

Family	Not at all	Low	Moderate	High	Very High
Friends	Not at all	Low	Moderate	High	Very High
External groups/ organisations/ institutions (such as school)	Not at all	Low	Moderate	High	Very High
The Media (TV/ Newspapers/ magazine)	Not at all	Low	Moderate	High	Very High
Social Media	Not at all	Low	Moderate	High	Very High
Other (please describe)	Not at all	Low	Moderate	High	Very High

If you have any other comments or relevant experiences you would like to share, please do so in the text box below.

As a thank you for taking part in this survey, we are offering our participants the chance to win one of four \$100 Coles vouchers. If you would like to enter the draw, please provide your email address below as this will be used to contact you if you are one of the lucky winners. Your email address will not be used for any other purposes.

Email:

Thank you for your time in completing this survey.

United Kingdom Version

To be able to identify your data should you wish to withdraw please enter the following information as a code in the text box; **your birth year as four numbers followed by the first four letters of your mother’s maiden name.**

For example if you were born in 1995 and your mother’s maiden name is Smith, your code will be 1995SMIT.

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Date of birth (dd/mm/yyyy)</p> <p>_____</p> <p>2. Gender</p> <p>a. Male</p> <p>b. Female</p> <p>c. Other</p> <p>d. Prefer not to say</p> <p>3. What is your nationality?</p> <p>_____</p> <p>4. Do you identify as Aboriginal or Torres Strait Islander?</p> <p>a. Yes</p> <p>b. No</p> <p>5. In which country did you receive most of your education?</p> <p>a. Australia</p> <p>b. UK</p> <p>6. Current residential postcode:</p> <p>_____</p> | <p>7. Postcode of where you spent most of your childhood (childhood defined as up to 18 years old):</p> <p>_____</p> <p>8. What is your employment status?</p> <p>a. Full-time</p> <p>b. Part-time</p> <p>c. Casual</p> <p>d. Student</p> <p>e. Not currently employed</p> <p>f. Other (please provide details)</p> <p>9. What is your highest level of education? If you are still in education, please indicate the level you are working at. If you are no longer in education, please indicate the highest level you achieved.</p> <p>a. Primary School</p> <p>b. Secondary School</p> <p>c. Vocational/ Trade/ Diploma Certificate</p> <p>d. Undergraduate Degree</p> <p>e. Post-Graduate Degree</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

10. How confident are you in your ability to swim?

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

For the following questions, please indicate how confident you are in your ability to successfully deal with each aquatic situation

11. You are wearing street clothes whilst walking along a river bank where the river is flowing quickly and you accidentally fall in

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

12. You fall into the deep end (1.8m) of the local swimming pool

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

13. You are walking on coastal rocks and a wave knocks you into deep, rough water (waves 1m)

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

14. How many laps of a 25m swimming pool can you currently swim, using any stroke, without stopping or touching the bottom?

- a. Cannot swim
- b. Up to 1 lap (less than 25m)
- c. 1-4 laps (25m up to 100m)
- d. 5-8 laps (125m up to 200m)
- e. 9-12 laps (225m up to 300m)
- f. 13-16 laps (325m up to 400m)
- g. More than 16 laps (more than 400m)

15. Have you ever participated in aquatic activities after consuming alcohol?

- a. Yes
- b. No

If you answered 'Yes' to question 15, please move to questions 16 and 17. If you answered 'No', please move to question 18.

16. Approximately how old were you when you first consumed alcohol and participated in aquatic activities? _____

17. On this occasion who were you with (select all that apply)?

- a. Friends
- b. Parents
- c. Siblings
- d. Extended family (i.e aunt(s)/uncle(s); cousins; grandparents)
- e. Alone
- f. Other people (please give details)_____

18. Do you have any of the following aquatic qualifications? Please select all qualifications that you hold which are **current**:

- a. Pool Lifeguard – e.g. training and qualification
 - b. Beach Lifeguard – e.g. training and qualification
 - c. Swimming Teacher/Instructor – e.g. AUSTSWIM or the Swimming Teachers' Association.
 - d. Life Saving Qualification – e.g. bronze medallion
 - e. Other qualification (please provide as much detail as possible)
 - f. No current qualification/s
- 19.** Which of these qualifications also involved education about the effects of alcohol on water safety? Please select all that apply
- a. Pool Lifeguard – e.g. training and qualification
 - b. Beach Lifeguard – e.g. training and qualification
 - c. Swimming Teacher/Instructor – e.g. AUSTSWIM or the Swimming Teachers' Association.
 - d. Life Saving Qualification – e.g. bronze medallion
 - e. Other qualification (please provide as much detail as possible)
 - f. No current qualification/s
- 20.** Have you received water safety education in any of the following settings (please select all that apply)?
- a. Private swimming lessons
 - b. Primary school education – such as classroom discussions on water safety
 - c. Primary school swimming lessons
 - d. Secondary school education – such as through Physical Education, Sport or Health classes, camps, or classroom discussions about water safety
 - e. Secondary school swimming lessons
 - f. University education – such as Physical Education, Sport or Health courses
 - g. Life Saving organisations
 - h. Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online
 - i. External organisations such as those providing education at carnivals, fetes or events
 - j. Other (please provide as much detail as possible)
 - k. No previous education about water safety
- 21.** Please indicate if any of the following included education about the effects of alcohol on water safety (please select all that apply).
- a. Private swimming lessons
 - b. Primary school education – such as classroom discussions on water safety
 - c. Primary school swimming lessons
 - d. Secondary school education – such as through Physical Education, Sport or Health classes, camps, or classroom discussions about water safety
 - e. Secondary school swimming lessons
 - f. University education – such as Physical Education, Sport or Health courses
 - g. Life Saving organisations
 - h. Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online
 - i. External organisations such as those providing education at carnivals, fetes or events
 - j. Other (please provide as much detail as possible)

k. No previous education about water safety

22. Please indicate your level of agreement to each of the following statements

a. It is safe for me to swim in open water, such as lakes, rivers and the sea, after consuming 1-2 alcoholic drinks	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. It is safe for me to swim in public swimming pools after consuming 1-2 alcoholic drinks	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. Consuming alcoholic drinks in and around a private pool is safe as long as everyone can touch the bottom	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
d. It is OK for me to be in and on the water after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
e. It is OK for me to be around the water after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
f. It is OK for me to participate in aquatic activities after consuming alcohol if one person remains sober	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
g. The likelihood (i.e. risk) of me being harmed when participating in aquatic activities is increased if I have consumed alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
h. I think about the consequences of drinking alcohol before going to an aquatic location to drink	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
i. Drinking alcohol makes aquatic activities more fun for me	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
j. It is safe for me to get drunk in aquatic settings	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
k. I am confident in my knowledge about how alcohol could impact my safety when involved in aquatic activities	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

23. Please indicate how risky you believe it would be for you to drink alcohol and participate in aquatic activities in the following contexts

a. Patrolled beach (with lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
b. Unpatrolled beach (without lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
c. Lake/dam/quarry e.g. swimming, fishing, paddling	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
d. River/creek/stream e.g. swimming, fishing, paddling	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
e. Private swimming pool e.g. backyard pool, spa	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky
f. Public swimming pool (including spa)	Extremely risky	Quite risky	Neutral	Not very risky	Not at all risky

24. Please indicate your responses to the following questions

a. How worried are you about drowning when participating in aquatic activities if you have consumed alcohol?	Extremely worried	Quite worried	Neutral	Not very worried	Not at all worried
b. How worried are you that your friends may drown when participating in aquatic activities if they have consumed alcohol?	Extremely worried	Quite worried	Neutral	Not very worried	Not at all worried

25. Which of the following is 1 unit of alcohol?

- a. 250ml beer (4% alc.vol)
- b. 25ml spirit (40% alc.vol)
- c. 76ml wine (13% alc.vol)
- d. All of the above
- e. Don't know

26. Which of the following statements is the general definition of binge drinking for females and males?

- a. More than 5 units of alcohol for women and 7 for men
- b. More than 6 units of alcohol for women and 8 for men
- c. More than 7 units of alcohol for women and 9 for men
- d. More than 8 units of alcohol for women and 10 for men
- e. Don't know

27. What is the legal blood alcohol concentration limit for driving a motor vehicle in the UK?

- a. 0.02%
- b. 0.04%
- c. 0.05%
- d. 0.08%
- e. Don't know

28. Which of the following is NOT a short-term effect of alcohol use?

- a. Some alcohol passes quickly into the bloodstream from the stomach
- b. Nerves controlling involuntary functions are depressed
- c. Fats build up in the liver, causing liver cells to die
- d. Coordination and speech are impaired

- e. Don't know
- 29.** If someone is experiencing alcohol poisoning (having consumed too much alcohol), which of the following is an appropriate treatment for them before calling the emergency services?
- Giving them some coffee
 - Letting them sleep it off
 - Putting them in a cold shower
 - Keeping them awake and sitting up
 - Don't know
- 30.** Which of the following is an effect that alcohol can have on someone in the water?
- Protects against hypothermia (condition of having abnormally low body temperature)
 - Increases coordination
 - Reduces swimming strength, power, stamina and speed
 - Improves reaction time (makes it better/ faster) to changes in the water environment
 - Don't know
- 31.** In a survival setting in water, which of the following will best prevent hypothermia (condition of having abnormally low body temperature)?
- Leaving on all clothing, including shoes, and remaining as still as possible
 - A small intake of rum
 - Using slow swimming strokes such as breaststroke or sidestroke
 - Being fit and slim
 - Don't know
- 32.** At what blood alcohol level has alcohol been found to influence a persons' ability in the water?
- 0.02%
 - 0.04%
 - 0.07%
 - 0.09%
 - Don't know
- 33.** For your age group (adults and adolescents), how many drowning deaths are thought to involve alcohol?
- Up to a quarter (0%-25%)
 - Up to half (25%-50%)
 - Up to three quarters (50%-75%)
 - Nearly all (75%-100%)
- 34.** Please select a physiological effect of alcohol which impacts an individual's swimming ability in water
- Alcohol makes you tired and less able to swim
 - Alcohol numbs the fingers making swimming difficult
 - Alcohol can affect the fluid in the ear which disrupts balance – up can become down
 - All of the above

If you have never participated in aquatic activities having consumed alcohol, please skip to Q35.

- 35.** Who are you most often with when you have consumed alcohol and participated in aquatic activities? (select all that apply)
- Friends
 - Parents
 - Siblings
 - Extended family (i.e aunt(s)/uncle(s); cousins; grandparents)
 - Alone
 - Other (please provide details) _____
- 36.** In the past 12 months, how often have you participated in aquatic activities in each of the following contexts?

a. Patrolled beach (with lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
b. Unpatrolled beach (without lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
c. Lake/dam/quarry e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
d. River/creek/stream e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
e. Private swimming pool e.g. backyard pool, spa	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
f. Public swimming pool (including spa)	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)

37. How often have you consumed alcohol and participated in aquatic activities in the following locations in the previous 12 months?

a. Patrolled beach (with lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
b. Unpatrolled beach (without lifeguards/lifesavers) e.g. surfing, swimming, wading, paddling, fishing	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
c. Lake/dam/quarry e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
d. River/creek/stream e.g. swimming, fishing, paddling	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
e. Private swimming pool e.g. spa/ pool	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)

f. Public swimming pool e.g. spa/ pool	Never	Once	Not often (2-4 times)	Quite often (5-9 times)	Very often (10+ times)
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38. On average, how many units of alcohol would you consume when participating in aquatic activities (see units information below)?

- a. 0
- b. 1-2
- c. 3-4
- d. 5-6
- e. 7-9
- f. 10+



39. Will you be in an aquatic setting in the next 12 months?

- a. Yes
- b. No

If you answered 'Yes' to Q38 please move to Q39. If you answered 'No' please move to Q40.

40. Please read the following statements and select your level of agreement

a. In the next 12 months I intend to swim after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. In the next 12 months I intend to participate in other aquatic activities e.g. snorkelling, wading or paddling (e.g. canoe), after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. In the next 12 months it is likely that I will swim after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

41. Please read the following statements and select your level of agreement

a. Most people whose opinions I value would approve of me taking part in aquatic activities after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. Most people who are important to me think that I should participate in aquatic activity after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. When participating in aquatic activities I feel pressured to drink alcohol if others I am with are drinking alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
d. Most of my friends/ mates will participate in aquatic activities, after consuming alcohol in the next 12 months	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

e. Most of my friends/mates will think that participating in aquatic activities after consuming alcohol in the next 12 months is a bad thing to do	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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42. Please read the following statements and select your level of agreement

a. I have complete control over whether I participate in aquatic activities after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
b. It is mostly up to me whether I participate in aquatic activities after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
c. It would be easy for me NOT to drink alcohol and participate in aquatic activities if the rest of my group were drinking alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
d. I am confident that I could participate in aquatic activities without negative outcomes after consuming alcohol	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

43. Please indicate to what extent each of these sources has influenced your **attitude** towards combining alcohol and aquatic activities (i.e. how you think and feel about alcohol use when taking part in aquatic activities e.g. if you think it is a good/bad/fun thing to do).

Family	Not at all	Low	Moderate	High	Very High
Friends	Not at all	Low	Moderate	High	Very High
External groups/ organisations/ institutions (such as school)	Not at all	Low	Moderate	High	Very High
The Media (TV/ Newspapers/ magazine)	Not at all	Low	Moderate	High	Very High
Social Media	Not at all	Low	Moderate	High	Very High
Other (please describe) _____	Not at all	Low	Moderate	High	Very High

44. Please indicate to what extent each of these sources has influenced your **knowledge** about the risks of combining alcohol and aquatic activities (i.e. the level of facts, information and understanding you have about the risks of combining alcohol and aquatic activities).

Family	Not at all	Low	Moderate	High	Very High
Friends	Not at all	Low	Moderate	High	Very High
External groups/ organisations/ institutions (such as school)	Not at all	Low	Moderate	High	Very High
The Media (TV/ Newspapers/ magazine)	Not at all	Low	Moderate	High	Very High
Social Media	Not at all	Low	Moderate	High	Very High
Other (please describe) _____	Not at all	Low	Moderate	High	Very High

45. Please indicate to what extent each of these sources has influenced your **involvement** with combining alcohol and aquatic activities (i.e. your actual participation in consuming alcohol and taking part in aquatic activities).

Family	Not at all	Low	Moderate	High	Very High
Friends	Not at all	Low	Moderate	High	Very High
External groups/ organisations/ institutions (such as school)	Not at all	Low	Moderate	High	Very High
The Media (TV/ Newspapers/ magazine)	Not at all	Low	Moderate	High	Very High
Social Media	Not at all	Low	Moderate	High	Very High
Other (please describe) _____	Not at all	Low	Moderate	High	Very High

If you have any other comments or relevant experiences you would like to share, please do so in the text box below.

As a thank you for taking part in this survey, we are offering our participants the chance to win one of four £100 Amazon vouchers. If you would like to enter the draw, please provide your email address below as this will be used to contact you if you are one of the lucky winners.

Your email address will not be used for any other purposes.

Email:

Thank you for your time in completing this survey.

Appendix F

Ethical Approval for Survey

This Appendix entry provides the approval from the Human Research Ethics Committee at Federation University, Australia, to conduct the quantitative research project for this PhD.

Approval

Human Research Ethics Committee

Principal Researcher:	Dr Lauren Petrass
Other/Student Researcher/s:	Hannah Calverley Associate Prof Jenny Blitvich
School/Section:	School of Health Sciences, Human Movement and sport Science.
Project Number:	B18-049
Project Title:	Young people's perceptions, attitudes, behaviours and influencers on alcohol use in aquatic settings.
For the period:	11/12/2018 to 02/07/2020

Quote the Project No: B18-049 in all correspondence regarding this application.

Approval has been granted to undertake this project in accordance with the proposal submitted for the period listed above.

Please note: It is the responsibility of the Principal Researcher to ensure the Ethics Officer is contacted immediately regarding any proposed change or any serious or unexpected adverse effect on participants during the life of this project.

In Addition: Maintaining Ethics Approval is contingent upon adherence to all Standard Conditions of Approval as listed on the final page of this notification

COMPLIANCE REPORTING DATES TO HREC:

Annual project report:
11 December 2019

Final project report:
2 August 2020

The combined annual/final report template is available at:

<http://federation.edu.au/research/support-for-current-students-and-staff/ethics/human-ethics/human-ethics3>

Fiona Koop

Coordinator Research Ethics

11 December 2018

Please note the standard conditions of approval on Page 2:

STANDARD CONDITIONS OF APPROVAL

1. Conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC.
2. Advise (email: research.ethics@federation.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project.
3. Where approval has been given subject to the submission of copies of documents such as letters of support or approvals from third parties, these are to be provided to the Ethics Officer prior to research commencing at each relevant location.
4. Submission for approval of amendments to the approved project before implementing such changes. A combined amendment template covering the following is available on the HRE website:
<http://federation.edu.au/research/research-support/ethics/human-ethics/human-ethics3>
 - Request for Amendments
 - Request for Extension. Note: Extensions cannot be granted retrospectively.
 - Changes to Personnel
5. Annual Progress reports on the anniversary of the approval date and a Final report within a month of completion of the project are to be submitted by the due date each year for the project to have continuing approval.
6. If, for any reason, the project does not proceed or is discontinued, advise the committee by completing the Final report form.
7. Notify the Ethics Officer of any changes in contact details including address, phone number and email address for any member of the research team.
8. The HREC may conduct random audits and / or require additional reports concerning the research project as part of the requirements for monitoring, as set out in the National statement on Ethical Conduct in Human Research.

Failure to comply with the *National Statement on Ethical Conduct in Human Research (2007)* and with the conditions of approval will result in suspension or withdrawal of approval.

Appendix G

Survey Reliability

This Appendix presents Table 20 which provides the survey questions' reliability scores for both the Australian and United Kingdom versions of the survey used in the quantitative project of this PhD (discussed in Chapter Four Section One). Interpretations of these reliability scores is in accordance with suggestions of Altman (1991).

Table 20

Individual survey questions reliability scores and interpretations.

Section	Question	Reliability Score	Interpretation
Demographics and Background Information	2	.935	Very Good
	4	1	Very Good
	5	1	Very Good
	8	.720	Good
	9	.629	Good
	10	.606	Moderate
	11	.600	Moderate
	12	.647	Good
	13	.629	Good
	14	.893	Very Good
	15	.674	Good
	17a	.294	Fair
	17b	.667	Good
	17c	.636	Good
	17d	.583	Moderate
	17e	1	Very Good
	18a	.783	Good
	18b	1	Very Good
	18c	1	Very Good
	18d	.870	Very Good
18f	.759	Good	
19a	1	Very Good	

Section	Question	Reliability Score	Interpretation
Demographics and Background Information (<i>continued</i>)	19b	1	Very Good
	19c	-.333	Poor
	19d	1	Very Good
	19f	.263	Fair
	19g	.444	Moderate
	20a	.577	Moderate
	20b	.421	Moderate
	20c	.655	Good
	20d	.577	Moderate
	20e	.672	Good
	20f	.421	Moderate
	20g	.716	Good
	20h	.459	Moderate
	20i	.262	Fair
	20j	1	Very Good
	21a	-.097	Poor
	21b	.638	Good
	21c	.261	Fair
	21d	.757	Good
	21e	.308	Fair
	21f	1	Very Good
21g	1	Very Good	
21h	.298	Fair	
21i	1	Very Good	
21j	1	Very Good	
21k	.552	Moderate	
Attitudes	22a	.412	Moderate
	22b	.412	Moderate
	22c	.427	Moderate
	22d	.459	Moderate
	22e	.628	Good
	22f	.393	Fair
	22g	.309	Fair
	22h	-.119	Poor
	22i	.585	Moderate
	22j	.246	Fair
	22k	.201	Fair
	23a	.569	Moderate
	23b	.501	Moderate
	23c	.584	Moderate
	23d	.171	Poor
	23e	.445	Moderate
23f	.413	Moderate	
24a	.502	Moderate	
24b	.439	Moderate	
Knowledge	25 – Australia	1	Very Good

Section	Question	Reliability Score	Interpretation	
Knowledge (<i>continued</i>)	25 – UK	.560	Moderate	
	26 – Australia	.629	Good	
	26 – UK	.421	Moderate	
	27 – Australia	.782	Good	
	27 – UK	.500	Moderate	
	28	.233	Fair	
	29	.365	Fair	
	30	1	Very Good	
	31	.516	Moderate	
	32	.424	Moderate	
	33	.561	Moderate	
	34	.313	Fair	
	Behaviour	35a	1	Very Good
		35b	.385	Fair
35c		.600	Moderate	
35d		.444	Moderate	
35e		1	Very Good	
36a		.713	Good	
36b		.414	Moderate	
36c		.357	Fair	
36d		.590	Moderate	
36e		.612	Good	
36f		.615	Good	
36g		.457	Moderate	
37a		.796	Good	
37b		.739	Good	
37c		.557	Moderate	
37d		.457	Moderate	
37e		.595	Moderate	
37f		1	Very Good	
38 - Australia	.275	Fair		
38 - UK	.654	Good		
Intention	39	.526	Moderate	
	40a	.507	Moderate	
	40b	.404	Fair	
	40c	.638	Good	
Subjective Norms	41a	.440	Moderate	
	41b	.444	Moderate	
	41c	.410	Moderate	
	41d	.532	Moderate	
	41e	.329	Fair	
Perceived Behavioural Control	42a	.519	Moderate	
	42b	.695	Good	
	42c	.306	Fair	
	42d	.406	Fair	

Section	Question	Reliability Score	Interpretation
Influences	43a	.365	Fair
	43b	.544	Moderate
	43c	.302	Fair
	43d	.428	Moderate
	43e	.547	Moderate
	44a	.692	Good
	44b	.381	Fair
	44c	.489	Moderate
	44d	.507	Moderate
	44e	.331	Fair
	45a	.511	Moderate
	45b	.568	Moderate
	45c	.278	Fair
	45d	.235	Fair
	45e	.256	Fair

Appendix H

Quantitative Project Plain Language Information Statements and Debrief Forms

This Appendix entry offers the quantitative project Plain Language Information Statements and Debrief documentation provided to participants before, and immediately after completing the survey. These were the same documents for online and face-to-face completion. Participants from the United Kingdom and Australia received slightly different Plain Language Information Statements to detail available support in their corresponding nation, and these are labelled accordingly.

Plain Language Information Statement



Australian Version

FACULTY OF HEALTH

PROJECT TITLE:	Young people's perceptions, attitudes, behaviours and influencers on alcohol use in aquatic settings
PRINCIPAL RESEARCHER:	Dr Lauren Petrass: l.petrass@federation.edu.au
OTHER/STUDENT RESEARCHERS:	Hannah Calverley: h.calverley@federation.edu.au Assoc Prof Jenny Blitvich: j.blitvich@federation.edu.au

EXPLANATION OF PROJECT

Background Information

Previous research has found a link between drinking alcohol and drowning risks in both the United Kingdom (UK) and Australia among those aged 18-24 years, therefore this study is asking young people to detail their thoughts regarding alcohol use in aquatic settings. Within drowning prevention, little research has been conducted with young people to understand their opinions and behaviours, consequently the information gained from this study will be very helpful to water safety organisations.

What are the aims of this project?

This research project aims to investigate factors influencing youth alcohol consumption in aquatic settings. The online questionnaire will be used to obtain information from young people aged 18-24 years in the UK and Australia regarding their perceptions, influencers, knowledge and behaviour relating to alcohol use in aquatic settings.

Is the study approved?

This project has received ethical approval from the Human Research Ethics Committee at Federation University, Australia.

Why have you been selected to participate in this study?

You are invited to participate in this research project if you are between the ages of 18 and 24 years old and are Australian living permanently in Australia. If you are in a dependent relationship with any of the researchers involved in this project e.g. staff/student, your participation/non-participation will not affect ongoing assessment, grades, employment or management.

What will you be required to do?

Your participation would involve you completing an online questionnaire, which contains multiple choice answers and rating scales for each of the statements. Please answer the questions honestly and without conferring with others. You are free to choose not to answer questions on the questionnaire without consequence. If you choose to participate in the study, click 'continue', or close the window if you refuse to participate. After clicking

Plain Language Information Statement



'continue' you will be presented with the survey which should take no longer than 30 minutes to complete. After the final question, you will be asked to click 'submit' which will submit your responses and then you will be shown the participant debrief screen and thanked for your participation.

What are your rights as a participant in this study?

The return of your completed survey is taken as your implied consent to participate in this research. Your participation is voluntary, and if you wish to refuse to participate this requires no explanation - you are entitled to withdraw your consent to participate and discontinue participation at **any** time, without consequence. If consent is withdrawn after the data has been collected, de-identified and processed it will not be possible to withdraw non-identifiable data.

What are the risks involved?

The questions have been designed to minimise the chance of causing any psychological distress. However, if you do experience any psychological discomfort, please contact one of the following counselling services or your doctor:

Lifeline Australia: 13 11 14

What happens to the information gained from this study?

The data you provide by completing the questionnaire will be combined with the other participants' responses and analysed to determine any relationships among these data. Arrangements have been made to protect the confidentiality of the data, subject to legal limitations. The data will be de-identified before being analysed, and identifying information will be stored separately from the data. Aggregated results will be reported and individual participants will not be identified. Data will be stored for a minimum of five years and then securely destroyed after this time. Findings from the survey will be presented in academic journals and conferences, along with being provided to drowning prevention organisations to aid in the development of their campaigns.

How can you get in touch with the research team?

Please feel free to contact the research team if you have any questions or concerns regarding your participation:

Hannah Calverley EMAIL: h.calverley@federation.edu.au
PHONE: +61 353 276 049 (Australia)

If you wish to make a complaint regarding the conduct of this research, you should direct these comments to the Ethics Officer for attention, contact details are at the end of this form.

If you have any questions, or you would like further information regarding the project titled "*Young people's perceptions, attitudes, behaviours and influences on alcohol use in aquatic settings*", please contact the Principal Researcher Dr Lauren Petrass of the School of Health Sciences:
EMAIL: l.petrass@federation.edu.au

Plain Language Information Statement



PH: (03) 5327 9393

Should you (i.e. the participant) have any concerns about the ethical conduct of this research project, please contact the Federation University Ethics Officers, Research Services, Federation University Australia,

P O Box 663 Mt Helen Vic 3353

Telephone: (03) 5327 9765

Email: research.ethics@federation.edu.au

CRICOS Provider Number 00103D

Plain Language Information Statement



United Kingdom Version

FACULTY OF HEALTH

PROJECT TITLE:	Young people's perceptions, attitudes, behaviours and influencers on alcohol use in aquatic settings
PRINCIPAL RESEARCHER:	Dr Lauren Petrass: l.petrass@federation.edu.au
OTHER/STUDENT RESEARCHERS:	Hannah Calverley: h.calverley@federation.edu.au Assoc Prof Jenny Blitvich: j.blitvich@federation.edu.au

EXPLANATION OF PROJECT

Background Information

Previous research has found a link between drinking alcohol and drowning risks in both the United Kingdom (UK) and Australia among those aged 18-24 years, therefore this study is asking young people to detail their thoughts regarding alcohol use in aquatic settings. Within drowning prevention, little research has been conducted with young people to understand their opinions and behaviours, consequently the information gained from this study will be very helpful to water safety organisations.

What are the aims of this project?

This research project aims to investigate factors influencing young peoples' alcohol consumption in aquatic settings. The online questionnaire will be used to obtain information from young people aged 18-24 years in the UK and Australia regarding their perceptions, influencers, knowledge and behaviour relating to alcohol use in aquatic settings.

Is the study approved?

This project has received ethical approval from the Human Research Ethics Committee at Federation University, Australia.

Why have you been selected to participate in this study?

You are invited to participate in this research project if you are between the ages of 18 and 24 years old and are British living permanently in the UK. If you are in a dependent relationship with any of the researchers involved in this project e.g. staff/student, your participation/non-participation will not affect ongoing assessment, grades, employment or management.

What will you be required to do?

Your participation would involve you completing an online questionnaire, which contains multiple choice answers and rating scales for each of the statements. Please answer the questions honestly and without conferring with others. You are free to choose not to answer questions on the questionnaire without consequence. If you choose to participate

Plain Language Information Statement



in the study, click 'continue', or close the window if you refuse to participate. After clicking 'continue' you will be presented with the survey which should take no longer than 30 minutes to complete. After the final question, you will be asked to click 'submit' which will submit your responses and then you will be shown the participant debrief screen and thanked for your participation.

What are your rights as a participant in this study?

The return of your completed survey is taken as your implied consent to participate in this research. Your participation is voluntary, and if you wish to refuse to participate this requires no explanation - you are entitled to withdraw your consent to participate and discontinue participation at **any** time, without consequence. If consent is withdrawn after the data has been collected, de-identified and processed it will not be possible to withdraw non-identifiable data.

What are the risks involved?

The questions have been designed to minimise the chance of causing any psychological distress. However, if you do experience any psychological discomfort, please contact one of the following counselling services or your doctor:

Samaritans UK: 116 123

What happens to the information gained from this study?

The data you provide by completing the questionnaire will be combined with the other participants' responses and analysed to determine any relationships among these data. Arrangements have been made to protect the confidentiality of the data, subject to legal limitations. The data will be de-identified before being analysed, and identifying information will be stored separately from the data. Aggregated results will be reported and individual participants will not be identified. Data will be stored for a minimum of five years and then securely destroyed after this time. Findings from the survey will be presented in academic journals and conferences, along with being provided to drowning prevention organisations to aid in the development of their campaigns.

How can you get in touch with the research team?

Please feel free to contact the research team if you have any questions or concerns regarding your participation:

Hannah Calverley EMAIL: h.calverley@federation.edu.au
PHONE: +61 353 276 049 (Australia)

If you wish to make a complaint regarding the conduct of this research, you should direct these comments to the Ethics Officer for attention, contact details are at the end of this form.

If you have any questions, or you would like further information regarding the project titled "*Young people's perceptions, attitudes, behaviours and influences on alcohol use in aquatic settings*", please contact the Principal Researcher Dr Lauren Petrass of the School of Health Sciences:

EMAIL: l.petrass@federation.edu.au

PH: (03) 5327 9393

Plain Language Information Statement



Should you (i.e. the participant) have any concerns about the ethical conduct of this research project, please contact the Federation University Ethics Officers, Research Services, Federation University Australia,

P O Box 663 Mt Helen Vic 3353

Telephone: (03) 5327 9765

Email: research.ethics@federation.edu.au

CRICOS Provider Number 00103D

Debrief Information Statement

SCHOOL OF HEALTH SCIENCES

PROJECT TITLE:	Young people's perceptions, attitudes, behaviours and influencers on alcohol use in aquatic settings
PRINCIPAL RESEARCHER:	Dr Lauren Petrass
OTHER/STUDENT RESEARCHERS:	Hannah Calverley PhD Scholar Assoc Prof Jenny Blitvich

Thank you for participating in study: "Investigation of young people's perceptions, attitudes, behaviours and influencers on alcohol use in aquatic settings".

The aim of the research was to investigate factors influencing youth alcohol consumption in aquatic settings in both Australia and the United Kingdom. The survey you completed will be analysed to determine your perceptions, influencers, knowledge and behaviour relating to alcohol use in aquatic settings.

It is important for you to note that combining alcohol use in aquatic settings is dangerous and should be avoided. It is strongly advised that you do not drink alcohol and then participate in aquatic activities such as swimming, boating or fishing.

Please look at the following resources which give more details about alcohol influenced drowning in Australia, the UK and globally;

Royal Life Saving Australia:

<https://www.royallifesaving.com.au/facts-and-figures/key-facts/medical/alcohol-and-water-safety>

<https://www.royallifesaving.com.au/programs/Sinkers-DontDrinkAndSink>

<https://www.royallifesaving.com.au/programs/dont-let-your-mates-drink-and-drown>

<https://www.royallifesaving.com.au/facts-and-figures/research-and-reports/drowning-reports>

Royal Life Saving Society UK:

<https://rlss.org.uk/about-us/campaigns/dont-drink-drown/>

<https://rlss.org.uk/news/mother-of-tragic-megan-roberts-leads-national-campaign-warning-students-not-to-drink-and-drown-2/>

World Health Organisation:

http://apps.who.int/iris/bitstream/handle/10665/143893/9789241564786_eng.pdf;jsessionid=84F45C62FE75D5AC8E3DEEF242EE997F?sequence=1

If you wish to discuss the research or require more information, please use the following contact:

Hannah Calverley EMAIL: h.calverley@federation.edu.au

Appendix I

Interview Schedule

This Appendix presents the Interview schedule used to guide the semi-structured discussions in both the one-to-one and small group interviews of the qualitative project of this PhD (discussed in Chapter Four Section Two). When reading digitally, the following link will take the viewer back to the qualitative project methods section of this thesis:

[Qualitative Methodology](#).

Interview Schedule

First, I would like to thank you for giving up your time to be involved with this research project which is looking at understanding alcohol use in aquatic contexts among young people. It is important to highlight that the responses that you provide as part of today's discussion are confidential and that you will not be identified by name in the written documentation. Therefore, I would really value open and honest discussion and responses.

Before we get started, could I please ask that you sign the informed consent form and read through the Plain Language Information Statement (that I have provided). I will briefly explain the structure and purpose of this interview/focus group, which is also described in detail on the Plain Language Information Statement.

This interview/focus group seeks to obtain information from you regarding your perceptions, influencers, knowledge and behaviour relating to alcohol use in aquatic settings. You may choose not to answer questions without consequence. The interview/focus group will be audio-recorded, however all identifying information will remain anonymous and your responses will be allocated a false name for publications. You are also required to keep the anonymity of other participants and their responses within the interview/focus groups. Finally, the questions have been designed to minimise the chance of causing any psychological distress. However, if you do experience any psychological discomfort, please contact one of the counselling services on the Plain Language Information Statement or your doctor. Finally, you will receive a \$20 voucher at the end of the discussion to thank you for your time.

Does anyone have any questions before we begin?

I'd like to start by going round the group and introducing yourselves, please share with the group your name, what you currently do, and anything else of interest.

Question	Sub-questions	Additional Notes
1. To begin, recent data has shown that up to half of all drowning deaths in your age group have involved alcohol. What do you think about this?	a) Why do you think there is such a high number of young people drinking alcohol and then participating in aquatic activities? b) How do you think this number could be reduced?	
2. Moving on to the prevention campaigns in this area. Looking at the campaigns listed on the bottom of your questionnaire, were you familiar with any of them?	<u>If yes.</u> a) What do you know about them? b) What made you remember them? c) What do you think is their take-home message? <u>If no.</u> a) What is your first impression of those images? b) What would you think is their take-home message? c) Would you remember them? <u>Both.</u>	

Question	Sub-questions	Additional Notes
	c) How would you change this image to target your age group?	
3. Thinking about campaigns more generally, what do you take notice of when you see a risk-prevention campaign e.g. drink driving?	a) How do you think drowning prevention organisations could target your age group to reduce the number of alcohol-related drownings? b) What messages in a campaign would make your friends rethink their behaviours around water? c) What approach should campaigns take to reach your age group? Thinking about platforms, where information is displayed etc.	
4. We will now discuss a little more about your personal views/perceptions and behaviours. When do you think it is okay to drink alcohol in aquatic settings?	a) Are there any risks involved? b) Can this depend on who you are with? c) How does this change depending on the environment? E.g. where you are [pool/beach], the weather, time of day, lifeguards, boats. Why? d) Which settings are more dangerous? e) Which aquatic activities are more dangerous? f) How do you determine whether an aquatic setting is safe? g) What is the difference between drinking when in or on the water versus just around an aquatic setting (i.e. around the water)?	
5. Some research I have previously conducted has shown that many people your age think it is safe to swim in public pools after having 1-2 alcoholic drinks, but less safe in rivers, lakes and the sea. Could you explain what you think about this?		
6. This same research also highlighted that respondents were more worried about their	a) Why do you think this might be the case?	

Question	Sub-questions	Additional Notes
<p>friends drowning after consuming alcohol and participating in aquatic activity than themselves. What do you think about this?</p>		
<p>7. Can you tell me how your friends influence your behaviour in an aquatic context?</p>	<p>a) How does this compare to when you're with your family?</p>	
<p>8. What experiences have you had with your friends participating in aquatic activities after drinking alcohol?</p>	<p>a) Did you feel pressured to join in? b) If so, what sort of thing made you feel pressured? What were they doing/saying to encourage you? c) How do your friends influence you in this situation? d) How does the gender of the group affect the group's behaviour in this setting when alcohol is involved? Is behaviour different if it is a single sex group compared to when it's mixed? e) What strategies do you use to keep yourselves safe in this situation? f) In this situation with your friends, what sort of aquatic activities would you do?</p>	
<p>9. What experiences have you had with your family participating in aquatic activities after drinking?</p>	<p>a) Did you feel pressured to join in? b) If so, what sort of thing made you feel pressured? What were they doing/saying to encourage you? c) How do your family influence you in this situation? d) How does the gender of the group affect the group's behaviour in this setting when alcohol is involved? Is behaviour different if it is a single sex group compared to when it's mixed? e) What strategies do you use to keep yourselves safe? f) In this situation with your family, what sort of aquatic activities would you do?</p>	
<p>10. Do you have any other comments or points you feel are relevant to this</p>		

Question	Sub-questions	Additional Notes
area, or anything we have talked about, that you would like to discuss?		

That is the end of this interview/focus group. Thank you very much for your time today and if you have any comments, or you would like to get in touch with me, then use the email address on your Plain Language Information Sheet.

Appendix J

Ethical Approval for Interviews

This Appendix entry provides the approval from the Human Research Ethics Committee at Federation University, Australia, to conduct the qualitative research project for this PhD.

Approval

Human Research Ethics Committee

Principal Researcher:	Dr Lauren Petrass
Co-Researcher/s:	Associate Prof Jenny Blitvich Hannah Calverley
School/Section:	School of Health and Life Sciences
Project Number:	B19-027
Project Title:	What do young Australians think about taking part in aquatic activities after consuming alcohol?
For the period:	10/04/2019 to 03/07/2020

Quote the Project No: B19-027 in all correspondence regarding this application.

Approval has been granted to undertake this project in accordance with the proposal submitted for the period listed above.

Please note: It is the responsibility of the Principal Researcher to ensure the Ethics Office is contacted immediately regarding any proposed change or any serious or unexpected adverse effect on participants during the life of this project.

In Addition: Maintaining Ethics Approval is contingent upon adherence to all Standard Conditions of Approval as listed on the final page of this notification

COMPLIANCE REPORTING DATES TO HREC:

Annual project report:

10 April 2020

Final project report:

3 August 2020

The combined annual/final report template is available at:

<https://federation.edu.au/research/support-for-students-and-staff/ethics/human-ethics/human-ethics3>

Fiona Koop

Coordinator, Research Ethics

10 April 2019

Please note the standard conditions of approval on Page 2:

Approval

Human Research Ethics Committee



STANDARD CONDITIONS OF APPROVAL

1. Conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC.
2. Advise (email: research.ethics@federation.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project.
3. Where approval has been given subject to the submission of copies of documents such as letters of support or approvals from third parties, these are to be provided to the Ethics Officer prior to research commencing at each relevant location.
4. Submission for approval of amendments to the approved project before implementing such changes. A combined amendment template covering the following is available on the HRE website: <https://federation.edu.au/research/support-for-students-and-staff/ethics/human-ethics/human-ethics3>
 - Request for Amendments
 - Request for Extension. Note: Extensions cannot be granted retrospectively.
 - Changes to Personnel
5. Annual Progress reports on the anniversary of the approval date and a Final report within a month of completion of the project are to be submitted by the due date each year for the project to have continuing approval.
6. If, for any reason, the project does not proceed or is discontinued, advise the committee by completing the Final report form.
7. Notify the Ethics Coordinator of any changes in contact details including address, phone number and email address for any member of the research team.
8. The HREC may conduct random audits and / or require additional reports concerning the research project as part of the requirements for monitoring, as set out in the National statement on Ethical Conduct in Human Research.

Failure to comply with the *National Statement on Ethical Conduct in Human Research* (2007) and with the conditions of approval will result in suspension or withdrawal of approval.

Appendix K

Interview Recruitment Poster

This Appendix presents the recruitment poster used to recruit participants to participate in the qualitative project of this PhD.

Interested in talking about alcohol use and aquatic activity?

If you have an hour to spare, we are recruiting for participants to take part in focus groups and/or interviews to talk about alcohol use and participation in aquatic activity.

WHAT IS IN IT FOR ME?

To thank you for your time and participation we will provide you with a **\$20 Coles gift voucher**.

WHERE AND WHEN?

We would arrange a convenient time and place, most likely a booked room in the library at FedUni Mt Helen Campus.

WHO DO WE NEED?

You would need to be between 18-24 years old and received most of your education in Australia. You also cannot have participated in a survey in early 2019 about alcohol use and aquatic activity. You can sign up alone or with your friends (2-3 of you) to do the interview together.

INTERESTED-CONTACT ME:

Please email Hannah Calverley: h.Calverley@federation.edu.au if you are interested in participating and/or would like further information. Details on tabs below.

Email: Hannah Calverley
h.calverley@federation.edu.au

Email: Hannah Calverley
h.calverley@federation.edu.au

Email: Hannah Calverley
h.calverley@federation.edu.au

Email: Hannah Calverley
h.calverley@federation.edu.au

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Email: Hannah Calverley
h.calverley@federation.edu.au

Email: Hannah Calverley
h.calverley@federation.edu.au

Appendix L

Qualitative Project Plain Language Information Statement, Debrief and Consent Forms

This Appendix provides the Plain Language Information Statement and Consent and Debrief forms which were used in the qualitative project of this PhD.

Plain Language Information Statement



SCHOOL OF HEALTH AND LIFE SCIENCES

PROJECT TITLE:	What do young Australians think about taking part in aquatic activities after consuming alcohol? A qualitative investigation into their attitudes, perceptions, knowledge and behaviour
PRINCIPAL RESEARCHER:	Dr Lauren Petrass: l.petrass@federation.edu.au +61 353 279 393
OTHER/STUDENT RESEARCHERS:	Hannah Calverley: h.calverley@federation.edu.au +61 353 276 049 Assoc Prof Jenny Blitvich: j.blitvich@federation.edu.au

EXPLANATION OF PROJECT

Background Information

Previous research has found a link between drinking alcohol and drowning risk among those aged 18-24 years. Within the drowning prevention area, little research has been conducted with young people to understand their opinions and behaviours, therefore this study is seeking to understand the views of young people regarding alcohol use in aquatic settings. Findings from this study are likely to be used by water safety organisations in the development of future drowning prevention campaigns.

What are the aims of this project?

This research project aims to investigate factors influencing young peoples' alcohol consumption in aquatic settings. The focus groups/interviews will be used to obtain information from young people aged 18-24 years in Australia regarding their perceptions, influencers, knowledge and behaviour relating to alcohol use in aquatic settings.

Who will take part in this study?

You are invited to participate in this research project if you are between the ages of 18 and 24 years old and have received most of your education in Australia. Approximately 25 people are required for this research project and participants will be selected on a first-come-first-serve basis.

What will you be required to do?

Your participation would involve you meeting the researcher and other participants in your focus group at a convenient time at a booked room e.g. on the Federation University Mount Helen Campus. The focus group will take no longer than 1 hour and if you agree to participate, you will be asked to complete/sign a consent form. If a convenient time cannot be arranged for multiple people, you will be invited to participate in a one-on-one interview. During the interview or focus group, we would request you

Plain Language Information Statement



answer the questions honestly. You are free to choose not to answer questions without consequence. If after the focus group you feel you have more information to disclose relating to anything discussed, please contact the researcher and if you agree, a convenient time will be arranged for a follow-up one-to-one interview. Following completion of the interview/focus group, you will be provided with a debrief sheet and thanked for your participation by receiving a \$20 voucher.

Please note that the interviews and focus groups will be audio-recorded, however all identifying information will remain anonymous and your responses will be allocated a false name for publications. However, in a circumstance where there is a small sample, there may be implications for privacy/anonymity. You are also required to keep the anonymity of other participants and their responses within the focus groups.

What are your rights as a participant in this study?

The return of your signed consent form is taken as your consent to participate in this research. Your participation is voluntary, and if you wish to refuse to participate this requires no explanation - you are entitled to withdraw your consent to participate and discontinue participation at **any** time, without consequence and all unprocessed data removed from the study. If consent is withdrawn after the data has been collected, de-identified and processed it will not be possible to withdraw non-identifiable data. If you are in a dependent relationship with any of the researchers involved in this project e.g. staff/student, your participation/non-participation will not affect ongoing assessment, grades, employment or management.

What are the risks involved?

The questions have been designed to minimise the chance of causing any psychological distress. However, if you do experience any psychological discomfort, please contact one of the following counselling services or your doctor:

Lifeline Australia: 13 11 14

FedUni Health Centre: (03) 5327 947

What happens to the information gained from this study?

The data will be transcribed by a third party who will not have access to your personal information. The transcribed discussions will be inputted into a software package called NVivo and combined with the other participants' responses to analyse and determine any relationships among the responses. Arrangements have been made to protect the confidentiality of the data, subject to legal limitations. The data will be de-identified before being analysed, and identifying information will be stored separately from the data. Aggregated results will be reported and presented in academic journals and conferences, along with being provided to drowning prevention organisations to aid in the development of their campaigns. Data will be stored for a minimum of five years and then securely destroyed after this time.

Is the study approved?

Plain Language Information Statement



This project has received approval from Federation University Human Research Ethics Committee.

If you have any questions, or you would like further information regarding the project titled "*What do young Australians think about taking part in aquatic activities after consuming alcohol? A qualitative investigation into their attitudes, perceptions, knowledge and behaviour*", please contact the Principal Researcher Dr Lauren Petrass of the School of Education:

EMAIL: l.petrass@federation.edu.au

PH: (03) 5327 9393

Should you (i.e. the participant) have any concerns about the ethical conduct of this research project, please contact the Federation University Ethics Officers, Research Services, Federation University

Australia,

P O Box 663 Mt Helen Vic 3353

Telephone: (03) 5327 9765

Email: research.ethics@federation.edu.au

CRICOS Provider Number 00103D

Debrief Information Statement

SCHOOL OF HEALTH AND LIFE SCIENCES

PROJECT TITLE:	What do young Australians think about taking part in aquatic activities after consuming alcohol? A qualitative investigation into their attitudes, perceptions, knowledge and behaviour
PRINCIPAL RESEARCHER:	Dr Lauren Petrass
OTHER/STUDENT RESEARCHERS:	Hannah Calverley PhD Scholar Assoc Prof Jenny Blitvich

Thank you for participating in study: "What do young Australians think about taking part in aquatic activities after consuming alcohol? A qualitative investigation into their attitudes, perceptions, knowledge and behaviour".

The aim of the research was to investigate factors influencing youth alcohol consumption in aquatic settings in Australia. The responses you gave during the interview/focus group will be analysed to determine your perceptions, influencers, knowledge and behaviour relating to alcohol use in aquatic settings.

The questions during the interview/focus group were designed not to induce any psychological distress, however, if you feel effected by the topics discussed in the research please contact your GP, Lifeline on 13 11 14 or the FedUni Health Centre on (03) 5327 9477.

It is important for you to note that combining alcohol use in aquatic settings is dangerous and should be avoided. It is strongly advised that you do not drink alcohol and then participate in aquatic activities such as swimming, boating or fishing.

Please look at the following resources which give more details about alcohol influenced drowning in Australia, the UK and globally;

Royal Life Saving Australia:

<https://www.royallifesaving.com.au/facts-and-figures/key-facts/medical/alcohol-and-water-safety>

<https://www.royallifesaving.com.au/programs/Sinkers-DontDrinkAndSink>

<https://www.royallifesaving.com.au/programs/dont-let-your-mates-drink-and-drown>

<https://www.royallifesaving.com.au/facts-and-figures/research-and-reports/drowning-reports>

World Health Organisation:

http://apps.who.int/iris/bitstream/handle/10665/143893/9789241564786_eng.pdf;jsessionid=84F45C62FE75D5AC8E3DEEF242EE997F?sequence=1

If you wish to discuss the research or require more information, please use the following contact:

Hannah Calverley EMAIL: h.calverley@federation.edu.au

Consent Form

Human Research Ethics Committee

PROJECT TITLE:	What do young Australians think about taking part in aquatic activities after consuming alcohol? A qualitative investigation into their attitudes, perceptions, knowledge and behaviour.
RESEARCHERS:	Dr Lauren Petrass l.petrass@federation.edu.au Hannah Calverley h.calverley@federation.edu.au Assoc Prof Jenny Blitvich j.blitvich@federation.edu.au

Code number allocated to the participant:	
--------------------------------------------------	--

Consent – Please complete the following information:

I _____ of

hereby consent to participate as a subject in the above research study.

The research program in which I am being asked to participate has been explained fully to me, verbally and in writing, and any matters on which I have sought information have been answered to my satisfaction.

I understand that: all information I provide will be treated with the strictest confidence and data will be stored separately from any listing that includes my name and address.

- I understand and agree to the audio recording of the interview or focus group I am participating.
- Aggregated results will be used for research purposes and may be reported in scientific and academic journals.
- I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and information/data obtained from it will not be used.
- I understand the exception to this is if I withdraw after information has been aggregated - it is unable to be individually identified - so from this point it is not possible to withdraw my information/data, although I may still withdraw my consent to participate.
- Information will remain anonymous, however in a circumstance where there is a small sample, there may be implications for privacy/anonymity.
- I understand the content and discussions during the focus groups/interviews are to remain anonymous, therefore I will respect participant anonymity/privacy and not disclose any information provided by other participants at any time away from the focus group/interview.

SIGNATURE: _____

DATE: _____

Appendix M

Qualitative Project Demographic Survey

This Appendix presents the brief demographic survey completed by participants before the qualitative discussions commenced.

Interview/Focus Group Number: _____

Interview/Focus Group Demographic Questionnaire

1. Name: _____
2. Date of birth (dd/mm/yyyy): _____
3. Age _____
4. Gender
 - a. Male
 - b. Female
 - c. Other
 - d. Prefer not to say
5. What is your nationality?

6. Do you identify as Aboriginal or Torres Strait Islander?
 - a. Yes
 - b. No
7. Current residential postcode:

8. Postcode of where you spent most of your childhood (childhood defined as up to 18 years old):

9. What is your employment status?
 - a. Full-time
 - b. Part-time
 - c. Casual
 - d. Student
 - e. Not currently employed
- f. Other (please provide details)
10. What is your highest level of education? If you are still in education, please indicate the level you are working at. If you are no longer in education, please indicate the highest level you achieved.
 - a. Primary School
 - b. Secondary School
 - c. Vocational/ Trade/ Diploma Certificate
 - d. Undergraduate Degree
 - e. Post-Graduate Degree
11. Have you ever participated in aquatic activities after consuming alcohol?
 - a. Yes
 - b. No
12. Earlier this year (2019), did you complete a survey about alcohol use in aquatic settings?
 - a. Yes
 - b. No
13. If yes, please provide your personal identifying code. This consisted of the year you were born and the first four letters of your mother's maiden name.

14. How confident are you in your ability to swim?

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

For the following questions, please indicate how confident you are in your ability to successfully deal with each aquatic situation

15. You are wearing street clothes whilst walking along a river bank where the river is flowing quickly and you accidentally fall in

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

16. You fall into the deep end (1.8m) of the local swimming pool

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

17. You are walking on coastal rocks and a wave knocks you into deep, rough water (waves

	1	2	3	4	5	6	7	8	9	10	
Not at all confident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very confident

1m)

18. How many laps of a 25m swimming pool can you currently swim, using any stroke, without stopping or touching the bottom?

- Cannot swim
- Up to 1 lap (less than 25m)
- 1-4 laps (25m up to 100m)
- 5-8 laps (125m up to 200m)
- 9-12 laps (225m up to 300m)
- 13-16 laps (325m up to 400m)
- More than 16 laps (more than 400m)

19. Do you have any of the following aquatic qualifications? Please tick **all current** qualifications.

<ul style="list-style-type: none"> Pool Lifeguard – e.g. training and qualification 	<ul style="list-style-type: none"> Beach Lifeguard – e.g. training and qualification 	<ul style="list-style-type: none"> Swimming Teacher/Instructor – e.g. AUSTSWIM or the Swimming Teachers' Association.
<ul style="list-style-type: none"> Life Saving Qualification – e.g. bronze medallion 	<ul style="list-style-type: none"> Other qualification (please provide as much detail as possible) 	<ul style="list-style-type: none"> No current qualification/s

20. Have you received water safety education in any of the following settings (select all that apply)?

<ul style="list-style-type: none"> • Private swimming lessons 	<ul style="list-style-type: none"> • Primary school swimming lessons 	<ul style="list-style-type: none"> • Life Saving organisations
<ul style="list-style-type: none"> • Secondary school education – such as through Physical Education, Sport or Health classes, camps, or classroom discussions about water safety 	<ul style="list-style-type: none"> • Education through the media - such as TV or Radio advertisements, newspaper articles, posters or online 	<ul style="list-style-type: none"> • University education – such as Physical Education, Sport or Health courses
<ul style="list-style-type: none"> • Primary school education – such as classroom discussions on water safety 	<ul style="list-style-type: none"> • Secondary school swimming lessons 	<ul style="list-style-type: none"> • External organisations such as those providing education at carnivals, fetes or events
<ul style="list-style-type: none"> • Other (please provide as much detail as possible) 	<ul style="list-style-type: none"> • No previous education about water safety 	

21. Please select all of the alcohol focused drowning prevention campaigns that you recognise. Please add any others which are not listed that you are aware of. We will discuss these in the interview/focus group.

<ul style="list-style-type: none"> • Don't let your mates drink and drown 	<ul style="list-style-type: none"> • Sinkers #dontdrinkandsink 
<ul style="list-style-type: none"> • Swim safe swim sober 	<ul style="list-style-type: none"> • Respect the river 

- **Play it safe by the water**



- **Others (please list)...**

Appendix N

Publication Three Supplementary File

This Appendix presents the Supplementary File for Publication Three: the mixed-methods publication reporting results from the qualitative and quantitative PhD projects.

This article was published online by the peer-reviewed journal *Drugs: Education, Prevention and Policy* in October 2020. When reading digitally, the following link will take the viewer back to Publication Three (Chapter Five Section One) of this thesis:

[Publication Three](#).

Table 21*Survey sections, aligning questions and responses styles.*

Survey Section	Question(s)	Response Styles	Informing Material
Demographic and Background Information 21 questions	1 – 21	Multiple-choice Rating scales (0-10) Dichotomous	<ul style="list-style-type: none"> • Can You Swim Survey (Moran et al., 2012; Petrass et al., 2012) • Aquatic research (Hamilton & Schmidt, 2014; Petrass & Blitvich, 2018)
Attitudes 3 questions containing 19 statements	22 – 24	Five-point Likert Scales	<ul style="list-style-type: none"> • Can You Swim Survey (Moran et al., 2012; Petrass et al., 2012) • Alcohol and aquatic activity surveys and research findings (Hamilton & Schmidt, 2014; Sinkinson, 2014) • Survey on young adults' attitudes towards alcohol (Midford et al., 2000) and risky driving (Delcher et al., 2013; Ulleberg & Rundmo, 2003) • Psychometric scale of risk taking (Weber et al., 2002)
Knowledge 10 Questions (13 including all UK and Australian versions)	25 – 34	Multiple-choice	<ul style="list-style-type: none"> • Research on alcohol (Thadani et al., 2009; Weatherwax-Fall, 2008) and aquatics (Driscoll et al., 2003; Moran et al., 2012; Perrine et al., 1994; Petrass et al., 2012) • Factual resources of alcohol health effects and guidelines for use in the United Kingdom and Australia (National Health and Medical Research Council, 2009; National Health Service, 2018; Office for National Statistics, 2018; United Kingdom Government, 2018)

Survey Section	Question(s)	Response Styles	Informing Material
Behaviour 4 questions containing 12 statements	35 – 38	Multiple-choice Five-point Likert Scales	<ul style="list-style-type: none"> • Alcohol and aquatic research (Hamilton & Schmidt, 2014) • Survey of aquatic behaviours among young people (Moran, 2008a; Petrass et al., 2012) • Reviews of locations for alcohol-influenced drownings (Peden et al., 2017)
Intention 2 questions, 1 containing 3 statements	39 – 40	Dichotomous Five-point Likert Scales	<ul style="list-style-type: none"> • Theory of Planned Behaviour guidelines (Ajzen, 1985) • Survey of alcohol and aquatic activity (Hamilton & Schmidt, 2014)
Subjective Norms 1 question containing 5 statements	41	Five-point Likert Scales	<ul style="list-style-type: none"> • Theory of Planned Behaviour guidelines (Ajzen, 1985) • Survey of alcohol and aquatic activity (Hamilton & Schmidt, 2014)
PBC 1 question containing 4 statements	42	Five-point Likert Scales	<ul style="list-style-type: none"> • Theory of Planned Behaviour guidelines (Ajzen, 1985) • Survey of alcohol and aquatic activity (Hamilton & Schmidt, 2014)
Influencers 3 questions containing 15 statements	43 – 45	Five-point Likert Scales	<ul style="list-style-type: none"> • Survey of aquatic behaviours among young people (Moran, 2008a)