



Preventing adolescent drowning: Understanding water safety knowledge, attitudes and swimming ability. The effect of a short water safety intervention

Lauren A. Petrass*, Jennifer D. Blitvich

Faculty of Health Federation University Australia Mt Helen, Ballarat, VIC, Australia

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ABSTRACT

Worldwide, epidemiological data indicate that children are a high-risk group for drowning and while progress has been made in understanding toddler drownings, there is a lack of empirical evidence regarding the drowning risk and protective factors inherent for adolescents and young adults. This study used a self-report questionnaire to establish swimming and water safety knowledge and attitudes of young adults and objectively measured their actual swimming ability using formal practical testing procedures. Participants then completed a short, 12-week intervention that encompassed swimming, survival and rescue skills, along with water safety knowledge applicable to a range of aquatic environments. Knowledge, attitudes and swimming ability were then re-measured following the intervention to evaluate its effectiveness. The Wilcoxon matched pairs signed ranks test was performed to detect whether there were significant differences between knowledge, attitude and swim ability scores pre-intervention and post-intervention. A total of 135 participants completed the baseline and follow up questionnaire and all practical testing. Results indicated that these young adults had a very low level of water safety knowledge pre-intervention, although the majority had sound swimming and water safety skills and attitudes. Overall, significant improvements were evident in knowledge ($p < 0.001$) and swim ability ($p < 0.001$) post-intervention, although no changes were observed in attitudes ($p = 0.079$). Previous participation in formal swimming lessons and/or swimming within the school curriculum had no significant impact on water safety knowledge, skills or attitudes of these young adults, and there were few significant gender differences. While it is important to conduct further studies to confirm that these findings are consistent with a more representative sample of young adults, our findings are the first to provide empirical evidence of the value of a comprehensive aquatic education program as a drowning prevention strategy for young adults.

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1. Introduction

Worldwide, epidemiological data indicate that children are a high-risk group for drowning (Taneja et al., 2008). In Australia, for example, between July 2002 and June 2011, there were 589 drowning deaths in the 0–19 year age group. Significant progress has been made in understanding toddler drownings in Australia and other high income countries. Drowning prevention measures for toddlers and young children typically include strategies such as isolation swimming pool fencing (Thompson and Rivara, 1998), supervision (Petrass et al., 2011) and child safe play areas (Fragar et al., 2003), and teaching parents skills such as CPR (Marchant et al.,

2008). In contrast, there is a lack of empirical evidence regarding the drowning risk and protective factors inherent in the later age groups and the diversity of drowning locations and activities within these groups makes prevention a significant challenge.

Research relating to drowning deaths among young adults (both male and female) has predominantly focused on a small number of key risk factors including alcohol and drug use; risk-taking behaviour; and swimming ability. The negative effect of alcohol consumption in and around aquatic environments has been widely documented (American Academy of Pediatrics, Committee on Injury, Violence, and Poison Prevention 2003; Driscoll et al., 2004; Quan and Cummings, 2003). A recent Australian study investigating drowning in the 15–19 years age group identified that alcohol was involved in 21% of all drowning deaths, most commonly at rivers, creeks and streams (Royal Life Saving Society Australia [RLSSA], 2012a), and this has been identified as a priority

* Corresponding author. Tel.: +61 3 5327 9392.

E-mail address: l.petrass@federation.edu.au (L.A. Petrass).

concern (Australian Water Safety Council, 2012). Further, during adolescence there is a complex interaction among psychological, cognitive and physical developmental processes which cumulates in increased risk taking and novelty seeking behaviours (Steinberg, 2004). This, combined with increasing autonomy and the need to gain peer approval and acceptance, results in heightened vulnerability to injury (Johnson and Jones, 2011; Steinberg, 2004), particularly drowning in aquatic settings. Supervision remains as a drowning prevention strategy for young adults however, due to their increased autonomy, supervision changes from being provided by parents to almost entirely being provided by lifeguards and peers (Royal Life Saving Society Australia [RLSSA], 2012a). Accordingly, young adults need to be equipped with sufficient swimming and water safety knowledge and skills to make informed decisions and take appropriate action in a variety of situations where a drowning risk is present.

While limited research connects increased swimming ability (though some form of instruction) to a decrease in drownings (Smith, 1995), swimming ability continues to be considered a preventative strategy that may be beneficial for persons of all ages (Brenner et al., 2003, 2009). Accordingly, RLSSA promotes that every child should have access to a quality swimming and water safety education program that includes swimming, survival and rescue skills, and water safety knowledge suitable for use in a range of aquatic settings (Royal Life Saving Society Australia [RLSSA], 2012b). For young children, research indicates that swimming skills are more readily attained when motor development is at least the level of a 5 year old (Blanksby et al., 1995; Parker and Blanksby, 1997). However, it remains unknown whether the swimming and water safety skills and knowledge acquired through participation in formal swimming lessons as a young child are retained at older ages. Further, it is also unknown whether swimming and water safety education programs conducted through the primary and secondary school years impact on young adults' (18–34 years) water safety skills and knowledge.

Recent international research investigating the relationship between perceived and real swimming ability of first year collegiate physical education students (aged 17–29 years) in Australia, Japan, New Zealand and Norway confirmed that most students had a sound aquatic skill base. This was expected, given that participants were undertaking a program where aquatic activities were part of their professional development (Moran et al., 2012; Petrass et al., 2012). In contrast, a self-report study that examined the swimming ability of US adults, which claimed to be representative of the US population, indicated that 37% of respondents reported limited swimming ability (defined as unable to swim/could not swim the length of a standard pool [24 yd or 22 m]) (Irwin et al., 2009). Equivalent research on the swimming competence of young Australian adults is lacking, and to our knowledge no research has considered the swimming and water safety knowledge and attitudes of this population. Therefore this study fulfils three purposes: (1) to ascertain the water safety knowledge, attitudes and swimming ability of young Australian adults; (2) to explore demographic variables that significantly influence water safety knowledge, attitudes and swimming ability; and (3) to determine the effect of a 12-week swimming and water safety intervention on young adults' swimming and water safety knowledge, attitudes and ability of young adults.

2. Method

2.1. Participants and procedure

The “Can You Swim Intervention” study was conducted between February and June 2010. All first year Bachelor of Exercise and

Sports Science students were invited to participate as the swimming and water safety intervention program was embedded within the Swimming and Water Safety course that formed part of the students' undergraduate degree. General background information relating to the study was provided in the first practical class and students interested in the intervention completed a substantially extended version of the “Can You Swim” self-report survey (described in Section 2.2) which provided baseline data. Following the completion of the survey, practical swimming assessment commenced (to gather baseline practical skills data) and all practical assessment was completed within the first four practical classes, well before the specific skills were introduced, to eliminate the possibility of learning in the course impacting pre-intervention results. To decrease the likelihood of participant response bias, students were not informed that some of the survey questions paralleled the practical test items. To enable comparisons between pre- and post-intervention, in the final practical session of the swimming and water safety intervention program the “Can You Swim Intervention” self-report survey and practical assessment items were repeated. Ethical approval was granted by the University Human Research Ethics Committee and informed consent was obtained from all participants prior to the completion of the survey and practical swimming assessment.

2.2. Instruments

The “Can You Swim Intervention” self-report survey was an extended version of the survey validated for similar use and applied in a large international study that included New Zealand, Norway, Japan and Australia (Moran et al., 2012; Petrass et al., 2012). Modifications to the original survey included the addition of ten multiple choice questions that assessed swimming, water safety and aquatic knowledge (e.g., which of the following categories of drowning victims is least likely to wave or call for help?). Twelve attitude statements were included, with participants required to indicate the extent of agreement to each statement on a five-point Likert scale (ranging from strongly agree to strongly disagree). For example, it is safe to swim at surf beaches and rivers after consuming more than 1–2 standard alcoholic drinks. Eight closed-ended response questions were also added that enabled characterisation of aquatic participation and behaviour (e.g., in the past year how often did you swim at the following venues: home swimming pool; public swimming pool; surf beach; lake, pond, water hole; river, creek).

To establish content validity of the additional 30 questions in the “Can You Swim Intervention” survey, the entire instrument was reviewed by a panel of eight experts with extensive swim coaching and teaching experience. Two academics with psychology backgrounds also reviewed the instrument, specifically focussing on the attitude and behaviour questions. Experts were invited to provide suggestions for modifications, additions or deletions to the survey content. Expert feedback was collated and condensed and a small number of modifications were made to the wording within the survey. The amended version was piloted with a small number of Bachelor of Education students, a group similar to the study participant group. This pilot trial enabled face validity to be determined, ambiguity within questions identified and addressed, and instructions and question wording clarified where necessary. All feedback received from the pilot study was addressed for questionnaire improvement.

Test–retest reliability of the extended “Can You Swim Intervention” survey was conducted one month prior to the data collection. Reliability was assessed through repeat completion of the questionnaire over a short time interval (mean 14 days) with a group of 50 Bachelor of Education students. Kappa statistics were

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