

1-20-2021

Predicting Young Adults' Intentions and Involvement in Alcohol-Influenced Aquatic Activity

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Recommended Citation

Calverley, Hannah L M; Petrass, Lauren A. Ph.D.; and Blitvich, Jennifer D. (2021) "Predicting Young Adults' Intentions and Involvement in Alcohol-Influenced Aquatic Activity," *International Journal of Aquatic Research and Education*: Vol. 13: No. 3, Article 6.

DOI: <https://doi.org/10.25035/ijare.13.03.06>

Available at: <https://scholarworks.bgsu.edu/ijare/vol13/iss3/6>

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Cover Page Footnote

This work was supported by an Australian Government Research Training Program (RTP) Stipend and RTP Fee-Offset Scholarship through Federation University Australia.

Abstract

Globally, alcohol consumption is a public health issue and a risk factor for drownings among young adults. While studies have identified a prominence of alcohol in youth drownings, little is known about the factors that influence young adults' involvement in alcohol-influenced aquatic activity. The current study aimed to identify the predictors of young adults' intention to participate, and past participation, in alcohol-influenced aquatic activity. A reliable and valid survey, informed by the Theory of Planned Behavior, was distributed to young adults (aged 18-24 years) educated in the UK and Australia. Cumulative odds ordinal logistic regressions with proportional odds were conducted to establish predictors. Overall, 182 participants completed the survey. Subjective norms (Wald χ^2 (2) = 8.43, p = .015), cognitive attitudes (Wald χ^2 (2) = 6.40, p = .041) and previous involvement (χ^2 (1) = 8.98, p = .003) were significant predictors of intention, whilst the influence of friends (Wald χ^2 (2) = 10.99, p = .004) and intention (Wald χ^2 (2) = 10.80, p = .005) were significant predictors of behavior. Practitioners should enhance risk awareness and norm perceptions in prevention programs to encourage informed decision making in social aquatic situations.

Keywords: drowning prevention, youth, alcohol

Introduction

Globally, alcohol is a risk factor for many health-related problems, including diseases, mental health, and injuries (World Health Organization [WHO], 2018). In relation to injuries, alcohol consumption contributes to both intentional and unintentional injuries, including falls, homicides, and drowning (WHO, 2018). Previous research has investigated fatal and non-fatal alcohol-related injuries and corresponding risks, such as those associated with drink driving (e.g., Borges et al., 2006; Hyder & Vecino, 2018; Taylor et al., 2010), but there is a dearth concerning alcohol-related drownings.

Estimates of alcohol-related drowning mortality suggest that between 30-50% of all drownings worldwide are linked to alcohol use, with those aged 15 years and over particularly at risk (Ahlm et al., 2013; Driscoll et al., 2003; WHO, 2014). To more effectively prevent alcohol-influenced drownings, further epidemiological research, alongside the use of established behavior change models, is required to determine factors associated with this behavior (Calverley et al., 2020; Mahony & Peden, 2016; Peden et al., 2018; Peden et al., 2017). For example, the Theory of Planned Behavior (TPB) has been used extensively in public health promotion and prevention to predict health-related behaviors including: cigarette smoking (McMillan & Conner, 2003), alcohol consumption (Huchting et al., 2008), and safe sex (Breinbauer & Maddaleno, 2005).

The TPB has been used to explain and predict behavior in circumstances where an individual has appropriate resources to perform the behavior, such as time and money (Ajzen, 1985, 1991), although it does not explain cases where such resources are not available. According to the TPB, behavior is determined by an individual's intention to engage in it and the perceived behavioral control (PBC) the individual believes they have over performing that behavior, considering prior experiences, personal limitations, and barriers (Ajzen, 1988, 1991). PBC, along with attitudes and subjective norms, are determinants of intention. Attitudes relate to the individual's disposition in responding positively or negatively towards a phenomena, incorporating both cognitive attitudes (perceptions and information relating to the phenomena) and affective attitudes (feelings towards the phenomena; Ajzen, 1989). Subjective norms consider the perceived social pressures on the individual to participate in, or avoid the behavior (Ajzen, 1991) and encompass injunctive norms (perceptions of significant others' approval) and descriptive norms (perceptions of others' behavior; White et al., 2009). Execution of a behavior depends on a combination of intention, and PBC, with participation increasing when both intention and PBC are high (Ajzen, 1991).

Meta-analyses support the use of the TPB in explaining variance in health-related behaviors and intentions. These studies have found the TPB produces an R^2 value of up to .41 for explaining intention, and up to .34 for explaining behavior, and is a stronger model when predicting self-reported behavior rather than objective/observed behavior (Armitage & Conner, 2001; Godin & Kok, 1996). Another systematic review and meta-analysis supported the use of the TPB to predict intended and actual alcohol consumption: medium-to-large effect sizes were recorded for attitudes, subjective norms, and self-efficacy in predicting alcohol-related intention and behavior (Cooke et al., 2016).

The TPB has been applied extensively in the health domain to inform prevention (Trifiletti et al., 2005), but its application within the context of drowning prevention has been somewhat limited (Giles et al., 2009; Hamilton et al., 2016), and only one study (to the authors' knowledge) explicitly adopted this model to investigate alcohol consumption in aquatic settings (Hamilton & Schmidt, 2014). Hamilton and Schmidt designed a self-report survey underpinned by the TPB to determine reasons why Australian males combine alcohol and swimming. They found that attitudes and subjective norms made a significant contribution to intention. Despite this study expanding on current understanding of alcohol use in aquatic settings, the study only detailed predictors of intention, not behavior, and was limited by the male-only sample from one area of Australia (Hamilton & Schmidt, 2014).

These sample limitations are consistent with other Australian and New Zealand studies of young adults' alcohol consumption in aquatic settings

(Abercromby et al., 2020; Enkel et al., 2018; Sinkinson, 2014; Watt et al., 2012). As a result, they restrict the applicability of findings to a wider population. Further, as few studies have been conducted in other high-income countries (HICs) where young adults' alcohol-related drowning rates are of concern (e.g., the United Kingdom [UK]; The National Water Safety Forum Strategy Working Group, 2015), little empirical evidence is available to support the development of alcohol-focused drowning prevention campaigns. Therefore, the current study aimed to provide additional information from participant groups in the UK and Australia to determine the predictors of young adults': (i) intention to participate in alcohol-influenced aquatic activities (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); and (ii) self-reported participation in alcohol-influenced aquatic activities.

Method

Participants and Procedure

A purposive sample of young adults aged 18 to 24 years who had received most of their education in the UK or Australia were invited to participate. The survey was available online through the Lime Survey platform, and a survey link was created and distributed on social media, via email and through direct liaison with prospective participants. Organizations involved with young adults aged 18 to 24 years (e.g., university tutors and staff managing university student accommodations) were also contacted and, if they agreed, promoted the survey via email to their contacts. To enhance the response rate, hard-copies of the survey were distributed at two Australian universities during lectures, events, and other related activities. Participants completed the survey independently, taking approximately 30 minutes. Informed consent was implied by return of the survey (detailed in the information provided to participants). Following completion, website links that detailed and encouraged safe behavior around water were provided. Incentives were used to attract participants to complete the survey: eight vouchers were randomly allocated among those who completed the survey and provided an email address.

Survey Instrument

A validated and reliable survey was developed to measure reasons why young adults participate in alcohol-influenced aquatic activities. The survey was underpinned by the TPB (Ajzen, 1991, 2017), previous drowning prevention research, and self-report surveys designed and applied to public health problems (e.g., Hamilton & Schmidt, 2014; Moran, 2008; Petrass et al., 2012). The developed survey consisted of 45 questions, presented in sub-sections to align with the TPB components: demographic and background information; attitudes; knowledge; past behavior; subjective norms; PBC; intention; and, influencers. Consuming alcohol was defined as consuming any alcoholic drink, rather than quantifying an amount, because the specific blood alcohol concentration (BAC) that affects aquatic ability is currently unconfirmed (Peden et al., 2017). The

definition of aquatic activities was informed by the research of Hamilton and Schmidt (2014) and defined as ‘*activities in and on the water undertaken for fun, pleasure or amateur sport. This did not include boating or activities involving powered watercrafts such as jet skis*’. The survey development details, including reliability and validity testing, are reported elsewhere. For analysis, total scores were calculated for each of the survey sections.

Demographic and Background Information

Alongside basic demographic information (e.g., age, gender) participants reported their swimming confidence and swimming ability. Four hypothetical scenarios (e.g., “You fall into the deep end [1.8m] of the local swimming pool”) measured on 10-point scales (*not at all confident to very confident*) determined confidence. Numerical ratings from the four scenarios were combined to create a confidence score with participants allocated to one of three categories (i.e., 0-13 low confidence, 14-27 moderate confidence, 28-40 high confidence). For swimming ability, participants selected the number of laps they could swim continuously in a swimming pool (*cannot swim to more than 16 laps*, with seven distance categories provided): less than 4 laps was categorized as *poor* swimming ability, 5-12 laps as *moderate*, 13+ laps as *good*.

Attitude

Attitude was measured through 19 statements: 11 measured cognitive attitude (e.g., “Consuming alcoholic drinks in and around a private pool is safe as long as everyone can touch the bottom”) and eight measured affective attitude (e.g., “I am confident in my knowledge about how alcohol could impact my safety when involved in aquatic activities”). All statements were measured on 5-point Likert Scales, *strongly disagree (1), disagree (2), neither agree or disagree (3), agree (4), strongly agree (5)*. Overall cognitive and affective attitude scores were calculated through summation of the Likert Scale responses (maximum score of 55 for cognitive and 40 for affective) with a high score indicative of an accepting attitude towards alcohol-influenced aquatic activity (i.e., they agreed or strongly agreed to most of the statements).

Knowledge

A measure of knowledge was obtained by calculating the number of correct responses to 10 multiple choice questions that addressed both general risks of alcohol use (e.g., “Which of the following is one standard drink?”) and aquatic-related alcohol knowledge (e.g., “In a survival setting, which of the following will best prevent hypothermia?”). To align with other variables (attitudes, intention and subjective norms) where a higher score indicated an undesirable outlook on alcohol-influenced aquatic activity (i.e., participants were favorably pre-disposed to alcohol-influenced aquatic activity), the number of incorrect responses was summed as the knowledge score.

Subjective Norm

Five Likert Scale statements (*strongly disagree* to *strongly agree*) were used to assess both descriptive (e.g., “When participating in aquatic activities I feel pressured to drink alcohol if others I am with are drinking alcohol”), and injunctive subjective norms (e.g., “Most people who are important to me think that I should participate in aquatic activity after consuming alcohol”). This approach aligned with previous research which has measured injunctive and descriptive subjective norms together using a small number of items (e.g., Ajzen et al., 2011; Hamilton & Schmidt, 2014). The total score was the sum of the Likert Scale responses with a maximum score of 25.

Perceived Behavioral Control (PBC)

PBC was measured through four, 5-point Likert Scale statements (*strongly disagree* to *strongly agree*) requiring participants to rate the level of control they had in regard to engaging in alcohol-influenced aquatic activity (e.g., “I have complete control over whether I participate in aquatic activity after consuming alcohol”). The total score was the sum of the Likert Scale responses with a maximum score of 20. The PBC scores were reversed to match other variables where a higher score indicated an undesirable outlook on alcohol-influenced aquatic activity.

Intention

Intention was measured using three statements that determined intention to participate in alcohol-influenced aquatic activity in the upcoming 12 months (e.g., “In the next 12 months I intend to swim after consuming alcohol”), each rated on 5-point Likert Scales (*strongly disagree* to *strongly agree*). The total score was the sum of the responses to the Likert Scales, with a maximum score of 15.

Influencers

A series of 5-point Likert Scale statements asked participants to indicate the level of influence they felt from: family; friends; external organizations; the media; and, social media, on their involvement in alcohol-influenced aquatic activity (“Please indicate to what extent each of these sources has influenced your involvement with combining alcohol and aquatic activities”), using the scale options *not at all*, *low*, *moderate*, *high*, *very high*. Unequal participant distribution within the scale responses led to regrouping the categories into three: no influence; moderate influence (low or moderate rating), and; high influence (high or very high rating).

Past Behavior

Past participation in alcohol-influenced aquatic activity was self-reported. Six aquatic locations were listed (patrolled beach, unpatrolled beach, lake/dam/quarry, river/creek/stream, private swimming pool, public swimming pool) and participants indicated (for the previous 12 months): (i) how often they

visited each location, and; (ii) how often they consumed alcohol and participated in aquatic activity at each location. Both were measured using 5-point Likert Scales *never*, *once*, *not often (2-4 times)*, *quite often (5-9 times)*, *very often (10+ times)*. A behavioral score was calculated, based on locations where the participant indicated they had consumed alcohol, as this demonstrated their involvement in risky behavior. Therefore, any locations where participants reported *never* consuming alcohol, or *never* attending, were not included in the calculation.

The remaining Likert Scale responses corresponded to a number on the scale (*once* =2, *not often [2-4 times]* =3, *quite often [5-9 times]* =4, *very often [10+ times]* =5). The score was calculated by summing the total number of times participants visited each location and the total number of times they consumed alcohol at each location. This total was then divided by the number of locations they had visited and consumed alcohol. An example of this calculation would be a participant indicating they had visited an unpatrolled beach *quite often* (4) but *not often* (3) consumed alcohol; visited a private pool *very often* (5) and consumed alcohol *quite often* (4); and, visited a public pool *very often* (5) but *never* consumed alcohol. The calculation would be as follows:

$$\frac{(4+3)+(5+4)}{2} = 8$$

This provided a score out of 10, and a higher score indicated poorer behavior (i.e., more frequent involvement in alcohol-influenced aquatic activity). These scores were initially quintile split to align with Likert Scale responses, but due to uneven groupings, the extreme categories were grouped to create three more evenly distributed categories (Sheskin, 2011): 0-4 (no/low risk), 4.1-6 (moderate risk), 6.1-10 (high risk).

Data Analysis

Data were exported from Lime Survey to Microsoft Excel and imported to IBM SPSS Statistics 24. Hard-copy survey responses were double entered and checked for accuracy in SPSS. Responses were coded and missing data and incomplete surveys identified and deleted listwise per the default feature in SPSS. Descriptive statistics (i.e., frequency, mean, median, and standard deviation [SD]) were calculated to determine the distribution of responses and inform analyses. Total scores from ordinal variables initially were quintile split to align with the associated Likert Scale response. Due to uneven group distributions in most variables with five categories, extreme responses were combined with the subsequent level to create three more equally distributed groups (Sheskin, 2011); that is, an agree group, a neutral group, and a disagree group. This recoding met the proportional odds assumptions of an ordinal logistic regression, and the data also met the assumptions for this test as the independent variables were continuous (e.g., age in years) or categorical (e.g., gender) and the dependent variable ordinal.

Cumulative odds ordinal logistic regressions with proportional odds were calculated to predict: (i) intention to participate in alcohol-influenced aquatic activities, and (ii) past behavior (i.e., previous involvement in alcohol-influenced aquatic activities). The variables (i.e., age; gender; swimming confidence; swimming ability; country educated; employment status; education level; water safety education; and, aquatic qualifications; cognitive attitudes; affective attitudes; knowledge; intention; subjective norms; perceived behavioral control; influence of friends, family, external organizations, the media and social media) were entered into both regression models. The variable 'previous participation in alcohol-influenced aquatic activity' was omitted from the prediction of behavior as it was a measure of past behavior, which was the same measure as that dependent variable. Due to multicollinearity, the variables: swimming confidence; employment status; prior water safety education; and, influences of external organizations and social media were removed from both analyses. Further, because many participants selected different 'education' categories, these data could not be translated accurately as a predictor and were removed from the analysis.

Results

The assumption of proportional odds was met for intention ($\chi^2(22) = 26.99, p = .212$) and behavior ($\chi^2(23) = 5.65, p = 1.000$), as assessed by a full likelihood ratio test comparing the fit of the proportional odds location model to a model with varying location parameters. The deviance goodness-of-fit tests indicated the models were a good fit to the observed data: intention, $\chi^2(242) = 182.24, p = .998$; behavior, $\chi^2(239) = 197.00, p = .978$. These Chi-square results should be treated with caution as most cells (66.1% for intention and 66.7% for behavior) were sparse with zero frequencies (Laerd Statistics, 2015). The final intention model ($\chi^2(22) = 95.84, p < .001$) and the final behavior model ($\chi^2(23) = 78.91, p < .001$) significantly predicted the dependent variables over and above the intercept-only model.

In total, 182 participants completed the survey (aged 18-24 years, Mean age = 20.66 years, \pm SD = 1.97). See Table 1 for full breakdown of demographic information.

Table 1
Demographic information of the participants

Variable	Sub categories	Percentage of participants
Gender	Male	40.8%
	Female	59.2%
Country educated	Australia	79.3%
	UK	20.7%
Employment status	Full-time	21.7%
	Part-time/casual	30.9%
	Student	44%
	Unemployed	3.4%
Highest level of education	Secondary school	14%
	Vocational/ trade/ diploma	10.1%
	Undergraduate/ postgraduate	75.8%
Self-report swimming ability	Poor	32.6%
	Moderate	30.9%
	Good	36.6%
Self-reported swimming confidence	Poor	4.4%
	Moderate	27.5%
	Good	68.1%
Current water safety qualification	Yes	68.2%
	No	31.8%
Prior water safety education	Yes	97.8%
	No	2.2%
Previous involvement in alcohol-influenced aquatic activities	Yes	49.2%
	No	50.8%
Self-reported involvement in alcohol-influenced aquatic activities (past behavior)	No/low risk	52.5%
	Moderate risk	19.1%
	High risk	28.4%
Intention to participate in alcohol-influenced aquatic activity in the upcoming 12 months	No/low	49%
	Moderate	29.7%
	High ^a	21.4%
PBC	No/low	27.5%
	Moderate	47.7%
	High ^a	24.8%
Affective attitude	Unaccepting	24.7%
	Moderately accepting	48.9%
	Accepting ^a	26.4%

Variable	Sub categories	Percentage of participants
Cognitive attitude	Unaccepting	46.2%
	Moderately accepting	39.6%
	Accepting ^a	14.3%
Subjective norms	No/low	35.9%
	Moderate	48.4%
	High ^a	15.7%
Knowledge of alcohol and its impact on aquatic activities	Poor ^a	54.5%
	Good	45.5%
Influence of friends on participant's involvement in alcohol-influenced aquatic activity	No/low	21.3%
	Moderate	41.3%
	High	37.3%
Influence of external organizations on participant's involvement in alcohol-influenced aquatic activity	No/low	56.7%
	Moderate	36%
	High	7.3%
Influence of media on participant's involvement in alcohol-influenced aquatic activity ^b	No/low	51%
	Moderate	42.4%
	High	6.7%
Influence of family on participant's involvement in alcohol-influenced aquatic activity	No/low	37.3%
	Moderate	40%
	High	22.7%

^a Indicates the undesirable extreme as suggestive of a more approving outlook towards alcohol-influenced aquatic activity

^b Due to the near exact distribution of participants' responses, the results for influence of media and social media on participants' involvement in alcohol-influenced aquatic activity were combined and the mean reported as 'influence of media' for this Table

Model 1: Predicting Intention

The intention model contained 14 variables, detailed in Table 2, and explained 59% of the variance (Nagelkerke Pseudo $R^2 = .59$). Three variables significantly predicted intention: previous participation in alcohol-influenced aquatic activities ($\chi^2 (1) = 8.98, p = .003$); subjective norms (Wald $\chi^2 (2) = 8.43, p = .015$); and, cognitive attitudes (Wald $\chi^2 (2) = 6.40, p = .041$).

Those participants who reported previous involvement in alcohol-influenced aquatic activity were 4.89 times (95% CI, 1.73 to 13.80) more likely to have high intention to participate in this activity in the upcoming 12 months, compared to those with no prior involvement ($\chi^2 (1) = 8.98, p = .003$).

Those reporting high subjective norms were 9.11 times (95% CI, 2.04 to 40.68) more likely to have high intention to participate in alcohol-influenced aquatic activity in the upcoming 12 months, compared to those reporting no/low subjective norms ($\chi^2 (1) = 8.37, p = .004$). Likewise, participants reporting moderate subjective norms were 3.05 times (95% CI, 1.00 to 9.26) more likely to have high intention to participate in the upcoming 12 months, compared to those with no/low subjective norms ($\chi^2 (1) = 3.87, p = .049$).

Participants reporting accepting cognitive attitudes towards alcohol-influenced aquatic activity were 7.49 times (95% CI, 1.54 to 36.36) more likely to highly intend to participate in this activity in the following 12 months, compared to those reporting unaccepting cognitive attitudes ($\chi^2 (1) = 6.24, p = .012$). No significant differences were observed relating to participants' intention based on a moderately accepting cognitive attitude.

Model 2: Predicting Past Behavior

The behavior model contained 14 variables, detailed in Table 3, and explained 51% of the variance (Nagelkerke Pseudo $R^2 = .51$). Two independent variables, intention (Wald $\chi^2 (2) = 10.80, p = .005$) and influence of friends (Wald $\chi^2 (2) = 10.99, p = .004$) significantly predicted past behavior.

Participants reporting high influence of friends on their involvement in alcohol-influenced aquatic activity were 20.44 times (95% CI, 3.36 to 124.34) more likely to report prior, high-risk (i.e., high frequency) participation in this activity than those reporting no/low influence of friends ($\chi^2 (1) = 10.73, p = .001$). Those with a moderate influence of friends were 8.91 times (95% CI, 1.62 to 49.13) more likely to report previous, high-risk involvement than those with no/low influence ($\chi^2 (1) = 6.31, p = .012$).

Participants with high intention were 5.08 times (95% CI, 1.38 to 18.68) more likely to report previous high-risk participation in alcohol-influenced aquatic activity than those with no/low intention ($\chi^2 (1) = 5.99, p = .014$). Similarly, participants with moderate intention were 5.54 times (95% CI, 1.87 to 16.38) more likely to have reported previous, high-risk participation than those with no/low intention ($\chi^2 (1) = 9.58, p = .002$).

Table 2*Ordinal logistic regression results showing significant and non-significant predictors of intention*

Variables	Response	SE	Odds Ratio [95% CI]	Wald Chi-Square	df	p value
PBC	None/low	.65	0.94 [0.27, 3.33]	0.01	1	.922
	Moderate	.57	2.18 [0.71, 6.66]	1.85	1	.173
	High ^a	0*	0*		0*	
Affective attitude	Unaccepting	.88	0.36 [0.07, 2.02]	1.34	1	.247
	Moderately accepting	.51	0.63 [0.23, 1.72]	0.82	1	.364
	Accepting ^a	0*	0*		0*	
Cognitive attitude	Accepting ^a	.81	7.49 [1.54, 36.36]	6.24	1	.012
	Moderately accepting	.56	2.68 [0.89, 8.03]	3.08	1	.079
	Unaccepting	0*	0*		0*	
Subjective norms	High ^a	.76	9.11 [2.04, 40.68]	8.37	1	.004
	Moderate	.57	3.05 [1.00, 9.26]	3.87	1	.049
	None/low	0*	0*		0*	
Age	-	.12	1.04 [0.81, 1.32]	0.08	1	.779
Aquatic qualifications	No	.53	0.45 [0.16, 1.27]	2.29	1	.447
	Yes	0*	0*		0*	
Country educated	Australia	.61	1.06 [0.32, 3.47]	0.01	1	.927
	UK	0*	0*		0*	
Gender	Female	.48	1.79 [0.70, 4.58]	1.46	1	.227
	Male	0*	0*		0*	
Influence of family	None/low	.69	1.37 [0.35, 5.30]	0.20	1	.653
	Moderate	.56	2.25 [0.75, 6.76]	2.08	1	.149
	High	0*	0*		0*	

Influence of friends	None/low	.87	0.78 [0.14, 4.29]	0.08	1	.778
	Moderate	.51	1.16 [0.43, 3.13]	0.09	1	.768
	High	0*	0*		0*	
Influence of media	None/low	.97	0.38 [0.06, 2.50]	1.03	1	.311
	Moderate	.94	0.52 [0.08, 3.26]	0.50	1	.481
	High	0*	0*		0*	
Knowledge	Poor	.46	0.90 [0.37, 2.22]	0.05	1	.819
	Good	0*	0*		0*	
Previous participation in alcohol-influenced aquatic activities	Yes	.53	4.89 [1.73, 13.80]	8.98	1	.003
	No	0*	0*		0*	
Swimming ability	Poor	.60	0.58 [0.18, 1.87]	0.84	1	.359
	Moderate	.55	0.92 [0.32, 2.67]	0.03	1	.874
	Good	0*	0*		0*	

Note. Odds ratio when comparing to redundant parameters.

^a Indicates the undesirable extreme as suggestive of a more approving outlook towards alcohol-influenced aquatic activity

* This parameter is set to zero because it is redundant.

Table 3*Ordinal logistic regression results showing significant and non-significant predictors of behavior*

Variables	Response	SE	Odds Ratio [95% CI]	Wald Chi-Square	df	p value
Intention	High ^a	0.66	5.08 [1.38, 18.68]	5.99	1	.014
	Moderate	0.55	5.54 [1.87, 16.38]	9.58	1	.002
	No/low	0*	0*		0*	
PBC	None/low	0.63	3.35 [0.98, 11.44]	3.74	1	.053
	Moderate	0.55	1.25 [0.42, 3.69]	0.16	1	.693
	High ^a	0*	0*		0*	
Affective attitude	Unaccepting	0.87	2.90 [0.53, 15.94]	1.49	1	.222
	Moderately accepting	0.54	1.68 [0.58, 4.82]	0.93	1	.336
	Accepting ^a	0*	0*		0*	
Cognitive attitude	Accepting	0.83	2.60 [0.51, 13.24]	1.32	1	.251
	Moderately accepting	0.57	2.39 [0.79, 7.24]	2.37	1	.124
	Unaccepting ^a	0*	0*		0*	
Subjective norms	High ^a	0.74	3.07 [0.72, 13.15]	2.28	1	.131
	Moderate	0.55	1.90 [0.65, 5.61]	1.36	1	.243
	None/low	0*	0*		0*	
Age	-	0.13	1.20 [0.93, 1.53]	1.97	1	.161
Aquatic qualifications	No	0.56	0.77 [0.26, 2.30]	0.22	1	.642
	Yes	0*	0*		0*	
Country educated	Australia	0.62	2.00 [0.59, 6.74]	1.25	1	.264
	UK	0*	0*		0*	
Gender	Female	0.50	0.53 [0.20, 1.43]	1.55	1	.213
	Male	0*	0*		0*	

Influence of family	None/low	0.69	1.53 [0.40, 5.92]	0.38	1	.538
	Moderate	0.57	1.35 [0.44, 4.17]	0.28	1	.597
	High	0*	0*		0*	
Influence of friends	High	0.92	20.44 [3.36, 124.34]	10.73	1	.001
	Moderate	0.87	8.91 [1.62, 49.13]	6.31	1	.012
	None/low	0*	0*		0*	
Influence of media	None/low	1.03	3.35 [0.45, 25.02]	1.39	1	.238
	Moderate	0.96	2.09 [0.32, 13.85]	0.59	1	.444
	High	0*	0*		0*	
Knowledge	Poor	0.46	1.61 [0.66, 3.93]	1.08	1	.299
	Good	0*	0*		0*	
Swimming ability	Poor	0.62	0.62 [0.18, 2.10]	0.59	1	.441
	Moderate	0.56	0.55 [0.19, 1.65]	1.13	1	.287
	Good	0*	0*		0*	

Note. Odds ratio when comparing to redundant parameters.

^a Indicates the undesirable extreme as suggestive of a more approving outlook towards alcohol-influenced aquatic activity

* This parameter is set to zero because it is redundant.

Discussion

Alcohol-influenced drowning among young people (aged 15 years and above) has been identified as a public health issue (Ahlm et al., 2013; Driscoll et al., 2003; WHO, 2014). In Australia, this group is an area of focus with an emphasis placed on extending the current understanding of alcohol-influenced aquatic activity, to identify areas both for further exploration, and for inclusion in drowning prevention campaigns (Abercromby et al., 2020; Hamilton & Schmidt, 2014; Peden et al., 2017; Royal Life Saving Society - Australia, 2019). To the authors' knowledge, this is the first study to identify predictors of intention to participate, and past involvement in alcohol-influenced aquatic activity for young adults from different HICs (i.e., Australia and the UK), an important addition to assist understanding of why young adults are prevalent within alcohol-related drowning statistics in HICs.

This study identified that previous involvement, accepting cognitive attitudes, and high subjective norms were significant predictors of intention to participate in alcohol-influenced aquatic activity for study participants, explaining 59% of the variance. The significant influence of subjective norms in the current results is comparable to injury prevention and public health research investigating adolescents' alcohol-related behavior, for example drinking and driving (Potard et al., 2018), binge drinking (Johnston & White, 2003), and drinking in aquatic contexts (Hamilton & Schmidt, 2014). These authors suggested that identification with the social group of reference can moderate the effects of subjective norms on alcohol-related behaviors – subjective norms are more influential among those identifying strongly with the social group (Johnston & White, 2003). Johnston and White (2003) recommended that, to reduce the negative effects of subjective norms on young adults' alcohol use, campaigns should seek to alter the strong association of social groups with alcohol consumption, and instead promote involvement with healthier activities. Further, drink driving literature has suggested that campaigns should aim to correct misperceptions about group norms in order to overcome this influence on young adults' behaviors (González-Iglesias et al., 2015). To influence the social norms identified in this study and previous research (Hamilton & Schmidt, 2014), drowning prevention campaigns could employ a similar approach by encouraging non-alcohol-related behaviors and activities in aquatic contexts, citing also the potential for disapproval from their social group if alcohol is consumed. Factual information about alcohol-influenced aquatic activity could be presented through campaigns addressing social norms to correct any misperceptions.

Cognitive attitudes were identified as another predictor of intention to participate in alcohol-influenced aquatic activity, and these are formulated from the individual's perceptions and information about the behavior (Ajzen, 1989). This finding contrasts to earlier literature, where affective attitudes typically have been shown as stronger predictors of risky behaviors than cognitive

attitudes, due to the emotional response they invoke (Lawton et al., 2009; Russell, 2003). Previous research has suggested that when individuals are ambivalent towards a behavior, their cognitive attitudes along with anticipated affective reactions, can become influential in their decision-making about involvement in that behavior (Conner et al., 2013). The current participants reported overall neutral attitudes towards alcohol-influenced aquatic activity. Those with more accepting cognitive attitudes and perhaps perceiving less negative emotional outcomes may have been more likely to intend to participate in this behavior. Consequently, drowning prevention practitioners should strive to develop a more disapproving attitude towards alcohol-influenced aquatic activity among young adults and ensure they have accurate information to remain safe and cautious when in aquatic settings. Alcohol-influenced aquatic activity is prominent within the culture of some nations, such as Australia (Abercromby et al., 2020), and practitioners aiming to prevent alcohol-related drowning incidents should consider implementing approaches similar to those adopted for preventing drink driving. A combination of prevention methods, such as legislation and legal alcohol limits; random breath tests in aquatic settings; and, enforcing penalties may prove beneficial in changing attitudes towards alcohol-influenced aquatic activity. Such methods had demonstrated success in shifting the norms and acceptance of drink driving, as well as reducing associated deaths within Australia (Trinca, 1987), and may have a similar effect on alcohol-related drownings.

Prior experience was the strongest predictor of intention. This finding is consistent with other alcohol-related research which indicated that positively evaluated experiences of risky behavior could lead to enhanced intention and repetitions of the behavior (Conner et al., 1999). This practice may result in the formation of a habit that requires less cognitive processing, thought, or consideration with the behavior becoming more automated (Ajzen, 2002; Ouellette & Wood, 1999). Habit formation has been demonstrated to influence involvement in risk-taking behaviors, and research has recommended tougher controls and penalties should be introduced to break these habits (De Pelsmacker & Janssens, 2007). This guidance is based on habits involving risk to the individual, but details of the level of risk associated with the current young adults' previous experiences were not recorded, and it is likely that the degree of risk exposure varied across participants. For example, actual behaviors of participants within this study may have included some who had been swimming and diving; others could have been standing in the water; some recreating in deep water in a high-risk open water setting; and all while consuming different amounts of alcohol. Without details of participants' behaviors, experiences or habits in aquatic settings, it is impossible to determine the actual risks young adults were exposed to during their past involvement, and how this may influence their intentions and future behaviors. To address this limitation, future research should consider naturalistic observations of young adults drinking alcohol in aquatic settings to monitor the amount of alcohol consumed, the

objective risks of their behaviors, and the participants' own perspectives of the experience. This would provide a significant contribution to understanding young adults' alcohol-related behaviors in aquatic settings, determine their actual and perceived exposure to risk, and the subsequent effect on their future actions. This new knowledge would be invaluable to inform future prevention campaigns.

In an attempt to measure risk, the survey questions in the current study tried to gauge exposure by inquiring about the frequency participants' consumed alcohol in aquatic locations in relation to their attendance at those locations. Details of the amount of alcohol they consumed during their visits was also collected, but this question produced a poor reliability score and was removed. Findings indicated that high intention to participate in alcohol-influenced aquatic activity, and a high influence from friends, were both significant predictors (explaining 51% of the variance) of participants' previous high-frequency involvement in alcohol-influenced aquatic activity.

The strong influence of friends is consistent with previous literature which has identified that adolescents' risky drinking behavior corresponds with that of their close friends, even longitudinally, and particularly when the friend is considered to be of higher social status and the friendship is non-reciprocal (Bot et al., 2005). Frequency of peer communication about a behavior (e.g., driving) can enhance young people's perceptions of their peers' approval of risks associated with that behavior (e.g., breaking speed limits), even without necessarily discussing those risky actions (Geber et al., 2019). Actual involvement in this risky behavior heightens when peer communication becomes positive towards it (Geber et al., 2019). Young adults' friends have also been shown to influence positive behaviors. Abercromby et al. (2020) indicated peers and the social environment were influencers on young adults' decision to be involved in, or avoid, alcohol-influenced aquatic activity. Earlier literature has also demonstrated that friends can influence reductions in young adults' risk involvement by non-involvement in the risky behavior (Butters, 2004; Maxwell, 2002); involvement in prosocial behaviors (Prinstein et al., 2001); and promoting safer involvement (Bobrova et al., 2005). As the current study did not determine the details of friends' influence, simply developing campaigns to address peer influence may lack effectiveness, as peers actually may be encouraging 'safe' but frequent participation in alcohol-influenced aquatic activity, through limiting certain activities or the amount of alcohol consumed. What could be suggested, in accordance with prior research (Bazargan-Hejazi et al., 2016; Klassen et al., 2000) and alongside the previous recommendation for observational investigations, is that campaigns be developed which aim to heighten awareness of the risks associated with alcohol-influenced aquatic activity. Young adults could be encouraged to apply this knowledge in situations where subjective norms or peer behavior may be encouraging risky behaviors and thus make more suitable decisions based on

the additional knowledge. In this way, practitioners can attempt to address the prevalence of young adults experiencing alcohol-influenced drowning incidents by encouraging informed decision making among friends since this research has shown social groups affect frequency of involvement in alcohol-influenced aquatic activity.

Intention was also a predictor of previous involvement in alcohol-influenced aquatic activity, albeit at a lower level than that of the influence of friends. This effect of intention is consistent with previous research where intention has significantly predicted texting while driving (Nemme & White, 2010), problem gambling (St-Pierre et al., 2015), and risky aquatic behaviors (i.e., swimming outside beach flags; White & Hyde, 2010). Despite participants reporting high intention to participate in alcohol-influenced aquatic activity, the details of this intention (e.g., how much alcohol they intended to consume, their intended aquatic activities), and how this corresponded to their actual behavior and risk exposure was beyond the scope of this study and remains unknown. Meta-analyses of TPB literature have suggested that past behavior can significantly reduce the intention-behavior relationship (Hagger & Chatzisarantis, 2002), and that past behavior is a more important predictor of behavior than intention (McEachan et al., 2011). Accordingly, this may demonstrate the need for interventions to target separately those who have, and have not, previously participated in alcohol-influenced aquatic activity because their intentions and approach to the behavior may be different. Therefore, whilst this finding aligns with the TPB in that intention predicted behavior (Ajzen, 1985), further research is required to determine what young adults intend to do when participating in alcohol-influenced aquatic activity, and how this may vary between those with previous experience and those without. A qualitative approach could be appropriate to investigate this concept more deeply than is possible through surveys. The findings of such research would support practitioners to be more focused with their prevention efforts.

Limitations

A limitation of this study was that alcohol-influenced aquatic activity was self-reported. While steps were taken to encourage honesty (e.g., participant anonymity and participants encouraged to complete the survey alone), it is possible some participants may have completed the survey inaccurately to align with their perceptions of acceptable behavior, particularly as the survey inquired about risky and potentially socially undesirable behaviors (Grimm, 2010). Furthermore, while efforts were made to obtain a large and varied sample, the majority of participants reported holding, or studying towards, a university degree and had received some form of water safety education which could limit the generalizability of the results. These sample characteristics may have influenced the results and could explain why no significant prediction of PBC, knowledge, or gender was recorded on intention or behavior. Participants may have not been affected by these variables. These variables should not be

disregarded from future research particularly considering the demonstrated risks associated with gender for experiencing alcohol-related drowning incidents (e.g., Hamilton et al., 2018). Likewise, an absence of socioeconomic information in this study led to its effect not being considered, and consequently the inclusion of such detail in future investigations is recommended.

Conclusion

To conclude, this study offers new information detailing predictors of young adults' self-reported intention and previous participation in alcohol-influenced aquatic activities. High subjective norms, previous involvement in alcohol-influenced aquatic activity, and cognitive attitudes that are accepting of this behavior predicted high intention to be involved in this activity in the upcoming 12 months. When predicting frequency of past involvement in alcohol-influenced aquatic activity, high intention and a high influence from friends were significant contributors. The notable influence of subjective norms, and of friends on the reported intention and frequency of past behaviors of study participants highlight areas of focus for future prevention efforts. While this study enhanced understanding of young adults' involvement in this behavior, the actual exposure to risk and motives of participation in alcohol-influenced aquatic activity remain unknown and should be further explored. When developing future interventions, drowning prevention practitioners should consider promoting safe aquatic behaviors and correcting misperceptions of norms, as well as enhancing awareness of risks associated with alcohol-influenced aquatic activity. In doing so, young adults may be encouraged to recognize risk and make informed decisions about their behaviors in social aquatic situations.

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