DECIDING TO DRIVE THROUGH FLOODWATER

A qualitative analysis through the lived experience

Research Partner

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ABOUT ROYAL LIFE SAVING

Royal Life Saving is focused on reducing drowning and promoting healthy, active and skilled communities through innovative, reliable, evidence based advocacy; strong and effective partnerships; quality programs, products and services; underpinned by a cohesive and sustainable national organisation.

Royal Life Saving is a public benevolent institution (PBI) dedicated to reducing drowning and turning everyday people into everyday community lifesavers. We achieve this through: advocacy, education, training, health promotion, aquatic risk management, community development, research, sport, leadership and participation and international networks.

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Royal Life Saving Society – Australia
The drowning prevention research of the Royal Life Saving Society – Australia is proudly supported by the Australian Government.

Australian Government

159

Drowning deaths known to have involved flooding across Australia, between 2004/05 and 2014/15.

53%

Over half of these were known to be as a result of driving through floodwaters.

IN A QUALITATIVE STUDY OF PEOPLE WHO HAD PREVIOUSLY DRIVEN THROUGH FLOODWATERS COMMON THEMES BEHIND THE DECISION MADE WERE REVEALED:

Past experience

- Having successfully driven through floodwaters in the past

Individual perceptions

- Pressure to arrive at the destination
- Situation perceived to be different to warnings
- Avoiding the potential to become stranded
- Lack of appeal of alternatives (such as alternative routes)

Social and environmental context

- Pressure from other drivers to go through
- Encouragement from others in the car that they could make it
- A sense of security that there were others there to rescue them if something went wrong
- Witnessing other motorists successfully drive through

Self-efficacy judgments

- Believing they had the skills and knowledge to drive through safely
- Belief in their ability to assess and mitigate the risks posed by floodwaters
- Belief in the ability of their vehicle (e.g. 4wd, presence of snorkel, diesel powered)

Driving through floodwaters is not worth the risk.
The findings of this study will be used to develop evidence based interventions aimed at reducing the prevalence of driving through flooded waterways and ultimately save lives.

Respect the River
Saving lives in Australian Rivers

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DECIDING TO DRIVE THROUGH FLOODWATER: A QUALITATIVE ANALYSIS THROUGH THE LIVED EXPERIENCE

Table of Contents

Table of Figures 5

Executive Summary 6
Past experience 6
Individual perceptions 6
- Pressure to arrive at the destination 6
- Situations perceived as different to warnings 6
- Avoiding the potential to become stranded 6
- Lack of appeal of alternatives 7

Social and environmental context 7
- Social influences: pressure, encouragement, and a sense of security 7
- Other motorists driving through 7
- Perceived environmental conditions 7

Self-efficacy judgements 7
- Skills and knowledge 7
- Perceived ability to assess and mitigate risk 7
- Vehicle efficacy beliefs 7

Conclusion 9

Did you know? 9

Next Steps 10
Policy, Programs and Advocacy 10
Research Agenda 10

Background 11

Aims 12

Methods 13
Participants 13
Design and Procedure 13
Interview Guide 13
Interview Analysis 13

Results 14
Past Experience 14
Individual Perceptions 14
- Pressure to arrive at destination 14
- Situation perceived as different to warnings 15
- Avoiding the potential to become stranded 15
- Lack of appeal of alternatives 15

Social and Environmental Context 16
- Social influences: pressure, encouragement, and sense of security 16
- Other motorists driving through 16
- Perceived environmental conditions 17

Self-efficacy Judgements 18
- Skills and knowledge 18
- Perceived ability to assess and mitigate risk 18
- Vehicle efficacy beliefs 18

Discussion 20
The Influence of Past Experience 20
The Influence of Individual Factors 20
The Influence of Social and Environmental Context 21
Influences on Self-Efficacy Judgements 22
Conclusion 23
Appendix One: Media Release 24
References 26

Table of Figures

Figure 1: Thematic map of influences on decisions to drive through flooded waterways from Hamilton K, Peden AE, Keech JJ & Hagger MS (under review).Driving through floodwater: exploring driver decisions through the lived experience. 19

EXECUTIVE SUMMARY

More than half of unintentional flood-related drowning deaths in Australia are due to driving through floodwater. Currently, there is a critical knowledge gap in understanding why individuals choose to drive through floodwater and the decisions that may lead to such actions. We propose that a more complete understanding of individuals' decisions to drive through floodwater needs to be considered in the context of the lived experience.

Australian drivers (N=20) who had intentionally driven through floodwater participated in semi-structured interviews. Data were analysed using a thematic analysis. Participants were community members from New South Wales and Queensland, Australia who held a current driver's license and who had driven through a flooded road in the past three years (after the launch of the "If it's flooded, forget it" campaign). Ten males and 10 females (N = 20) ranging in age from 19 to 64 years (Mage = 23.94; SDage = 14.25) were recruited using social media, snowballing techniques, and media releases in newspapers and online/websites.

Interviews were conducted with participants using questions designed to stimulate discussion regarding their thoughts in the prelude to driving through the flooded waterway and their experiences of the actual event. Interviews were conducted by telephone or in-person at the drivers' convenience (average length=30 minutes). Drivers were free to speak at length with minimal interruption other than prompting for clarification.

The current study received ethical approval from the Griffith University Human Research Ethics Committee (reference # PSY/A9/15/HREC).

Four overarching themes emerged in the driver's descriptions of factors that influenced their decision to drive through flooded waterways. These were: past experience (e.g. successfully having driven through floodwaters before), individual factors (e.g. situation perceived as different to warnings), the social environment context (e.g. pressure and encouragement from others, seeing other motorists driving through) and self-efficacy judgements (belief in one's own ability to successfully drive through floodwaters).

Past experience

It was common among drivers with previous experience of driving through floodwater to report they had the ability to make a reliable risk assessment which led to an informed decision regarding whether it was safe to drive through a flooded waterway. In addition to the perceived ability to make an informed decision, it was also commonly described that having previously driven through floodwater afforded the experience necessary to safely drive through floodwater in the current situation. Despite the assessment at the time that the skills of driving through floodwater attained through past experience are transferable, following the incident a number of drivers described that this is often not the case given the uncertainty of conditions and lack of safety precautions in place.

Individual perceptions

Pressure to arrive at the destination

The theme emerged in driver descriptions that often there was a strong external pressure felt to arrive at their destination. The pressure that was most commonly described was the pressure to get home to check on the welfare of their family, home, and pets given the severe weather events taking place. Another commonly reported pressure was the perceived need to get to work, which has been described as compelling the driver to take substantial risks. This pressure was described as deriving more from internal rather than external influences in that the need to get to work was placed more upon one's self rather than from a supervisor or manager, and given the adverse weather it was acknowledged that their absence would likely have been excused or relatively inconsequential.

Situations perceived as different to warnings

The theme also emerged that a number of drivers' perceived the circumstances through which they drove through flood water to be different to current government messages such as "If it's flooded, forget it" and media reports of incidents. A number of drivers also reported lack of agreement with, or a lack of clarity regarding, what constitutes a flooded road as outlined by current safety messages. This prompted the need to confirm what flooded really means, particularly with respect to water depth.

Avoiding the potential to become stranded

The theme also emerged that many drivers made the decision to take the risk of driving through floodwater based on the perception that they were likely to become stranded for an extended period if they did not drive through. One driver also described that although comfortable with the alternative option, it became less desirable due to the potential for it to become particularly enduring (e.g. not being able to get home for three days due to being stranded).

Lack of appeal of alternatives

A number of drivers also reported that taking alternate routes were not appealing due to a number of factors including adding extra time to their journey, finding alternative routes were also flooded, and to avoid sleeping in the car for an extended period of time. While these descriptions indicate a deliberate consideration of alternatives (even if their appeal is minimised in this process) and driving through the floodwater, a small number of the drivers described a more impulsive and spontaneous decision making process where they just continued driving through the water without giving much thought to what they were doing.

Social and environmental context

Social influences: pressure, encouragement, and a sense of security

Another theme that emerged from drivers' descriptions was that there was a pressure placed on them from others, and in particular other motorists, to drive through the water. While many drivers reported pressure to drive through the floodwater, a number reported experiencing a more positively framed 'encouragement' from significant others to drive through the flooded waterway. A number of drivers also described the experience of a sense of security being felt due to the presence of other people who would have the potential to rescue them if something was to happen.

Other motorists driving through

A theme emerged in the descriptions of many drivers that their decision to drive through the floodwater was heavily influenced by other motorists driving through the water before them. Based on driver accounts, it was clear that observing others' success in driving through the floodwater was enough evidence for them to not weigh up the risks for themselves. It was also described that seeing others in front go through the water led to the appraisal that the behaviour was less risky than it otherwise would have been.

Perceived environmental conditions

The majority of drivers indicated that fast-flowing water should not be driven into and would likely prevent them making the decision to drive through. The depth of water was also perceived to be important with some drivers reporting that they feel comfortable driving through water up to a certain depth (e.g. 20cm of water in a four wheel drive), but were limited in explaining how they assess the depth.

The type and length of crossing were also perceived to be important. One driver described that the risk was perceived as being lower due to there not being anywhere for the vehicle to be washed off the causeway, the crossing was short, the other side was visible or familiarity with the location. Although many respondents stated they would be unlikely to drive through floodwaters with loved ones (particularly children) in the car, some drivers did drive through with such people in the car.

Self-efficacy judgements

Skills and knowledge

Often described as a key component in deriving the efficacy to safely cross the floodwater were the skills and knowledge attained from past experience. In addition, drivers often described the use of techniques for driving through floodwater or for making an assessment of the conditions. The techniques were stated to have been provided to them by trusted others.

Perceived ability to assess and mitigate risk

Drivers often made an assessment of the risk based on the conditions (e.g., speed of current, depth of water, objects in water, degradation of road). Conditions were reported to be checked either by visual observation of objects in the water or by actually walking through the water. Water depth was commonly identified as a condition examined prior to driving through the floodwater, but this assessment was often subjective with limited means described in assessing actual depth.

Vehicle efficacy beliefs

Many drivers also reported that they perceived their vehicle to be capable of driving through the water, particularly four wheel drives or diesel powered vehicles, even without prior experience of driving a four wheel drive through floodwaters.

Another driver described that the assessed depth of the water entered was within the vehicle manufacturer's approved wading depth (the maximum driving depth of water approved by the manufacturer for the specific vehicle); however, the problem arose when the water was deeper than anticipated.

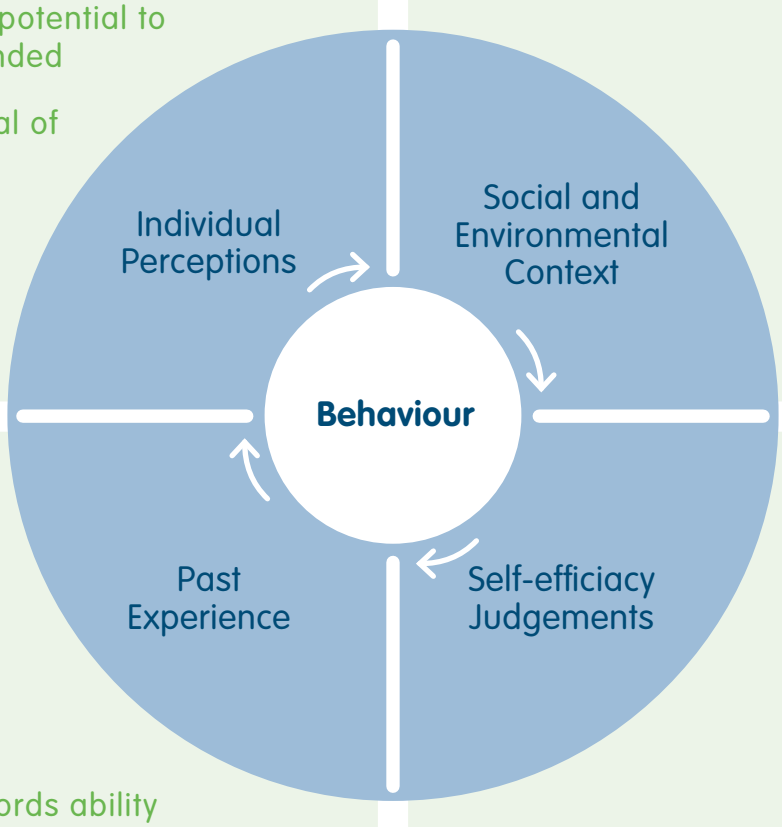
Most salient was that although there was a common awareness of the risk posed by driving through flooded waterways, the decision to take this risk emerged as being heavily reliant on one's ability to construct a sense of self-efficacy in the lead-up to the incident. However, this sense of self-efficacy was often a misrepresentation.

Themes are visually mapped in Figure 1.

Figure 1: Thematic map of influences on decisions to drive through flooded waterways from Hamilton K, Peden AE, Keech JJ & Hagger MS (under review).Driving through floodwater: exploring driver decisions through the lived experience.

- Pressure to arrive at destination (home or work)
- Situation perceived as different to warnings
- Lack of clarity regarding what guidelines refer to
- Avoiding the potential to become stranded
- Lack of appeal of alternatives

- Social influences; pressure, encouragement, and sense of security
- Other motorists driving through
- Perceived environmental conditions



- Experince affords ability to make relaible risk assessment
- Experience affords ability to drive through more safely
- Experience perceived to be transferable to current situation

- Skills and knowledge
- Perceived ability to assess and mitigate risk
- Vehicle efficacy beliefs

CONCLUSION

This study is the first to explore drivers' descriptions of the influences on their decision to drive through a road covered in water. Through inductive analyses of interviews in which drivers provided rich in-depth descriptions of their lived experience, the current study was able to isolate a range of commonly occurring themes which will be instrumental in planning future research and interventions aimed at reducing the prevalence of this risky behaviour.

In summary, it was identified that the overarching influences on driver decision-making were value placed on successful past experiences, individual deliberative motivational and impulsive influences, social and environmental context, and judgements of self-efficacy. It is recommended that future research further explore the identified influences on driver decision making, and target these influences in developing evidence based interventions aimed at reducing the prevalence of driving through flooded waterways. These findings can also be utilised to develop public education materials and prevention programs aimed at road users.

DID YOU KNOW?

- Between 2004/05 and 2014/15, there were 159 drowning deaths known to have involved flooding across Australia.
- Driving through floodwater still accounts for more than half (53%) of unintentional flood-related drowning deaths in Australia.
- In a qualitative study interviewing people who self-reported previously driving through floodwater, past experience, individual perceptions and the social and environmental context emerged as important influences on driver decision-making.
- Despite risk awareness, decisions were heavily reliant on the driver's ability to construct self-efficacy in the lead up to the incident, i.e. beliefs that they would successfully be able to cross due to previous successful attempts, capability of vehicle, presence of potential rescuers, conditions being favourable to a crossing.
- Method of assessing conditions often varied but regularly did not accurately reflect the conditions once the respondent was driving through. These constructions of self-efficacy were often based on false beliefs and the method of assessing conditions often varied but regularly did not accurately reflect the conditions once the respondent was driving through.
- This study is the first to explore drivers' descriptions of the influences on their decision to drive through a road covered in water.
- It is recommended that future research further explore the identified influences on driver decision making, and target these influences in developing evidence based interventions aimed at reducing the prevalence of driving through flooded waterways.

Policy, Programs and Advocacy

- Findings on behavioural aspects behind people's decision making processes to be embedded into flood safety resources and public awareness materials such as fact sheets, video infographics, social media messaging and messaging through mainstream media campaigns as well as Royal Life Saving's national Respect the River program
  - Messages should encourage drivers to turn around and go the other way so as to remove themselves from the situation containing the normative social influence. This could include stopping and calling emergency services if unable to turn around. It is important to encourage people to change their behaviour in the face of social pressure to drive through floodwater
  - This includes advocating for such information to be taught in learner driver education courses to instill a norm about this behaviour
  - Messages should provide information to drivers that risk and depth are often misjudged, even when the driver has experienced driving through floodwater before
  - Messages should encourage drivers to consider their moral obligations in thinking about the potential risk they are exposing bystanders and emergency services personnel to
  - Disseminate more widely, information on the depth of water needed to float most four wheel drives (600mm) to owners and drivers of such vehicles
  - Target these messages at those high risk groups drawn from the fatal drowning data as well as those groups known for risky driving behaviours based on optimism bias (e.g. young males)
- Clarify the meaning of the term flooded and use consistent definitions and terminology when communicating with the driving public (e.g. should 10cm deep water in a four wheel drive not be entered into?)
- Advocate for the inclusion of cues to action be made readily available in the environment within which the behaviour occurs
  - Cues could take the form of a reminder on the back of a car registration label, a small sticker people can place near the four-wheel drive activation button in their vehicle, or clear signs that indicate the danger placed in sections of roads prone to flooding
  - Examine feasibility of utilisation of emergency notification services which can provide messages to cellular mobile phones to warn of impending risks
- Work with authorities responsible to promoting safe driving behaviours should develop readily available resources such as smartphone applications, websites, and fridge magnets where drivers can make a plan and store it in a proximal location
  - These messages should reduce the impact of the internal pressures felt by those driving during adverse weather. Messages should encourage drivers to pre-emptively plan steps they need to take in order to feel comfortable with not making it to their destination
- Encourage government departments responsible for regulating road safety take steps to restructure the physical environment as a means of physically preventing drivers from entering floodwater (i.e. when road closed signs are installed at the location, also install barricades to close off both lanes)
- Target advocacy activities to those government departments responsible for the development of legislation and enforcement of specific offences related to the behaviours associated with driving through floodwaters
  - A legislative approach should involve implementation of specific driving offences attributed to this behaviour, public awareness campaigns regarding the associated penalties and strict enforcement of regulations
- Advocating for change within advertising standards and/or the introduction of legislation mandating what can and cannot be advertised within the promotion of four wheel drives by manufacturers
  - This includes discouraging the use of imagery which glorifies vehicles driving through water

Research Agenda

- Conduct review of known cases of fatal unintentional drowning as a result of flooding
  - Identify common scenarios and risk factors to inform strategies for prevention
  - Review coronial recommendations made around flood related unintentional drowning deaths in Australia to identify common themes and prevention strategies based on expert opinion
- Explore emergency personnel experiences of rescuing people from floodwaters using behavioural theory
- Conduct qualitative interviews with those who self-report avoiding driving through floodwaters to understand the alternative reasons for not driving through floodwater
  - Compare and contrast findings between this study and the study of those who self-report driving through floodwaters
- Conduct research using Functional Imagery Training (FIT) to coax test subjects towards avoiding driving through floodwaters
  - Using mental imagery tasks may be useful in making the non-visible risks associated with driving through floodwaters more salient
- Consider conducting an observational study to observe those driving through floodwaters and the effect of road closure signage
- Consider conducting a quantitative survey-based study investigating the attitudes and beliefs of learner drivers toward driving through floodwaters
  - Use findings to advocate for changes/improvements to the education of learner drivers with respect to flooding

BACKGROUND

Rivers are a significant location for drowning in Australia, with a 10 year review of drowning deaths in Australian rivers, creeks and streams identifying rivers as the leading location for drowning nationally[1]. The Royal Life Saving Society – Australia (RLS) report entitled Drowning Deaths in Australian Rivers, Creeks and Streams: A 10 Year Analysis, found that 735 people drowned in rivers, creeks and streams in Australia between 2002 and 2012.

Rivers continue to be the leading location with the recent Royal Life Saving National Drowning Report 2015, finding that between 1 July 2014 and 30 June 2015, 72 people died as a result of unintentional drowning in Australian rivers, creeks and streams [2], making rivers once more the leading location for unintentional fatal drowning in Australia.

The number of drowning deaths in Australian rivers, creeks and streams has seen the Australian Water Safety Council (AWSC) in successive Australian Water Safety Strategies identify rivers, creeks and streams as being a high risk drowning location [3 4 5]. Interventions proposed include:

- In all communities
  - Develop, implement and evaluate community-focused drowning prevention plans in known inland waterway drowning black spots
  - Explore partnerships that expand reach and effectiveness of flood and weather warnings
  - Identify, develop and implement strategies aimed at reducing alcohol-related drowning around inland waterways
  - Enhance community awareness of the danger of recreating in and around flooded roads and drains, with a focus on conveying the impact of weather and rainfall on the risk
- In rural and remote areas
  - Increase access to inland waterway safety programs for people living in rural and remote areas
  - Address infrastructure and human resource needs in rural and remote areas to ensure adequate coverage of aquatic instructors and safety risk management
- In urban communities
  - Increase access to information on hazards and risks in urban waterways and ensure this information is embedded in drowning prevention programs

In 2015, in response to drowning risk in rivers, creeks and streams, Royal Life Saving launched the Respect the River campaign, with the support of the Federal Government. The program aims to work across Australia to promote safe aquatic recreation and prevent drowning in inland waterways. Local interventions in all States and Territories across the country are helping to spread drowning prevention strategies around the top 10 river drowning blackspots.

The program includes four key river safety tips:

- Wear a lifejacket – Ensure you always wear a lifejacket when boating on our inland waterways to reduce your risk of drowning
- Avoid alcohol around water – Alcohol is a known risk factor for drowning, reduce your risk by not consuming alcohol prior to participating in aquatic activity
- Never Swim Alone – If something goes wrong, there is no one there to help you
- Learn how to save a life - Learn CPR to ensure you have the skills and knowledge to react in an emergency

Floods are among the most widespread of natural disasters [6] and drowning is the leading cause of death [7]. In Australia, flood-related drowning deaths are a key concern, with 17% of all unintentional fatal river drownings known to involve flooding [1]. Between 2004/05 and 2014/15, there were 159 drowning deaths known to have involved flooding across Australia [5]. A risk factor for many flood-related drowning fatalities is intentional driving through flooded waterways or entering floodwaters on foot. Over half (53%) of these were known to be as a result of driving through floodwaters [5].

The prevention of drowning deaths as a result of disaster and extreme weather is also a priority of the Australian Water Safety Strategy 2016-20 [5]. Key objectives associated with prevention within this goal area of the Strategy are to:

- Forge greater links and recognition of drowning prevention in national, regional and community-level resilience building programs
- Implement strategies that raise community resilience that prevents drowning during floods, particularly as a result of driving through floodwaters
- Collaboration is expanded with emergency response agencies to strengthen skills and awareness of aquatic rescue strategies
- Enhance early warning systems to provide practical advice prior to the onset of dangerous surf, flood, storm surge and tsunami, particularly in vulnerable areas to minimize exposure to hazardous conditions

AIMS

Previously completed research drawing on sound psychological theory identified common beliefs about driving through a flooded waterway and examined belief predictors of drivers' willingness to drive through a flooded waterway [8]. This study used two scenarios, low risk (road covered in 20cm of water) and high risk (road covered in 60cms of water) and found a range of beliefs emerged as predicting driver's willingness to engage in the unsafe behaviour.

Beliefs included attitudinal beliefs (sustain vehicle damage, becoming stuck/stranded), beliefs of social expectations (pressure from friends, family members, police) and efficacy beliefs (small distance of water to drive through, presence of signage). The study identified the need to incorporate attitudinal, normative and control influences into interventions aimed at reducing people's willingness to drive through flooded waterways [8].

With the aim of understanding behavioural decisions around flooded waterways, Royal Life Saving partnered with Griffith University to undertake research into the behaviours of those who self-report having previously driven through floodwaters, with the aim of understanding the experiences of drivers who have previously driven through flooded waterways.

Although previously conducted research has identified a range of beliefs that play a role in influencing individual's motives to drive through floodwater, there is a knowledge gap in understanding the experiences of individuals who have driven through floodwater and the decisions that led to their actions. Therefore this study aims to adopt qualitative methods, using semi-structured interviews with 20 participants to uncover experiences of individuals who had intentionally driven through floodwater.

METHODS

Participants

Participants were community members from New South Wales and Queensland, Australia who held a current driver's license and who had driven through a flooded road in the past three years (after the launch of the "If it's flooded, forget it" campaign) [9]. Ten males and 10 females (N = 20) ranging in age from 19 to 64 years (Mage = 23.94; SDage = 14.25) were recruited using social media, snowballing techniques, and media releases in newspapers and online/websites.

Many of the drivers (65%) were employed full-time, 25% were studying full-time at university, one driver was working part-time alongside home duties, and one was unemployed. The majority of drivers (70%) reported having children, and three of those had their children in the vehicle at the time of the experience. A quarter of the drivers (25%) had completed senior high school, 35% had received a vocational/trade qualification, and 40% had received a university degree qualification.

All but one of the drivers were from English-speaking backgrounds and all but two drivers (who held provisional licenses) held an unrestricted drivers license, with years of driving experience ranging from 1 to 47 years (M = 21.10). A quarter of the drivers (25%) drove large four-wheel drive vehicles (e.g., Toyota Landcruiser) and 35% drove dual-cab ute four-wheel drive vehicles (e.g., Toyota Hilux), while 20% drove small or medium four-wheel drive vehicles (e.g., Honda CRV) and 20% drove small sedan or hatchback vehicles (e.g., Hyundai i30).

Drivers were provided with a $50AUD department store gift card as an incentive for participation.

Design and Procedure

The current study adopted an interpretivist inductive approach to understand the experiences of drivers who had driven through a flooded waterway (i.e., driven a vehicle through a road covered in flooded water to a depth of 60cm or greater). Results reported are part of a larger study investigating the experiences of individuals who had intentionally driven through floodwater and emergency personal who rescue them. This report focuses on drivers' experience both in the lead-up to and after the event.

Questions were thus designed to stimulate discussion regarding their thoughts in the prelude to driving through the flooded waterway and their experiences of the actual event. Author JK, a researcher trained in qualitative methods, conducted the interviews by telephone or in-person at the drivers' convenience (average length=30 minutes). Drivers were free to speak at length with minimal interruption other than prompting for clarification.

All interviews were audio-recorded and uploaded to a secure website for verbatim transcription. As Braun and Clarke [10 11] note, it is good practice to reflect on researcher assumptions to maintain transparency in analysis. The researcher therefore kept a reflexive journal throughout the interview and data analysis process.

The current study received ethical approval from the Griffith University Human Research Ethics Committee (reference # PSY/A9/15/HREC).

Interview Guide

The interview was guided by a series of open ended questions common to each interview and designed to stimulate participants in providing a rich, detailed self-directed narrative of their experiences. In order to lead in to the discussion surrounding drivers' experience of driving through a flooded waterway and to gain an understanding of their knowledge about the behaviour, the interviewer first asked, "Are you aware of any information about driving through flooded waterways?"

The second question focused on drivers' thoughts in the prelude to driving through the flooded waterway, "If you are comfortable, can tell me about the circumstances that led up to you driving through the floodwater?" Where descriptions had not already been provided, the interviewed probed for information regarding physical and social environment (e.g., situation, type of car, others in car), prior behaviour, attitude regarding costs and benefits at the time of the situation, normative expectations, and self-efficacy beliefs.

The third question related to drivers' experience of the actual event, "Again, if you are comfortable, can you tell me about your actual experience of driving through the flooded waterway?" At the conclusion of the interview, drivers were invited to share any additional thoughts on their experience or the behaviour in general, or if they believed the interviewer had missed anything they would like to share. To ensure the rigour of analyses, confirming summaries occurred throughout the interviews to validate drivers' responses.

Interview Analysis

As the aim of the current research was to allow themes to form based on individuals' descriptions of their experiences, a thematic analysis based in an interpretivist approach was used to interpret the data [10 11]. Author JK coded the transcripts.

To ensure stability of coding, a code-recode procedure was undertaken for 20% of the data and author KH co-coded 10% of the data. The transcribed data was first read and re-read to ensure familiarity. Interesting features of the data were then identified and coded systematically in relation to the research question using NVivo 10 qualitative analysis software. At the next step, codes were searched and separated inductively into initial themes.

Using an iterative process, themes were reviewed with reference to the interview transcripts from which they were drawn in order to ensure they were reflective of their original contexts. Themes were then reviewed, refined, and named by authors KH and JK. As a final step, the list of themes was reported and extracts were included to demonstrate contextual significance.

Almost all drivers reported an awareness of information about the risks of driving through floodwater. This included government directives and campaigns (e.g., "If it's flooded, forget it") that urge people not to drive through floodwater, as well media reports of fatalities, vehicle losses, and experiential awareness.

Overall, drivers described that the information indicates that driving through floodwater is risky and should not be undertaken and, despite this awareness, all made the decision to drive through floodwater. Through thematic analysis of the interview data, the following themes emerged regarding drivers' decisions to drive through floodwater and their experiences of their actions. Themes that emerged from the data were similar across drivers. Thus, the most salient emerging themes across all drivers are presented below. Extracts are classified by driver number (e.g., P01) and themes are visually mapped in (Figure 1).

Past Experience

It was common among drivers with previous experience of driving through floodwater to report they had the ability to make a reliable risk assessment which led to an informed decision regarding whether it was safe to drive through a flooded waterway. Accounts of past experiences varied with some drivers reporting experience in a recreational four-wheel-driving setting, while others reported experience driving through urban roads covered in water or roads familiar to the driver that are known to flood. One driver described, *"They say you know, don't go into the water, you know if there's water across the road don't go in, basically is what they say. But from my experience having lived in a flood prone area for 35 years, yeah we usually have had to make our own judgement." - P04.*

The value of past experience was particularly impactful for some drivers who described dissatisfaction with campaigns discouraging all driving through floodwater, *"It just comes down to experience and also understanding with that particular crossing…I get annoyed that they paint the standard picture that no one can drive through floodwater and that there are people that do stupid things, but there is also situations where it is safe to drive through floodwater and also that if you are living in a remote or regional area that there's going to be a lot of times where you actually do have to drive through floodwater, and I don't think that they take that into account." - P08.*

In addition to the perceived ability to make an informed decision, it was also commonly described that having previously driven through floodwater afforded the experience necessary to safely drive through floodwater in the current situation. One driver described, *"Look I've driven four-wheel-drives for 10 years and I've driven through water crossings and different things plenty of times. So for me I feel I'm a very skilled four-wheel-drive water crossing sort of person… I'd driven through flood water earlier in the day, and quite comfortably." - P19.*

Despite the assessment at the time that the skills of driving through floodwater attained through past experience are transferable, following the incident a number of drivers described that this is often not the case given the uncertainty of conditions and lack of safety precautions in place. For example, one driver described, *"And I realise that it's not...when you're out four-wheel-driving and things like that you're more controlled on what's going on around you. And because of other people. There's a lot more other people that make different choices and you're not in control of them. So it made me a little bit, now that I've heard more of those "If it's flooded forget it". You don't know what the road's like underneath', all that kind of stuff it's made me think that's exactly right. You don't know. You're not in control. You don't have safety measures in place." - P19.*

Individual Perceptions

Pressure to arrive at destination

The theme emerged in driver descriptions that often there was a strong externally felt pressure to arrive at their destination. The pressure that was most commonly described was the pressure to get home to check on the welfare of their family, home, and pets given the severe weather events taking place. Two drivers described, *"I wanted to get home to my family and I had a young daughter at home and my thoughts were I have to get home and make sure they are all okay." - P01*; and, *"By that point I had been in the rain so much I was starting to worry about my house, if it was this wet, what was my house like, worried about my dog." - P11.*

It was also described by another driver that given the rising water and adverse weather there was a desire to reach the safety of home, *"The town was almost actually isolated with the, you know, the floods that were surrounding it and I just wanted to get home." P17.*

Another commonly reported pressure was the perceived need to get to work, which has been described as compelling the driver to take substantial risks. One driver described, *"I saw…this is going to sound dreadful, I saw signs up saying the road was closed. But there were cars, four-wheel-drives coming towards me so I thought…and I thought 'oh I should turn around, I should turn around', but I was panicking about being late for work. I felt really panicky about not getting there. And when I saw four-wheel-drives coming towards me I thought okay I can do this." - P04.*

This pressure to get to work was described as deriving more from internal rather than external influences. In both instances it was described as being placed upon one's self rather than from a supervisor or manager, and given the adverse weather it was acknowledged that their absence would likely have been excused or unimportant. For example, one driver described, *"It was mainly the pressure from the people behind and the pressure to get there and lecture. The silly thing is once I got through that my phone went [phone message received], and the people were saying that [de-identified; workplace] was out of power and totally flooded in there and they were cancelling the lecture anyway." - P20.*

Situation perceived as different to warnings

The theme also emerged that a number of drivers' perceived the circumstances through which they drove through flooded water to be different to the government messages such as "If it's flooded, forget it" and media reports of incidents. One driver described, *"So wherever you see the incidents on television where there is normally a drop to the side where the cars had been pushed off and my understanding was that due to the impact on the side of the car it probably got stuck. Or they were driving through water in excess of a metre high. Or in a normal car, two-wheel drive." - P15.*

Another driver reported a similar account, *"Before that there was the Grantham flood (severe 2011 flash flooding event that occurred in rural Queensland, Australia where 12 people were killed; Grantham Floods Commission of Enquiry, 2015) and all that, yeah. I think, yeah [I was] more aware of people getting washed off bridges and things. But I mean I didn't feel this was a bridge, I know it's double standards. I wouldn't have driven down and up a bridge but this was, I felt oh this is a long straight where the water has made like an ocean like yeah." - P04.*

A number of drivers also reported lack of agreement with, or a lack of clarity regarding, what constitutes a flooded road as outlined by the safety message *"If it's flooded, forget it." For example, one driver described, "Like you said if it's flooded forget it. But then really what is flooded? Is it 100mm over the road surface? You can still see the road from there. I don't know if too many people are going to heed to 100mm over the water." - P05.*

Avoiding the potential to become stranded

The theme also emerged that many drivers made the decision to take the risk of driving through floodwater based on the perception that they were likely to become stranded for an extended period if they did not drive through, *"I was concerned that I would be stuck on that side and then there was no way back either because the motorway was being cut [behind me] so I would have been stuck on the highway for however long." - P01.*

Another driver described that although comfortable with the alternative option, it became less desirable due to the potential for it to become particularly enduring, *"I didn't feel unsafe pulling up and snoozing, but I knew it was going to get worse. It was going… the flood levels were going to get worse, and I thought if I don't get through now, I won't get through for three days, kind of thing." - P12.*

Lack of appeal of alternatives

A number of drivers also reported that taking alternate routes were not appealing due to a number of factors. One driver, for example, described their lack of willingness to take an alternate route, *"I was definitely rushing... because it [the detour to take a friend home] made me a bit late [for work]… I'd say that potentially affected my position because I was so close... and the detour would have added a few more minutes. I reckon that would've definitely affected the decision." - P18.*

Another driver reported that having already gone another way, which had also been flooded, led to an increased desire to make it home on the current route, *"But at that point I think this served then to sort of made me, well not made me do it, but felt like I wanted to do it or could do it was that I had already gone another way, couldn't get home." - P11.*

Another driver described that there was consideration and discussion of alternative options which resulted in the conclusion that going through the floodwater was the only way to avoid sleeping in the car for an extended period of time, *"We did try to reverse up this track and try and turn around and back out again. Which wasn't really feasible at the time due to it was raining we could hardly see out the back while reversing. And I think we came through another creek so I think I made the educated judge that if this creek was flooded then the one behind us would've been flooded as well. So if we got stuck at that stage we'd have to sleep in the car until whenever." - P15.*

While these descriptions indicate a deliberate consideration of alternatives (even if their appeal is minimised in this process), a small number of the drivers described a more impulsive and spontaneous decision making process. One driver described, *"So I slowed, I didn't even come to a complete stop. If I'd have come to a complete stop, I might have been in a frame of mind to think about it more. But I slowed down to the point where I thought I had enough information about it, and then started to make my way through. So I was moving at about, maybe 40 kilometres an hour. Which is what gave the vehicle enough momentum for me not to be able to stop, and then reverse back out of it, as it started to get deeper, and deeper. So I approached it too fast as well." - P13.*

Social and Environmental Context

Social influences: pressure, encouragement, and sense of security

Another theme that emerged from drivers' descriptions was that there was a pressure placed on them from others, and in particular other motorists, to drive through the water. One driver explained, *"I don't think there was ever an option where I wasn't going to do it because I couldn't turn around, or to stop I would have to stop all the traffic" - P11*. It was also described that some drivers experienced pressure (sometimes including horn beeping) from vehicles behind which applied substantial pressure to keep moving and get through the water, *"There was big bus on my tail and he was just getting closer and closer and beeping and shaking his fist at me." - P20.*

While many drivers reported pressure to drive through the floodwater, a number reported experiencing a more positively framed 'encouragement' from significant others to drive through the flooded waterway. One driver explained, *"He [father] was like, 'you know, you've done creek crossings before, you'll be fine, let's get you across quickly, we'll walk it through before the water rises any more' like, and he was just very much like, you know, 'You'll be fine, you can, you have to do it, this is how you're going to do it', like if it wasn't him there telling me what to do, I probably wouldn't have done it. Even if it was, you know, just another person like a, someone who was just there, who I didn't know, I probably wouldn't have done it. So it was a lot of his encouragement I guess." - P16.*

Another driver described that following the incident they wished they were warned rather than encouraged, *"Like I said I wasn't happy about it and I wish that they'd given me a call and said, 'Hey I don't know if you want to try it.' " - P05*. It was also often described that the internal and environmental pressures were concurrently present in the situation, providing a substantial amount of pressure to drive through the floodwater. One driver described, *"So it was mainly the pressure from the people behind and the pressure to get there." - P20.*

A number of drivers also described the experience of a sense of security being felt due to the presence of other people who would have the potential to rescue them if something was to happen. One driver described that due to the presence of her father standing on the other side she felt comfortable that she could be rescued if the experience did not go as planned, *"I felt more comfortable someone else being there if something went wrong, then you know, they'd call for someone to come help, or they could come in and help me and being very experienced, they would have been able to jump in and help me." - P16.*

Another driver; who was travelling in a convoy of other families on a vacation, similarly described an influential factor in her decision to drive through the floodwater was the presence of potential rescuers, *"If anything would have happened then there's always someone to, you know, save us." - P14.*

Other motorists driving through

A theme emerged in the descriptions of many drivers that their decision to drive through the floodwater was heavily influenced by other motorists driving through the water before them. One driver stated, *"Probably if I'd been the only person on the road I might have hesitated but I saw other people go through in similar cars and that was the catalyst for my decision to go through." - P01.*

Based on driver accounts, it was clear that observing others' success in driving through the floodwater was enough evidence for them to not weigh up the risks for themselves, *"It's not like I checked the depth. Whereas if he wasn't there I'd be looking at it and I think... I don't know if I would've gone through it if he wasn't there. It may have influenced my decision seeing...it definitely did seeing someone else go first. It certainly made it easier for me to go just go for it. He made it through, yes I can make it through." - P05.*

It was also described that seeing others in front go through the water led to the appraisal that the behaviour was less risky than it otherwise would have been, *"I'd just seen probably one or two cars make it through the water just before I went to go through. So that's also added I guess to me thinking it wasn't that risky." - P19;* and, *"It's a good indication of whether or not you are going to be able to get through if they go ahead in front of you and they get through in a car that is similar to what you are in, you are a bit more confident to take the risk." - P05.*

Perceived environmental conditions

Perceptions of the environmental context were reported by drivers to be influential in their decision to drive through the floodwater. The majority of drivers indicated that fast-flowing water should not be driven into and would likely prevent them making the decision to drive though. For example, one driver described, *"The speed that the water is travelling at is always important. If the water is travelling really fast I would never go in, if the water is travelling at a slower pace then I'm more likely to consider it." - P04;* and, *"So it's tidal, and knowing that, that's why I'm quite comfortable driving through it. Even when the level is quite high, because there is not a lot of flow it's quite calm conditions." - P09.*

The depth of water was also perceived to be important with some drivers reporting that they feel comfortable driving through water up to a certain depth. One driver described, *"For a four-wheel-drive if it's 200mm of water a four-wheel-drive can drive through that. And they're going to want to get home and no one's going to stop them. They would do it." - P19.*

The type and length of crossing were also perceived to be important. One driver described that the risk was perceived as being lower due to there not being anywhere for the vehicle to be washed off the causeway, *"So it's still flowing but it's wider and there's no drop-off anywhere. You know you're not going to run off the side of the road into a river." - P05.*

Another driver described that the risk was perceived to be lower if the length of the crossing was not far and the other side was visible, *"The creek was about a road length I would say…my theoretical calculation would say maybe 1.5m or less than that…It was quite narrow okay. So I thought the risk is only that much, you know." - P14.*

It was also often reported that drivers felt more confidence in their ability to perceive the depth and conditions, and in their ability to make it through the water when it was a known location. One driver described, *"You drive the road a lot and you obviously like knew that it was flooding and so you know, I just saw the water and then you're sort of like the house is just you know, literally 200m away which should be okay. And like, you know the road and all the rest of it and like 'Oh yeah, it can't be that deep'. And it was deeper than I realised." - P17.*

Further, it was often reported that drivers would not make the same decision to drive through had their kids been in the car at the time, or would have at least considered their need to drive through more carefully. Two drivers explained, *"I don't believe I would have driven through if my child or any of our kids had been in the car" - P01;* and, *"Anytime my daughter is in the car and it's not just me. You know if I take my own risk that's one thing and of course I'm not looking to die. But if my daughters' in the car I'll be a bit safer." - P12.*

Some drivers, however, did have their kids with them at the time of their experience, and often expressed a sense of regret in the period following. One driver expressed this due to the risk placed on the children, *"With kids in the car I felt very irresponsible. Not happy about it. So to the point where I told my work partner and family and stuff. And it's sort of like, Jeez I won't tell too many people" - P05.*

While another described that this was not a good example that had been set for their children, *"Now I reflect back and I think I haven't given my kids a good lesson. I just took the opinion that you know I had to make them happy [by arriving at destination], but it's not a good lesson for their life. Like you know it's a big risk. If it was my children driving in then you know that would give me a big threat." - P14.*

Self-efficacy Judgements

Given the common awareness of the risk posed by driving through flooded waterways, the decision to take this risk has emerged as being heavily reliant on one's ability to construct a sense of self-efficacy in the lead-up to the incident. One driver exclaimed, *"I'd be a dickhead to drive into it if I thought I wasn't going to make it, you know? Like, that's counterintuitive." - P13.*

Skills and knowledge

Often described as a key component in deriving the efficacy to safely cross the floodwater were the skills and knowledge attained from past experience. One driver described, *"It's common sense and experience, that's I guess what I was relying on, experience. From the age of like 10 onwards either driving on country or property roads in central Queensland, or being with family who were doing similar things." - P12.*

In addition, drivers often described the use of techniques for driving through floodwater or for making an assessment of the conditions. The techniques were stated to have been provided to them by trusted others, or were in some cases from unknown origins, *"Trying to keep the revs up. And the bow in the water as well, trying to minimise that. And then suddenly going through the water and applying more and more pressure, acceleration trying to push through it." - P15.*

Perceived ability to assess and mitigate risk

It also emerged that in a deliberate attempt to construct self-efficacy, drivers often made an assessment of the risk based on the conditions (e.g., speed of current, depth of water, objects in water, degradation of road). Conditions were reported to be checked either by visual observation of objects in the water or by actually walking through the water. Water depth was commonly identified as a condition examined prior to driving through the floodwater.

Diverse methods of depth perception were reported, with one driver describing making the assessment based on a car stranded in the water, *"Look, there was the ute that was sort of stuck in the road. And I was looking at where he was at and I was thinking it was probably three-quarters my tyres. And watching the two cars go through beforehand were probably a good indicator as well. That's what I was using to gauge the ability to go through." - P02.*

Getting out of the car and walking through the water also emerged as a common method of assessing the conditions. For example, one driver described, *"But I really did assess it, I spent a good 20 minutes or so walking in this water across this hundred odd stretch of deep water and it was pooling but it wasn't flowing fast and there was no debris in it yet." - P12.*

Following the experiences, however, an overwhelming majority of drivers reported that they had misjudged either the depth of water and/or the conditions. For example, *"It was very still water, and I just, it just dove deeper than I thought it was... and it, there was too late before, you know, before I'd realised. I was lucky enough to put the window down as soon as the car started, that I felt the car float, I pressed the down button on the electric windows, and that's how I had to get out of the car." - P13.*

In addition, in the lead-up to driving through the floodwater, a number of drivers described behaviours executed in a deliberate attempt to mitigate the risk associated with the endeavour. One behaviour, as discussed in the previous paragraph, was walking through to assess the conditions in the actual water. Second, another driver described conducting an internet search to inform their decision-making, *"I did go onto the website did some research on you know what could be the danger and the things so yes I did read through it but we took up the challenge." - P14.*

Finally, another driver described that given the potential for the car to become inundated with water, she made all attempts that her daughter who was asleep at the time was woken up prior to entering the floodwater, *"I did wake my daughter up to make sure that if anything bad happened we got out." - P12.*

Vehicle efficacy beliefs

Many drivers also reported that they perceived their vehicle to be capable of driving through the water. The following driver, whose car was lost while driving through a flooded waterway, describes the self-efficacy that was constructed due to the perceived capability of his vehicle despite reported lack of relevant experience, *"I've never encountered driving through water four-wheel-driving, but you've got a four-wheel-drive you think that that's what you can do." - P02.*

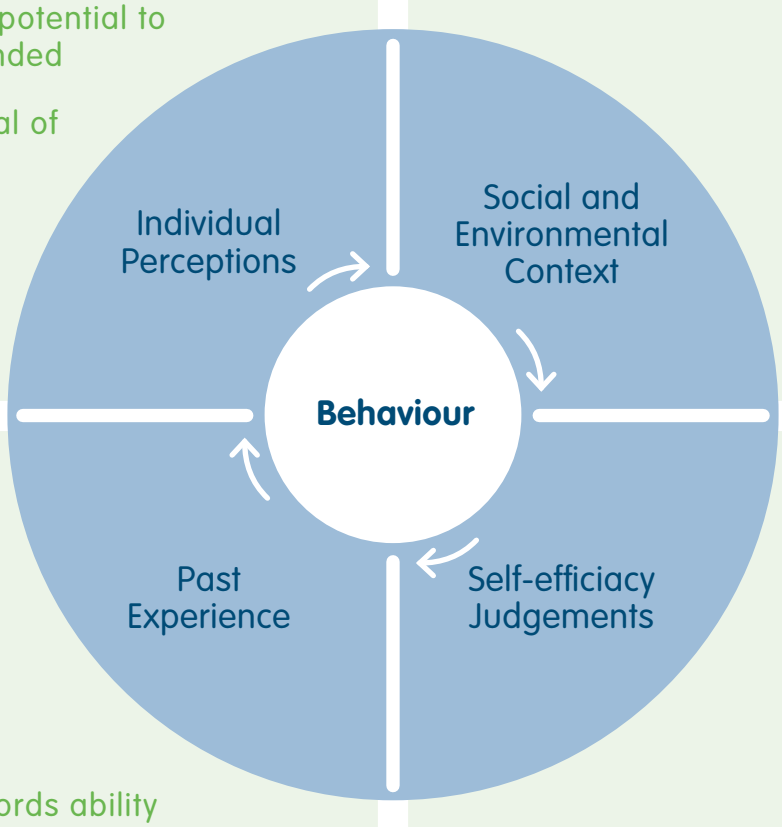
Another driver described that the assessed depth of the water entered was within the vehicle manufacturer's approved wading depth (the maximum driving depth of water approved by the manufacturer for the specific vehicle); however, the problem arose when the water was deeper than anticipated, *"Still would have been a depth that I would have been able to drive through based on the wading depth of that particular vehicle. The vehicle has a wading depth that's approved at a certain point, but that doesn't mean you should be driving through the water." - P13.*

Vehicle characteristics other than driving a four-wheel-drive vehicle were also described as influencing the decision to drive through floodwater, *"I thought well I'm in a diesel I should be alright because that was always part of living in the country, you get a diesel car for floods… with a diesel I'm told, and again I don't know this I'm just taking other…well what men tell me. The diesel will keep going for a lot longer than a petrol car." - P04.*

Figure 1: Thematic map of influences on decisions to drive through flooded waterways from Hamilton K, Peden AE, Keech JJ & Hagger MS (under review).Driving through floodwater: exploring driver decisions through the lived experience.

- Pressure to arrive at destination (home or work)
- Situation perceived as different to warnings
- Lack of clarity regarding what guidelines refer to
- Avoiding the potential to become stranded
- Lack of appeal of alternatives

- Social influences; pressure, encouragement, and sense of security
- Other motorists driving through
- Perceived environmental conditions



- Experince affords ability to make relaible risk assessment
- Experience affords ability to drive through more safely
- Experience perceived to be transferable to current situation

- Skills and knowledge
- Perceived ability to assess and mitigate risk
- Vehicle efficacy beliefs

DISCUSSION

The current study adopted an inductive interpretive approach in order to attain a rich understanding of why individuals decide to drive through roads covered in water despite awareness of the risks. Four overarching themes emerged in driver's descriptions; indicating that value placed on past experience, individual factors, social and environmental context, and self-efficacy judgements, are key influences on behavioural decision-making for driving through floodwater.

The Influence of Past Experience

Past experience of having driven through water, both in recreational settings, and settings where a road has been flooded, emerged in driver's descriptions as an influential theme in deciding whether to drive through a flooded road. Drivers described that they felt confidence in their ability to make a reliable risk assessment, as well as their ability to navigate safely through the floodwater, and that this is afforded by their past experience.

Efficacy derived from past experience is intuitive; however, paradoxical for this target behaviour, given the uncertain and unpredictable conditions. Feelings of confidence and self-efficacy to engage in a particular behaviour rely on the similarity of situations or the transferability of skills; however, following their experience, many drivers reported that conditions were not as expected, and that the skills were not transferable.

Hence, messages aiming to reduce engagement in this behaviour should draw attention to the lack of transfer of skills to judge the depth of flooded waterways across situations and past experience between situations of driving through water. This should be highlighted through provision of information outlining uncertainty and unpredictability of conditions when driving through flooded waterways.

The Influence of Individual Factors

It emerged that a range of individual factors were also influential in decisions to drive through flooded roads. First, a number of drivers described a strong internal pressure to arrive at their destination, particularly in reference to getting home or getting to work. This has been found to occur despite the availability of options such as phoning family to be assured of their safety, and despite many workplaces closing and cancelling events during natural disasters.

Prior research indicates that those physically exposed to flooding worry more about potential flooding, perceive themselves as being more vulnerable to flooding, and perceive the consequences of flooding to be more severe in comparison to those who have not experienced flooding in the past [13]. As the current research was conducted in flood-prone regions, and almost all drivers described having prior exposure to flooding, it is unsurprising that the drivers described a strong motivation to arrive at their destination to ensure safety as a parent, a homeowner, or a pet owner in the face of potentially worsening conditions.

Hence, a recommendation arising from this finding is to reduce the impact of the internal pressures felt by those driving during adverse weather. Messages should encourage driver's to pre-emptively plan steps they need to take in order to feel comfortable with not making it to their destination. Both to encourage the forming of plans, and to provide scaffolding for how these plans should look, authorities responsible for promoting safe driving behaviours should develop readily available resources such as smartphone applications, websites, and fridge magnets where drivers can make a plan and store it in a proximal location.

In addition, one of the drivers interviewed described a situation where she passed a sign stating that the road was closed in order to drive through a flooded waterway and get to work. Given the sometimes overwhelming pressure to arrive at a destination which has been appraised by drivers to be more important than observing the immediate warning, it is suggested that departments responsible for regulating road safety take steps to restructure the physical environment as a means of physically preventing drivers from entering floodwater (i.e. when road closed signs are installed at the location, also install barricades to close off both lanes).

It further emerged that many drivers perceived the situation leading up to their experience as being different to situations they had been warned about regarding driving through floodwater. A number of drivers; both those who lost their car during the experience and those who did not, describe specific conditions in which they perceived driving through floodwater to be risky, and how their experience was perceived to be different in the lead-up. These accounts align closely with the concept of optimism bias, which has been shown to be influential in decision-making regarding a range of risky behaviours including driving under the influence of alcohol and mobile phone use while driving [14].

In addition, some drivers have also indicated a lack of clarity regarding what constitutes a flooded road (e.g., should 10cm deep water in a four-wheel-drive not be entered into?) While relationships are unable to be inferred using this research methodology, prior research into risky driving behaviours has found that young males most often demonstrate optimism bias regarding driving skills and accident risk perceptions. Interventions that emphasise personal accountability should adverse consequences occur are particularly effective with this group [15]. This intervention was not found to be effective with more experienced drivers. It is therefore recommended that messages aimed at reducing engagement in this behaviour demonstrate focus on both emphasising personal accountability for adverse consequences, and that there is a common risk posed by flooded roads when driven through despite prior experience.

A number of drivers also described that they needed to drive through the floodwater in order to avoid becoming stranded and having to sleep in their vehicle for an unspecified amount of time.

In addition, some drivers indicated that they found the option of taking an alternate route to be less appealing due to a range of factors such as time restraints, or having already tried at least one alternative option. This indicates that drivers quickly form outcome expectancies regarding the possible decisions. It is therefore recommended that messages aimed at reducing decisions to drive through floodwater encourage consideration of alternative options to driving through floodwater, as well as a realistic consideration of possible outcomes attributed to each decision. This may include familiarisation with all possible routes home or to work or familiarisation with technology such as mobile applications that are able to facilitate alternate route options, and also preparation for the worst possible outcome such as situations where one may find themselves not able to proceed to their destination (e.g., storing some water and food in the car during seasons where severe weather events are common).

It has been established that in this sample almost all drivers were aware of the risks associated with driving through flooded roads and many claimed that they planned never to drive through a road covered in water. In many of the instances described, this behaviour was planned, deliberate, and the result of a careful decision making process. It can be observed; however, that in the moment when an actual decision is made, there sometimes is a lack of reflection of the plan or one's attitudes toward driving through floodwater. Strack and Deutsch (2004) in their reflective impulsive model posit that in usual circumstances behaviour is driven by deliberate conscious processes (reflective route); however, when cognitive resources are stretched (i.e. in an emergency situation) behaviour is often executed by more impulsive non-conscious processes.

Given that both types of decision making have been represented in this sample; we recommend that cues to action be made readily available in the environments in which this behaviour occurs in order to trigger enactment of plans [17]. For example, cues could take the form of a reminder on the back of a car registration label, a small sticker people can place near the four-wheel drive activation button in their vehicle, or signs placed in sections of roads prone to flooding. In addition, many regions now utilise emergency notification services which can provide messages to cellular mobile phones to warn of impending risks. This existing infrastructure could be used to deliver a cue to action in the form of a message, which can remind drivers to enact their plans. A number of studies have found cues to action to be effective in enactment of plans. For example, the use of friendship bracelets as cues to action in enacting people's sober plans including the use of condoms while under the influence of alcohol [18 19] and also reducing alcohol consumption [20]. Given the potential for the occurrence of impulsive decision-making during alcohol intoxication, it is anticipated that cues to action will also be a useful tool in reducing the prevalence of driving through roads covered in water.

The Influence of Social and Environmental Context

Drivers also described a range of social influences as impacting on their decision to drive through a flooded waterway. These included the use of non-verbal persuasion from drivers behind through behaviours such as horn beeping and tailgating, and in other instances positively-framed verbal encouragement. These present as normative social influences, which are defined as the influence of others leading a person to conform in order to be liked and accepted, resulting in compliance but not necessarily private acceptance of the behaviour [21]. This is further evident in the current study due to the regret described by drivers influenced in this way. The effect of these influences present as examples of conformity in order to maintain social approval. For example, not conforming to a gesture such as a horn being beeped, or encouragement from an authority figure (such as a father or other knowledge-empowered authority figure) is often perceived as leading to reduced social approval.

Messages aiming to reduce willingness to drive through flooded waterways should focus on encouraging drivers to turn around and go the other way so as to remove themselves from the situation containing the normative social influence. This could involve providing information about steps drivers could take if it is not possible to turn their car around such as stopping and calling emergency or state rescue services for assistance.

A goal of encouraging drivers to stop their vehicle in the face of pressure from others should be to encourage individuals to be the first in a line of cars to break the consensus and resist the normative social influences. This could be taught in learner driver education courses to instil a norm about this behaviour. Norm-based interventions may be particularly useful in assisting drivers to resist this influence, and Van Der Linden [22] found that the combination of providing descriptive norm information and also a persuasive message was effective in significantly reducing behavioural intentions. In applying this type of intervention to driving through flooded waterways, the descriptive norm information could be that most people in fact do not drive through floodwater, and the persuasive message could be that breaking this consensus when presented with this social pressure to drive through a flooded road does not unnecessarily antagonise other drivers, but prevents them from having to be in the situation of making a potentially terrifying decision themselves.

A number of drivers also described increased willingness to drive through the flooded waterway they encountered due to the presence of other individuals who they perceived would be useful in the provision of a rescue in the event of an incident occurring. The comfort derived from the presence of these individuals relies on the assumption that they would know how to swim, that they possess the skills to conduct a swift-water rescue, and that they would be willing to put themselves at risk to provide assistance. In addition to these assumptions, it is also well established in the literature that in emergency situations, bystanders often do not intervene to provide assistance [23].

Messages should therefore encourage drivers to consider their moral obligations in thinking about the potential risk they are exposing bystanders and emergency services personnel to by taking these risks. Given that driving through flooded waterways has the potential to place people other than just the driver at risk of harm, consideration of legislation and enforcement of specific offences related to the behaviour which carry financial penalties (fines) is warranted. Implementation of fines or increases in the severity of fines have been demonstrated to provide a deterrence effect for other risky behaviours such as speeding [24], and also have been found to in some instances significantly decrease road incidents and fatalities [25]. In Australia, no specific offences currently exist to penalise driving through flooded waterways. Drivers can be fined if they ignore 'road closed' signs, and under negligent driving offences, which are rarely enforced and unlikely to exhibit a deterrent effect equal to public awareness of a specific offence. A legislative approach to reducing driving through flooded waterways should therefore involve the implementation of specific driving offences attributed to this behaviour, public awareness campaigns regarding the associated penalties, and strict enforcement of regulations.

The majority of drivers reported that observing other motorists driving through prior to themselves was a highly influential factor in their decision to drive through the floodwater. A sense of competence and self-efficacy can be acquired through vicarious experience [26]. In crisis or disaster situations where options are often ambiguous and decisions need to be made quickly, it is also argued that people often look to see what other people are doing to manage the situation and then act accordingly [27]. Consider the scenario that it would be uncommon to follow a person who is jumping off a bridge; even in a crisis situation, as the risk is highly salient. This is often not the case when presented with the decision of whether or not to follow another driver through a flooded waterway given that depth and potential submerged or floating objects are difficult to observe from a driver's position. Hence, the use of interventions containing mental imagery tasks may be useful in making the non-visible risks associated with the conditions more salient. Interventions utilising mental imagery have been successful in reducing engagement in health-risk behaviours [28] and in increasing implicit positive attitudes toward exercise in prior research [29].

It also emerged in driver's descriptions that a range of environmental conditions led to a perception of lower risk when driving through the floodwater. This included whether the water was not flowing, the depth judgement, or whether it was a known location. Messages aimed at reducing decisions to drive through flooded waterways should therefore provide information that the described conditions are not reliable indicators of risk. Consistent with the research regarding ethic of care; which refers to the culturally endorsed notion of a good parent whereby the child's wellbeing is placed above that of the parent [30 31], a number of drivers indicated that they would not drive through a flooded waterway with their child in the car. In addition; if they have done so, considerable regret was expressed. These descriptions of not driving through a flooded waterway so as not to place their child at risk highlights at least some level of understanding that the behaviour carries an inherent and substantial risk.

Influences on Self-Efficacy Judgements

It also emerged that through a range of sources, driver's made a judgement of self-efficacy in that they would be able to successfully drive through the floodwater. A number of drivers reported that they felt somewhat confident, skilled, and sufficiently knowledgeable about their ability to drive through the floodwater due to influences such as past experience (previous experiences did not have adverse consequences), the perceived ability to assess and mitigate risk, and also self-efficacy derived from one's vehicle. Perceived self-efficacy, which refers to the extent to which one believes in their ability to achieve a particular goal [32], has, in contexts such as health behaviour change [33], been associated with adaptive behaviours and more positive outcomes. In the context of driving through floodwater, however, self-efficacy may be maladaptive as these beliefs, which are formed based on successful past experience and the perceived ability to assess and mitigate risk and for which have limited actual utility due to the unobserved risks, are helping to inform individuals' decisions to drive through the water. Given this limited utility, messages should provide information to driver's that risk and depth are often misjudged, even when the driver has experience driving through before.

A substantial proportion of drivers also indicated strong efficacy beliefs derived from the perceived capability of their vehicle. Factors such as the size of the vehicle and that it is a four-wheel-drive or a diesel vehicle comprised driver's descriptions. None of the drivers who described their vehicle's perceived capability as being influential in their decision making indicated awareness of the information that 600mm of water is enough to make most four-wheel-drive vehicles float; and hence, dissemination of this information is important. Additionally, a number of vehicle manufacturers advertise without reservation that certain vehicles have an approved wading depth of up to 700mm, and also run television commercials depicting a glorified representation of their vehicles driving through water. Despite any guarantees that a vehicle will continue to operate mechanically in water of this depth, the inherent risk of doing so is well established [34] and raises substantial concern regarding advertising of this nature. Due to the health and social consequences of behaviours such as tobacco smoking and alcohol consumption, advertising restrictions have been implemented in many jurisdictions such as the Tobacco Plain Packaging Act 2011 (Cth) [35]. It is therefore recommended that legislation to restrict this type of advertising be considered.

CONCLUSION

The current study is the first to explore drivers' descriptions of the influences on their decision to drive through a road covered in water. Through inductive analyses of interviews in which drivers provided rich in-depth descriptions of their lived experience, the current study was able to isolate a range of commonly occurring themes which will be instrumental in planning future research and interventions aimed at reducing the prevalence of this risky behaviour.

In summary, it was identified that the overarching influences on driver decision-making were value placed on successful past experiences, individual deliberative motivational and impulsive influences, social and environmental context, and judgements of self-efficacy. It is recommended that future research further explore the identified influences on driver decision making, and target these influences in developing evidence based interventions aimed at reducing the prevalence of driving through flooded waterways. These findings can also be utilised to develop public education materials and prevention programs aimed at road users.

MEDIA RELEASE – FOR IMMEDIATE USE

In the ten year period from 2002 to 2012, Royal Life Saving – Australia calculates that there have been over 130 drowning deaths as a result of flooding, and over half of these were due to cars being driven through flood waters.

During this year's extreme weather events already, there have been five deaths in Queensland and two in NSW as a result of people driving their cars through flood waters.

Aided by funding from Royal Life Saving - Australia, a collaborative study with Griffith University will interview 20 participants who have made the decision at some point to drive their vehicle through a deep stretch of flood water.

Looking at why people take risks in floods

Looking at the reasons why people drive their vehicles through potentially dangerous flood water is the focus of new Griffith and Royal Life Saving Society Australia research which aims to reduce the number of fatalities.

During this year's extreme weather events already, there have been five deaths in Queensland and two in NSW as a result of people driving their cars through flood waters.

In the ten year period from 2002 to 2012, Royal Life Saving – Australia calculates that there have been over 130 drowning deaths as a result of flooding, and over half of these were due to cars being driven through flood waters.

"We already know that even driving a vehicle through 15 cm of water can cause it to become unstable; that's aside from the fact that you wouldn't know about any potential hazards underneath the water nor the condition of the road surface itself," says study leader Dr Kyra Hamilton from Griffith's Menzies Health Institute Queensland (MHIQ).

"We also know that driving a vehicle through 60cm of water can make it become buoyant with the potential for it to tip over and consequently submerge its occupants.

Aided by funding from Royal Life Saving - Australia, the collaborative study will interview 20 participants who have made the decision at some point to drive their vehicle through a deep stretch of flood water.

"This research aims to look at why people are taking risks around flood waters," says Dr Hamilton.

"This will be an in-depth qualitative study, which will discuss with participants the circumstances that led up to them making that decision and through their lived experience, discuss the actual event and the after effects.

"I think we will uncover rich and interesting insights as we really want to get a good understanding of what leads people to drive through flood waters and how that experience shapes their subsequent behaviour."

"We have a good understanding of the number of drowning deaths as a result of driving through flood waters," says Royal Life Saving Society Australia National Manager Research & Policy, Amy Peden.

"We have a strong culture around water in Australia, but as yet we do not have a lot of research around the attitudes towards water safety and this research will provide valuable information regarding why people make the choices they do when faced with a flooded road."

Dr Hamilton says that the results of the study will be used to positively influence public education and advocacy work undertaken by Royal Life Saving around drowning prevention during times of flood. It is also hoped to address a key area of the Australian Water Safety Strategy which aims to reduce drowning as a result of flooding and extreme weather.

Potential participants should contact Mr Jacob Keech via email jacob.keech@griffithuni.edu.au

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