Communication and Community Responses to Recycled Water Study 2: The Role of Issue Relevance and Risk/Benefit Information

Jennifer Price[1], Melissa Green[1], John Gardner[1], Zoe Leviston[1] and Kelly Fielding[2]

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The Urban Water Security Research Alliance (UWSRA) is a $50 million partnership over five years between the Queensland Government, CSIRO's Water for a Healthy Country Flagship, Griffith University and The University of Queensland. The Alliance has been formed to address South East Queensland's emerging urban water issues with a focus on water security and recycling. The program will bring new research capacity to South East Queensland tailored to tackling existing and anticipated future issues to inform the implementation of the Water Strategy.

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Enquiries should be addressed to:

The Urban Water Security Research Alliance
PO Box 15087
CITY EAST QLD 4002

Ph: 07-3247 3005
Email: Sharon.Wakem@qwc.qld.gov.au

Project Leader – John Gardner
CSIRO Ecosystem Sciences
Qld Bioscience Precinct, Boggo Road
DUTTON PARK QLD 4102
Ph: 07-3833 5552
Email: John.Gardner@csiro.au

Authors: 1 – CSIRO; 2 – University of Queensland

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Cover Photograph:

Description: Brisbane River - view over the Brisbane River in central Brisbane, looking southeast, with the Pacific Motorway on the left and the Victoria Bridge in the foreground.
Photographer: Xiaoming Wang

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FOREWORD

Water is fundamental to our quality of life, to economic growth and to the environment. With its booming economy and growing population, Australia's South East Queensland (SEQ) region faces increasing pressure on its water resources. These pressures are compounded by the impact of climate variability and accelerating climate change.

The Urban Water Security Research Alliance, through targeted, multidisciplinary research initiatives, has been formed to address the region's emerging urban water issues.

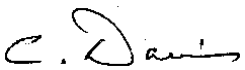
As the largest regionally focused urban water research program in Australia, the Alliance is focused on water security and recycling, but will align research where appropriate with other water research programs such as those of other SEQ water agencies, CSIRO's Water for a Healthy Country National Research Flagship, Water Quality Research Australia, eWater CRC and the Water Services Association of Australia (WSAA).

The Alliance is a partnership between the Queensland Government, CSIRO's Water for a Healthy Country National Research Flagship, The University of Queensland and Griffith University. It brings new research capacity to SEQ, tailored to tackling existing and anticipated future risks, assumptions and uncertainties facing water supply strategy. It is a $50 million partnership over five years.

Alliance research is examining fundamental issues necessary to deliver the region's water needs, including:

- ensuring the reliability and safety of recycled water systems.
- advising on infrastructure and technology for the recycling of wastewater and stormwater.
- building scientific knowledge into the management of health and safety risks in the water supply system.
- increasing community confidence in the future of water supply.

This report is part of a series summarising the output from the Urban Water Security Research Alliance. All reports and additional information about the Alliance can be found at http://www.urbanwateralliance.org.au/about.html.



Chris Davis
Chair, Urban Water Security Research Alliance

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EXECUTIVE SUMMARY

This study builds on previous research that investigated the effectiveness of techniques for communicating about recycled water. A previous study considered the role of message complexity and message "sidedness" in influencing people's perceptions of purified recycled water (PRW). Specifically, that first study examined whether complex messages were more effective than simple messages in influencing attitudes towards recycled water, and examined whether one-sided messages are more or less effective than two-sided messages. Overall, results indicated that provision of detailed information increased support for potable recycled water and presenting information that acknowledges arguments for and against recycled water increased trust in government.

Given that message complexity and sidedness are only two aspects of communication, the present study aimed to build on previous findings by examining other components of communication. Specifically, the present study investigated whether issue relevance and the provision of information about risks and benefits impacts on people's perceptions of PRW. These elements of communication were tested in an experimental online survey which participants completed over a two-week period in June 2012.

A two-by-three experimental design was devised to assess whether dual-processing theories of persuasion apply to the recycled water context. Participants took part in an online survey where they were provided with different information about a recycled water scheme in South East Queensland (SEQ) based on three experimental manipulations: *issue relevance* (high and low); *risks* (no and low risk information); and *benefits* (no and high benefit information).

The results detailed in this report provide evidence that confirms some of the research hypotheses whilst refuting others. The analyses suggest that the experimental design was largely effective. A number of demographic differences were observed for the key criterion variables of emotion towards recycled water, and support for recycled water. For example, results indicate that higher levels of support and more positive emotions towards recycled water are recorded by participants who are men, from Western Australia, aged over 75 years, from households earning more than $150,000 per year, and educated to tertiary post-graduate level.

The results support dual processing theories of persuasion, such as the Elaboration Likelihood Model (ELM) and Systematic Heuristic model (SHM), providing evidence of central or systematic route processing of risk information occurring only when recycled water is a relevant issue. Overall, messages about the benefits of recycled water were not more effective in fostering support than messages about the low risks; however, analyses revealed evidence of issue relevance and risk information interacting to affect support for recycled water. When recycled water was of low relevance to them, participants did not record significant differences in support for recycled water in the low risk information and no risk information conditions; whereas when recycled water was of high relevance, participants recorded higher support for recycled water in the low risk information condition compared to the no risk information condition. When recycled water is a relevant issue, people are more likely to undertake elaborative processing of information about the low relative risks of recycled water and respond positively by indicating higher support. This finding suggests that communication of relative risks can promote rather than hinder acceptance of recycled water, provided that the issue is relevant to the participants.

Participants for whom the issue is not relevant do not respond differently to messages about benefits of recycled water by demonstrating higher levels of support. This finding suggests that peripheral (where information is processed rapidly and shallowly) or heuristic information processing does not give more weight to messages about benefits compared to messages about risks of recycled water. Further, participants for whom the issue is not relevant do not demonstrate more negative emotions to recycled water. This finding suggests that an immediate reaction of disgust to the idea of recycled water (often termed the 'yuck factor') is *not* a form of peripheral processing. This conclusion supports recent claims in the literature that the idea of the 'yuck factor' may be outdated, and that people's attitudes and understanding of PRW are more complex.

A number of individual differences, or personality traits, were found to influence peoples' responses to recycled water. People who tend to avoid engaging in careful or difficult thought (i.e. have a low need for cognition), and those who tend to support the social status quo (i.e. demonstrate high system justification), are more likely to oppose recycled water, and are more likely to demonstrate negative emotions with respect to recycled water. Results indicate that responses to recycled water are dependent on how individuals' personality traits interact, demonstrating inter-relationships with:

- their need for affect (their tendency to approach situations that induce emotions);
- their regulatory focus (whether they seek information to aid successful outcomes, or to avoid failure); and
- system justification (their tendency to defend existing social arrangements as fair, legitimate and justified).

The research presented here could only begin to tap into the myriad of techniques available for communicating about PRW. Therefore the outcomes from this communication experiment only apply to a situation where text only information about PRW is required. We recognise the importance of visual imagery in communication and suggest that future research should consider how to incorporate this into an experimental setting. However, given that all research needs boundaries, we feel that our focus on issue relevance and risk/benefit information has provided some interesting insights in the initial application of psychological communication theory, such as ELM, to the recycled water domain. Further, the individual difference measures used in this research have been widely applied in the psychology domain and therefore provide robust measurements. It is hoped that this research will inform both future research in the field of communication, as well as the development of more informed communication strategies.

1. INTRODUCTION

The investigation of alternative water supply schemes, such as Purified Recycled Water (PRW), is becoming common place in Australia and around the world in an attempt to supplement current water supplies and to ensure future water security. Whilst these schemes are supported by rigorous science and constructed using the latest technology, ultimately, it is community acceptance that will determine success. Numerous studies have considered the role and importance of community acceptance of recycled water (Po, Kaercher and Nancarrow, 2003; Ingram *et al.*, 2006; Hurlimann and Dolnicar, 2010; Price, Fielding and Leviston, 2012), however there are few which explicitly consider how to effectively communicate to the 'community' about such schemes (Green *et al.*, 2010).

This study builds on previous research (see Price *et al.*, 2011) empirically investigating the effectiveness of techniques for communicating about recycled water. Price *et al.* (2011) considered the role of message complexity and sidedness in influencing people's perceptions of PRW. Specifically, whether complex messages were more effective than simple messages in influencing attitudes towards recycled water and whether one-sided messages, detailing only the advantages of recycled water, are more effective than two-sided messages, which acknowledge, but refute, criticism of recycled water. Overall, results indicated that provision of detailed information increased support for potable recycled water and presenting information that acknowledges arguments for and against recycled water increased trust in the Queensland government, ultimately the authority responsible for delivering this type of scheme (Price *et al.*, 2011).

Given that message complexity and sidedness are only two aspects of communication, this study aimed to build on previous findings by examining other components of communication. Specifically, whether issue relevance and the provision of information about risks and benefits impacts on people's perceptions of PRW.

1.1. Purified Recycled Water and South East Queensland

The Queensland State Government has determined that PRW is the best means of securing the water supply in South East Queensland (SEQ) against further drought and uncertainty in rainfall. A PRW plant that can supply water to SEQ has been built as part of the SEQ Water Grid. It currently only supplies water for industrial uses, but State Government policy is to add PRW to the potable supply if/when the combined drinking water dam storage levels drop below 40% (Veolia Water, 2013). Previous negative public reactions to the prospect of PRW (in Toowoomba, for example, see: Hurlimann and Dolnicar, 2010; Price, *et al.*, 2012), suggests that finding ways to communicate to the general population about PRW is an important consideration. In particular, can specific communication techniques encourage more positive views or increase support for a PRW scheme?

1.2. Conceptual Frameworks

1.2.1. Issue Relevance and the Elaboration Likelihood Model

The elaboration likelihood model (ELM) (Petty and Cacioppo, 1986) describes the process of how information, especially persuasive messages, is cognitively processed. Information is processed peripherally (rapidly, and shallowly) under some circumstances, and is processed centrally (more slowly and deeply) in other circumstances (Pierro *et al.*, 2005). When messages are processed peripherally, contextual features have a larger impact, e.g. the perceived expertise of the sender, the emotional tone of the message. When messages are processed centrally, these contextual cues are less relevant, and the message content has a larger impact. However, people need to be motivated and have the capacity to process information centrally, for example time and ability to understand the information presented (Petty and Cacioppo, 1984). When an issue is relevant or interesting, individuals centrally process information: this can result in longer-lasting changes in attitudes (Petty, Haugtvedt and Smith, 1995). According to Frewer *et al.* (1999) increasing the perceptions of personal relevance of the content of a message is likely to increase motivation to process information.

1.2.2. Cognitive Trade Off between Perceived Risks and Benefits

Communication about risk has been a focus of recycled water schemes in the past. The Water Services Association of Australia (2005) suggest that Australian's take the reliable supply of safe water for granted, implying that all alternative water management strategies have some degree of risk and, therefore, understanding these risks and how to communicate them is crucial to the long term future of Australian communities. These views are shared by Po *et al*. (2003) and Hurlimann (2007) who note that there is a need to understand different risk perceptions so that effective risk communication strategies can be developed that cater for specific concerns and different sectors of the community.

While research about risk perceptions and communication has traditionally had much attention, it is now recognised that understanding the benefits associated with a technology is necessary (Frewer, 1999). Further, it is suggested by Frewer (1999) that the treatment of risks and benefits as distinct and independent concepts is inappropriate. As Frewer (1999) has predominately investigated risks and benefits associated with emerging technologies, it is worth considering this approach of investigating both risks and benefits when examining considering perceptions and acceptance of PRW.

1.2.3. Recycled Water and the 'Yuck Factor'

As noted by Russel and Lux (2009), the idea of the 'yuck' factor, or disgust, has commonly been referred to as the reason why people may be reluctant to use recycled water, yet it may no longer be important to take this idea for granted. Further, Russel and Lux (2009) suggest that communities need opportunities to engage in a discourse about the issue; and scientists, planners and others need to challenge these community assumptions by provoking questioning about change, technology and behaviour.

This notion of the decreased value of the 'yuck factor' in understanding people's perceptions of recycled water has been supported in other studies. Browne *et al*. (2008) involved participants in a q-sort methodology where they were instructed to order 64 statements about PRW in order from 'most like my view' to 'least like my view'. Results indicated that the 'yuck factor' did not rate as highly as issues about the legislative requirements and governance arrangements surrounding a PRW scheme. As the q-sort methodology involves effortful decision-making, the findings suggest that the 'yuck factor' may be linked to peripheral processing. Studies in San Diego (Rea and Parker Research, 2011) have found that the 'yuck factor' becomes less important when water shortages are ominous; hence suggesting that it is less of an issue when personal relevance is increased.

1.2.4. Need for Cognition

Need for cognition is about an individual's tendency to engage in and enjoy thinking, or cognitive activity (Cacioppo and Petty, 1982; Cacioppo, Petty and Kao, 1984). Cohen, Stotland and Wolfe (1955, p.291) originally proposed that "need for cognition can be defined as a need to structure relevant situations in a meaningful, integrated ways" and suggested the need to develop an appropriate measure. Cacioppo and Petty (1982) further developed these ideas and created a set of statements by which to measure need for cognition. These were later refined into a short form scale by Cacioppo *et al*., 1984. The need for cognition construct is closely related to the ELM, as individuals with a high need for cognition are likely to engage in arguments and enjoy evaluating issues and analysing problems and solutions, and are therefore more likely to centrally process ideas, or engage in high elaboration (Dole and Sinatra, 1998). Those individuals not likely to engage in effortful thinking have a low need for cognition and are more likely to rely on peripheral cues to process information (Dole and Sinatra, 1998).

1.2.5. Need for Affect

Need for affect describes people's motivation to approach or avoid situations and activities that are emotion inducing for themselves and others (Maio and Esses, 2001). While it is known that people have different cognitive processes (e.g. ELM, Petty and Cacioppo, 1986) and emotional styles, Maio and Esses (2001) tested whether there are individual differences in people's motivation to seek out

emotions. Further, Maio and Esses (2001) noted that because emotions are a part of life and are useful for shaping judgements and behaviour, people that find emotions uncomfortable and unproductive would not actively approach them. In developing a scale to test the need for affect concept, Maio and Esses (2001) confirmed that those with high need for affect are more likely to allow their emotions to influence their attitudes and behaviour. Given that recycled water can evoke emotional responses (for example, the Citizens Against Drinking Sewerage group discussed by Hurlimann and Dolnicar, 2010), whether there is any relationship between need for affect and people's attitudes towards recycled water is of interest.

1.2.6. Regulatory Focus

Regulatory focus is used to describe how different self regulation focus can result in different desired end states for individuals (Higgins, 1997). Regulatory focus theory suggests that goal directed behaviour is motivated by two systems: promotion and prevention (Higgins *et al*. 2001). Those with a promotion focus are motivated to search for information aiding their pursuit of success and are influenced by positive role models; they use strategic means to achieve their goals (Higgins, 1997; Higgins *et al.*, 2001; Lockwood *et al.*, 2002). Those with a prevention focus search for information that is relevant to the avoidance of failure (Higgins, 1997; Higgins *et al.*, 2001; Lockwood *et al.*, 2002). Therefore the regulatory focus framework could provide an indication as to whether people are motivated by information about the risks or benefits of recycled water.

1.2.7. System Justification

System justification theory proposes that people are motivated to defend existing social arrangements as fair, legitimate and justified (Jost and Banaji, 1994). This rationalisation of the status quo takes place at both the group and individual level but also extends to include stereotypes, ideologies, and attitudes towards systems and authorities (Kay and Jost, 2003). Kay and Jost (2003, p. 828) investigated perceptions of fairness, legitimacy and justifiability of the prevailing social system to determine if there are any situational effects influencing system justification. Given that the introduction of recycled water is against the status quo, it is worth investigating whether there are any interactions between people's level of system justification and support for recycled water.

1.3. Study Rationale and Research Questions

The Elaboration Likelihood Model (ELM) framework is used in this research to explore whether central versus peripheral processing of information can explain different reactions to PRW. To provoke central processing of information about PRW, the preferred method in the literature is to evoke a greater sense of personal relevance with the message. As discussed, this can encourage people to pay increased attention, resulting in more extensive cognitive processing of the message content. To evoke personal relevance, we aim to recruit participants from various locations around Australia and provide them with background information about the Qld State Government policy to introduce PRW to the drinking water supply for SEQ when dam storage levels drop below 40%. We propose that participants residing in SEQ are more likely to find information about PRW in SEQ relevant than those recruited from other places in Australia.

Previous social research for the UWSRA has indicated that the 'yuck factor' may be linked to the way people process information and perhaps not play as much of a role in public perceptions of PRW as traditionally thought (see Browne *et al.*, 2008). In particular, we want to investigate whether the 'yuck factor' becomes less prominent when personal relevance is increased and therefore becoming more important for those peripherally processing information about PRW. In addition we aim to investigate whether the provision of information about risks, benefits, or risks and benefits will influence people's perceptions of recycled water. The research questions addressed in the experiment are detailed in Table 1.

Table 1: Research questions guiding the experiment.

Research Question	Hypothesis
Does communication of the risks, even when considered in relative terms, actually hinder rather than promote acceptance of recycled water?	Messages about the benefits of PRW should be more effective in fostering support than messages about the low risks of PRW.
Do SEQ participants with high elaboration likelihood respond better to messages about the low risks of PRW by demonstrating higher levels of support?	When issue relevance is high, people give more weight to messages about low risks of PRW.
Do participants with low elaboration likelihood respond better to messages about benefits of PRW by demonstrating higher levels of support?	When issue relevance is low people, should use peripheral processing and give less weight to messages about low risks of PRW.
Is the 'yuck factor' a form of peripheral processing?	Participants with low relevance, should demonstrate more negative emotions to PRW.
Do participants with a promotion focus respond better than those with a prevention focus to messages about benefits of PRW by demonstrating higher levels of support and more positive emotions?	Participants with a promotion focus should respond better to messages about benefits than those with a prevention focus.
Do participants who demonstrate a high need for cognition demonstrate different responses to recycled water?	Participants with a high need for cognition will demonstrate higher support for and more positive emotions towards recycled water, as they will rationalise the risk issues and rely less on the yuck-factor when forming opinions
Do participants' need for cognition influence how they respond to information about the risks and benefits of recycled water?	Participants with a high need for cognition should respond better to messages about risks than those with a low need for cognition who should respond better to benefits messages.
Do participants' need for affect influence how they respond to information about the risks and benefits of recycled water?	Participants with a high need for affect should respond better to messages about benefits than those with a low need for affect who should respond better to risk messages.
Do participants who justify the system demonstrate different responses to recycled water?	Participants with high levels of system justification will demonstrate lower support for and more negative emotions towards recycled water, as they will favour the status quo over new technologies.
Do participants with a high need for affect respond differently to recycled water based on their regulatory focus and levels of system justification?	As a new technology, recycled water will be framed as a gain, and therefore attractive to those with a promotion focus, if levels of system justification are low. Participants with a high Need for Affect will demonstrate more positive emotions to recycled water if they have a promotion focus and don't justify the system.

2. METHODOLOGY

This study investigated whether issue relevance and the provision of information on risks and benefits influenced community responses to PRW. These elements of communication were tested in an experimental online survey which participants completed over a two week period in June 2012.

2.1. Study Design Overview

A two-by-three experimental design was devised to assess whether dual-processing theories of persuasion, such as the ELM and HSM, apply to the recycled water context. Participants took part in an online survey where they were provided with different information about a recycled water scheme in SEQ based on three experimental manipulations: *issue relevance* (high and low); *risks* (no and low risk information); and *benefits* (no and high risk information). Table 2 provides an overview of the study design, which was comprised of eight experimental conditions in total. The specific information presented to participants is detailed in the following sections.

Table 2: Experimental design.

Issue relevance	Risks	Benefits
High (*SEQ*)	No info	No info (*Control*)
		High Benefits info
	Low risk info	No info (*Control*)
		High Benefits info
Low (*Other regions*)	No info	No info (*Control*)
		High Benefits info
	Low risk info	No info (*Control*)
		High Benefits info

Issue relevance was determined according to location, with those participants recruited from SEQ assumed to find the information more relevant than those from other regions of Australia. High and low issue relevance participants were then randomly assigned to experimental conditions where they received: information about the low relative risks of recycled water; the high benefits of recycled water; a combination of low risk and high benefit information; or no information. Participants receiving no information from SEQ and other regions of Australia comprised the two control groups. All participants then completed a questionnaire assessing their characteristics, traits and attitudes towards recycled water. Ethics approval for this research was granted from the CSIRO Social Science Human Research Ethics Committee.

2.1.1 Issue Relevance

Issue relevance was the first experimental manipulation administered in the survey and was assessed at two levels: high and low. After receiving the introductory information detailed in Table 3, participants were provided different instructions according to their location within Australia. As the study focused on a recycled water scheme in SEQ, it was assumed that the issue would be more relevant to participants from this region than those from other places around Australia. Participants from SEQ were "assigned" to the high issue relevance condition and received additional instructions to attend closely to the information about the benefits and risks associated with PRW (Table 4). Participants from other regions were assigned to the low issue relevance condition and received no further instructions.

Table 3: Introductory information provided to all participants.

Thank you for taking the time to take part in our research, which is about the use of purified recycled water for drinking water purposes. Purified recycled water is produced by taking water from wastewater treatment plants, and using a series of processes for removal of impurities, filtration and disinfection, to make it suitable for drinking. *In South East Queensland, purified recycled water is currently used to supply water for industrial uses. When combined dam levels fall below 40%, it is planned to supplement drinking water supplies by adding purified recycled water to Wivenhoe dam. If and when this occurs, South East Queensland's drinking water will include purified recycled water.*

Table 4: High issue relevance instructions.

You will be tested on what you remember from the information we are about to give you in this survey, ***so please pay close attention to the following information.***

2.1.2 Information on Risks

The risk information experimental manipulation was assessed at two levels. Participants from the high and low issue relevance conditions were either presented with: 1) information about the low relative risk of recycled water compared to other risks, which is detailed in Table 5; or 2) no information about the risks of recycled water.

Table 5: Information about the low relative risks of recycled water.

The risks from Purified Recycled Water are incredibly low. For instance, Purified Recycled Water: • ***Undergoes advanced treatment.*** *This includes an additional oxidisation process of adding hydrogen peroxide and UV light to destroy contaminates small enough to get through the treatment membrane.* • ***Treatment is monitored closely.*** *It takes up to 12 hours for the water to pass between each stage of the treatment, allowing time to stop the process if something goes wrong.* • ***Will be better controlled than current drinking-water.*** *A much bigger range of chemicals and hazards will be monitored and very conservative guidelines put in place.* • ***Does not have harmful levels of hormones.*** *A man would have to drink 5 litres of water a day for 20 years to get the equivalent female hormones from 1 contraceptive pill.* • ***Does not contain high levels of pharmaceuticals.*** *A person would have to drink 2 litres daily for 138,000 years to consume 100 mg of pharmaceuticals.* • ***Is very unlikely to cause health impacts.*** *The chance of a virus getting through is one in a billion.* • ***Risks are low compared to everyday risks.*** *People are far more likely to get pathogens and viruses from shaking hands or going to a day-care or school.* • ***Will be mixed in small amounts with dam-water.*** *Only a small percentage of the water in Wivenhoe dam will be recycled, and the time spent in the dam ensures that all remaining contaminants are removed.*

2.1.3 Information on Benefits

The benefits information experimental manipulation was also assessed at two levels. Participants the high and low issue relevance conditions were either presented with: 1) information about high benefits of water, which is detailed in Table 6; or 2) no information about the benefits of recycled water.

Table 6: Information about the high benefits of recycled water.

Purified Recycled Water has a number of benefits. For instance, Purified Recycled Water:

- ***Is healthy and safe****. The advanced technologies used (microfiltration, reverse osmosis and advanced oxidation) are scientifically proven and in use across the world.*
- ***Is cleaner than current drinking water supplies****. The seven treatment barriers result in 6-star drinking water that is of a higher standard.*
- ***Results in fewer carbon emissions than desalination****. Only one megawatt hour of electricity is required compared to 5 megawatts hours for desalinated water.*
- ***Is an efficient and economic option.*** *The process is cheaper and more sustainable than other water supply options like pipelines, additional dams and water trading.*
- ***Reduces pollutants in the environment****. Up to 57% of the environmentally harmful substances going into the ocean around SEQ from waste treatment plants would be removed.*
- ***Helps us to conserve water****. By recycling instead of wasting water that is already available less water will be extracted from water systems that are under pressure.*
- ***Provides opportunities for growth****. South East Queensland's population is forecast to increase by more than 5 million by 2056 placing additional demands on water supplies.*
- ***Provides water security****. South East Queensland's water supply will be less vulnerable to changes in weather conditions and climate, such as drought and high temperatures.*

2.1.4 Information on Risks and Benefits

To determine whether the provision risks and benefits information interacted to influence participants' responses to recycled water a sample of participants from the high and low issue relevance conditions received a combination of the risks and benefits information detailed above. An abridged combined version of the risks and benefits information was presented (see Table 7) to ensure that the word length did not greatly exceed that of the other conditions and exert undue influence on peripheral and central route information processing.

2.1.5 Control Group

A sample of participants from the high and low issue relevance conditions acted as control groups for the experimental study. These participants were given only the general introductory information on the planned implementation of recycled water in SEQ. They completed the questions in the survey without receiving any additional information about the risks or benefits of recycled water.

Table 7: Combined information about the high benefits and low relative risks of recycled water.

Purified Recycled Water has a number of benefits and is very low risk. For instance, Purified Recycled Water:

- ***Is healthy and safe****. The advanced technologies used (microfiltration, reverse osmosis and advanced oxidation) are scientifically proven across the world. The additional oxidisation process destroys contaminates small enough to get through treatment membranes.*
- ***Will be better than current drinking-water.*** *The seven treatment barriers result in 6-star drinking water of a higher standard. A much bigger range of chemicals and hazards will be monitored and very conservative guidelines put in place.*
- ***Treatment is monitored closely.*** *It takes up to 12 hours for the water to pass between each stage of the treatment, allowing time to stop the process if something goes wrong.*
- ***Helps us to conserve water and the environment****. By recycling water that is already available less water will be extracted from water systems under pressure. Up to 57% of the environmentally harmful substances going into Moreton Bay from waste treatment plants will also be removed.*
- ***Does not contain high levels of pharmaceuticals or hormones.*** *A person would have to drink 2 litres daily for 138,000 years to consume 100 mg of pharmaceuticals. A man would have to drink 5 litres of water a day for 20 years to get the equivalent female hormones from 1 contraceptive pill.*
- ***Is an efficient and economic option.*** *The process is cheaper and more sustainable than other water supply options. Only one megawatt hour of electricity is required compared to 5 megawatts hours for desalinated water.*
- ***Risks are low compared to everyday risks.*** *People are far more likely to get pathogens and viruses from shaking hands or going to a day-care or school. The chance of a virus getting through the treatment is one in a billion.*
- ***Provides security and opportunities for growth****. South East Queensland's will be less vulnerable to and changes in weather conditions and climate. With the South East Queensland's population forecast to increase by more than 5 million by 2056 there will be less pressure on water supplies.*

2.2. Participant Recruitment

Recruitment was conducted by a social research company, via access to an online panel of research volunteers who participate in exchange for the chance to win small prizes. Participants had to be aged 18 and over in order to complete the survey. Participants were recruited from across Australia, with approximately half the sample (n= 468) from the SEQ region and the other half (n= 489) from other Australian capital cities and regional areas.

2.3. Study Variables

All participants (including all experimental and control groups) were asked additional questions pertaining to the following variables:

- Personal relevance, personal interest and issue relevance scales (Qin and Brown, 2007; Frewer *et al*., 1997).
- Thought listing procedure (up to five) to measure PRW issue relevance (Petty and Cacioppo, 1986).
- Attitudes, emotional responses (yuck factor), and risk perceptions in relation to PRW (Nancarrow *et al*., 2007; Price *et al*., 2009).
- Need for Cognition scale (short form; Cacioppo, Petty and Kao, 1984).
- Need for Affect scale (Maio and Esses, 2001).
- Promotion/Prevention scale (Lockwood, Jordan and Kunda, 2002).
- Worldview questions adapted from Steg and Siever's (2000) Myths of Nature measure.
- Demographic variables such as sex, age, income and level of education.

Participants who had received one of the three types of information about purified recycled water (e.g. risks, benefits, risks and benefits) were also given a 'Test of Recall' question where they were asked to write down as many specific facts they could recall from the information they were provided with. This acted as an indication of whether participants were processing information centrally or peripherally and therefore an indication of high or low elaboration likelihood.

3. ANALYSES

3.1. Sampling

Participants were provided different information about a proposed recycled water scheme in SEQ based on three experimental manipulations. The issue relevance manipulation was assessed at two levels: high issue relevance participants were selected from SEQ (n=468) and instructed to attend closely to the information provided; and low issue relevance participants were selected from other regions of Australia (n=489). Table 8 provides details about the locations and number of participants in the high and low issue relevance conditions.

Table 8: Location and number of participants in low and high issue relevance conditions.

Low issue relevance (Other regions)		High issue relevance (SEQ)	
Location	**N**	**Location**	**N**
Sydney	104	Gold Coast	94
Other NSW	79	Brisbane	201
Melbourne	118	Sunshine Coast	63
Other VIC	39	Moreton Bay	30
Adelaide	37	Redlands	12
Other SA	16	Logan	27
Perth	48	Ipswich	16
Other WA	10	Scenic Rim	7
Hobart	7	Lockyer Valley	14
Other TAS	15	Somerset	4
Canberra	16		
Total	**489**		**468**

High and low issue relevance participants were then randomly assigned to one of four experimental conditions (risk only, benefit only, risk and benefit, no information), forming eight conditions in total. The risk information manipulation was assessed at two levels with participants either receiving information about the low relative risks of recycled water (n=495) or no risk information (n=462). The benefit information manipulation was also assessed at two levels with participants either receiving information about the high benefits of recycled water (n=476) or no benefit information (n=481). Those participants that received no information about the risks or benefits of recycled water from SEQ (n=118) and other regions of Australia (n=117) comprised the two control groups. Of the 957 participants sampled roughly equal proportions were assigned to each of the eight experimental conditions, as demonstrated in Table 9.

To assess whether the experimental conditions demonstrated demographic differences participants were asked to indicate their gender, age, income and education by selecting one of the options provided. Chi-square tests were performed to compare the observed frequencies of these demographic variables in each of the eight experimental conditions against the expected frequencies. This revealed that the experimental conditions did not demonstrate significant associations (p>.01) with any of the demographic variables[1].

[1] Gender, X^2 (7, n=957)=6.72, p=.459; age, X^2 (35, n=957)=52.69, p=.028, income, X^2 (42, n=957)=37.27, p=.678; and education, X^2 (28, n=957)=29.39, p=.393.

Table 9: Number of participants assigned to the experimental conditions.

Issue Relevance	Risk Information	Benefit Information		Total
		No info	High benefits	
Low (Other regions)	No info	118 *(Control)*	118	236
	Low risk info	125	128	253
High (SEQ)	No info	117 *(Control)*	109	226
	Low risk info	121	121	242
Total		**481**	**476**	**957**

3.2. Variable Construction

In order to assess the impact of the experimental conditions aggregate variables were computed from items, or attitudinal statements, in the survey. The variables and items used here were specified in measuring instruments called scales drawn from the ELM, HSM and recycled water literature. Reliability analysis further guided the computation of variables by identifying items inconsistent with others within the scales. Inconsistent items were deleted to reduce random error and improve reliability. The reliability, or internal consistency, of a scale is assessed statistically by Cronbach's alpha which is an index ranging from 0 to 1, with scores close to 1 representing a high degree of consistency. Summaries are provided in Table 10 of the variables measuring the effectiveness of the experimental manipulations, and Table 11 provides a summary of the criterion variables thought to be influenced by the experimental manipulations.

Table 10: Summary statistics for manipulation check variables.

Variable	Item	Min.	Max.	Mean	Std. Dev.	Skew	Item Tot. Corr.	Scale alpha
Issue Relevance	I think that the information that I have just read is very relevant to me personally (n=957)	1	9	6.03	2.15	-0.51	0.72	0.84
	How relevant is purified recycled water to you? (n=957)	1	9	5.95	2.30	-0.56	0.72	
Risks	Purified recycled water has a number of risks (n=957)	1	9	4.76	2.26	0.06	0.81	0.90
	I think that I am personally at risk from purified recycled water (n=957)	1	9	3.84	2.34	0.51	0.81	
	I think that the average person in SEQ is at risk from purified recycled water (n=957)	1	9	4.12	2.37	0.38	0.89	
	People are exposed to so many risks everyday that the risk of purified recycled water is too small to worry about* (n=957)	1	9	4.22	2.33	0.42	0.60	
Benefits	Purified recycled water has a number of benefits (n=957)	1	9	6.13	2.00	-0.58	0.75	0.88
	I think that I will personally benefit from purified recycled water (n=957)	1	9	4.76	2.25	-0.03	0.69	
	I think that the average person in SEQ will benefit from purified recycled water (n=957)	1	9	5.62	2.11	-0.44	0.85	

*reverse coded

Table 11: Summary statistics for criterion variables.

Variable	Item	Min.	Max.	Mean	Std. Dev.	Skew	Item Tot. Corr.	Scale alpha
Information quality	To what extent do you think the information was trustworthy? (n=957)	1	7	4.89	1.36	-0.60	.864	0.91
	To what extent do you think the information was accurate? (n=957)	1	7	4.92	1.32	-0.59	.868	
	To what extent do you think the information was factual? (n=957)	1	7	4.96	1.34	-0.64	.823	
	To what extent do you think the information was distorted?* (n=957)	1	7	4.84	1.46	-0.28	.634	
	To what extent do you think the information was truthful? (n=957)	1	7	4.89	1.35	-0.54	.835	
	To what extent do you think the information was biased?* (n=957)	1	7	4.22	1.53	-0.08	.511	
Support	What is your overall opinion of purified recycled water? (n=957)	1	7	4.65	1.77	-0.66	0.87	0.94
	I support adding purified recycled water to drinking water supply (n=957)	1	7	4.44	1.88	-0.47	0.90	
	I do not want purified recycled water to be mixed with drinking water* (n=957)	1	7	4.30	2.01	-0.30	0.73	
	I would drink the water that's provided by purified recycled water schemes (n=957)	1	7	4.46	1.87	-0.49	0.87	
	Given the choice, I would not drink water that contained purified recycled water* (n=957)	1	7	4.02	2.04	-0.06	0.72	
	I believe that purified recycled water would be safe to use (n=957)	1	7	4.71	1.76	-0.63	0.87	
Emotion	Repulsive/Attractive (n=957)	1	7	4.03	1.57	-0.32	0.92	0.97
	Disgusting/Appealing (n=957)	1	7	3.98	1.57	-0.25	0.90	
	Contaminated/Purified (n=957)	1	7	4.38	1.82	-0.35	0.86	
	Revolting/Refreshing (n=957)	1	7	4.06	1.63	-0.29	0.91	
	Tense/Calm (n=957)	1	7	4.30	1.82	-0.25	0.90	
	Afraid/Fearless (n=957)	1	7	4.25	1.74	-0.28	0.90	
	Sad/Happy (n=957)	1	7	4.23	1.67	-0.28	0.88	

*reverse coded

A one-way between groups analysis of variance was conducted to explore the effectiveness of the issue relevance experimental condition. Participants were provided information about a purified recycled water scheme in SEQ. Participants from SEQ were assigned to the high issue relevance condition and asked to pay close attention to the information provided, whereas participants from other areas of Australia were assigned to the low issue relevance condition and were not directed to pay close attention to the information. There was a statistically significant difference ($p<.001$) between participants from SEQ and other regions in terms of manipulation check variable of perceived issue relevance[2]. The effect size was medium to large; with participants from SEQ recording substantially higher mean perceived issue relevance scores[3] compared to other regions[4].

A one-way between groups analysis of variance was conducted to explore the effectiveness of the benefits information condition. Participants were provided information about the high level of benefits from purified recycled water or were not provided any information about the benefits. There was a statistically significant difference ($p<.05$) between the high and no benefits information conditions in terms of manipulation check variable of perceived benefits of recycled water[5]. The effect size was small however, with participants in the high benefits condition recording a marginally higher mean perceived benefits score[6] compared those in the no benefit information condition[7].

[2] $F(1, 955)=110.63$, $p<.001$, partial eta squared = 0.10
[3] M=6.66, SD=1.89, N=468
[4] M=5.34, SD=2.02, N=489
[5] $F(1, 955)=5.62$, $p=.018$, partial eta squared =0.006
[6] M=5.65, SD=1.85, N=476

A one-way between groups analysis of variance was conducted to explore the effectiveness of the risk condition. Participants were provided information about the low level of risk presented by purified recycled water or were not provided any information about the risks. There was a statistically significant difference ($p<.01$) between the low and no risk information conditions in terms of manipulation check variable of perceived risks of recycled water[8]. The effect size was small however; with participants in the low risk information condition recording slightly lower mean perceived risks score[9] compared those in the no risk information condition[10].

In summary, these analyses revealed that the issue relevance manipulation was particularly successful, with substantial differences observed between participants from SEQ and other regions in terms of manipulation check variable of perceived issue relevance. The risks and benefits information manipulations were less successful however; recording only small differences between experimental conditions in terms of the manipulation check variables of perceived risk and perceived benefits.

In order to assess the bearing of personality traits on support and emotion towards recycled water a range of individual difference variables were measured and assessed. Summary statistics are provided in Table 12 for the individual difference scales used in analyses: Need for Cognition (Cacioppo and Petty, 1982, Cacioppo, Petty and Kao, 1984); System Justification (Kay and Jost, 2003); Regulatory Focus (Lockwood *et al*. 2002); and Need for Affect (Maio and Esses, 2001). To confirm that provision of information had no bearing on individual differences a one-way analysis of variance was performed. As expected, no significant differences were observed for the different experimental conditions on any of the individual difference variables[11]. The individual difference variables were reduced to two roughly equal groups by performing median splits in order to perform further analyses.

Table 12: Summary statistics of individual difference scales.

Scale	Items	Min.	Max.	Mean	Std. Dev.	Median	Skew.	Cronbach alpha
Need for Cognition	18	1.00	8.83	5.72	1.08	5.61	0.00	0.89
System Justification	7	1.00	9.00	5.26	1.11	5.29	-0.04	0.67
Regulatory focus: *(promotion - prevention)*	18	-4.89	7.33	1.26	1.64	1.00	0.59	-
Promotion	9	1.00	9.00	5.88	1.46	5.89	-0.17	0.93
Prevention	9	1.00	9.00	4.62	1.44	4.67	0.17	0.89
Need for Affect: *(approach - avoid)*	14	-5.25	6.00	1.39	1.72	1.29	0.00	-
Approach	8	1.00	7.00	4.75	1.06	4.75	-0.52	0.90
Avoid	6	1.00	7.00	3.36	1.18	3.33	0.27	0.88

3.3. Testing Demographic Differences

To assess whether emotion towards and support for recycled water are related to any demographic variables, analyses of variance were conducted. Summary statistics are provided in Table 13 of demographic differences regarding emotion towards and support for recycled water. One-way between group analysis of variance revealed significant differences between men and women in terms of support[12] and emotion[13] towards recycled water, with women recording lower mean support and more negative emotion.

[7] M=5.36, SD=1.95, N=481.
[8] F(1, 955)=11.571, p=.001, partial eta squared = 0.01
[9] M=4.02, SD=2.00, N=495
[10] M=4.47, SD=2.05, N=462
[11] Need for Cognition, F(3, 953)=.707, p=.55; System Justification, F(3, 953)=1.08, p=.36; Regulatory Focus, F(3, 953)=.70, p=.56, Need for Affect, F(3, 953)=.22, p=.88.
[12] F(1, 955)=13.938, p<.001
[13] F(1, 955)=16.72, p<.001

Table 13: Demographic differences in emotion towards and support for recycled water.

Demographic Variable		N	Support		Emotion	
			Mean	Std. Dev.	Mean	Std. Dev.
State	New South Wales	183	4.46	1.60	4.28	1.52
	Victoria	157	4.27	1.65	4.06	1.52
	Queensland	468	4.35	1.72	4.09	1.64
	South Australia	53	4.68	1.48	4.35	1.46
	Western Australia	58	5.07	1.55	4.70	1.25
	Tasmania	22	4.25	1.61	3.75	1.49
	ACT	16	5.41	0.99	4.76	0.97
Age	18 to 23 years	72	4.29	1.31	3.93	1.24
	24 to 39 years	224	4.20	1.42	4.03	1.46
	40 to 55 years	250	4.40	1.70	4.16	1.58
	56 to 65 years	226	4.47	1.80	4.16	1.62
	66 to 75 years	144	4.56	1.76	4.34	1.61
	More than 75 years	41	5.50	1.71	4.98	1.68
Gender	Male	473	4.63	1.65	4.38	1.54
	Female	484	4.24	1.65	3.97	1.56
Income	Less than $30,000	191	4.23	1.81	4.04	1.73
	$30,000 to $59,999	240	4.58	1.59	4.30	1.46
	$60,000 to $89,999	186	4.34	1.52	4.13	1.40
	$90,000 to $119,999	107	4.46	1.80	4.27	1.75
	$120,000 to $149,999	74	4.89	1.45	4.54	1.49
	More than $150,000	48	5.25	1.36	4.62	1.37
	Prefer not to answer	111	3.92	1.68	3.69	1.51
Education	Primary school	11	3.59	1.98	3.43	2.22
	High school	298	4.32	1.62	4.05	1.55
	Trade/TAFE	277	4.30	1.68	4.05	1.64
	Tertiary - Undergraduate	223	4.36	1.71	4.18	1.49
	Tertiary - Postgraduate	148	5.09	1.47	4.70	1.35

One-way between group analysis of variance revealed significant differences between participants from different states in terms of support[14] and emotion[15] towards recycled water, with women recording lower mean support and more negative emotion. Post-hoc tests revealed that participants from Western Australia recorded significantly ($p<.05$) higher mean support[16] and more positive emotion[17] than those from Victoria[18] and Queensland[19]. State differences in support and emotion are displayed in Figure 1.

[14] F(6, 950)=3.09, p=.005
[15] F(6, 950)=2.41, p=.025
[16] M=5.07, SD=1.55, N=58
[17] M=4.70, SD=1.25, N=58
[18] Support: M=4.27, SD=1.65, N=157; Emotion: M=4.06, SD=1.52, N=157
[19] Support: M=4.35, SD=1.72, N=468; Emotion: M=4.09, SD=1.64, N=468

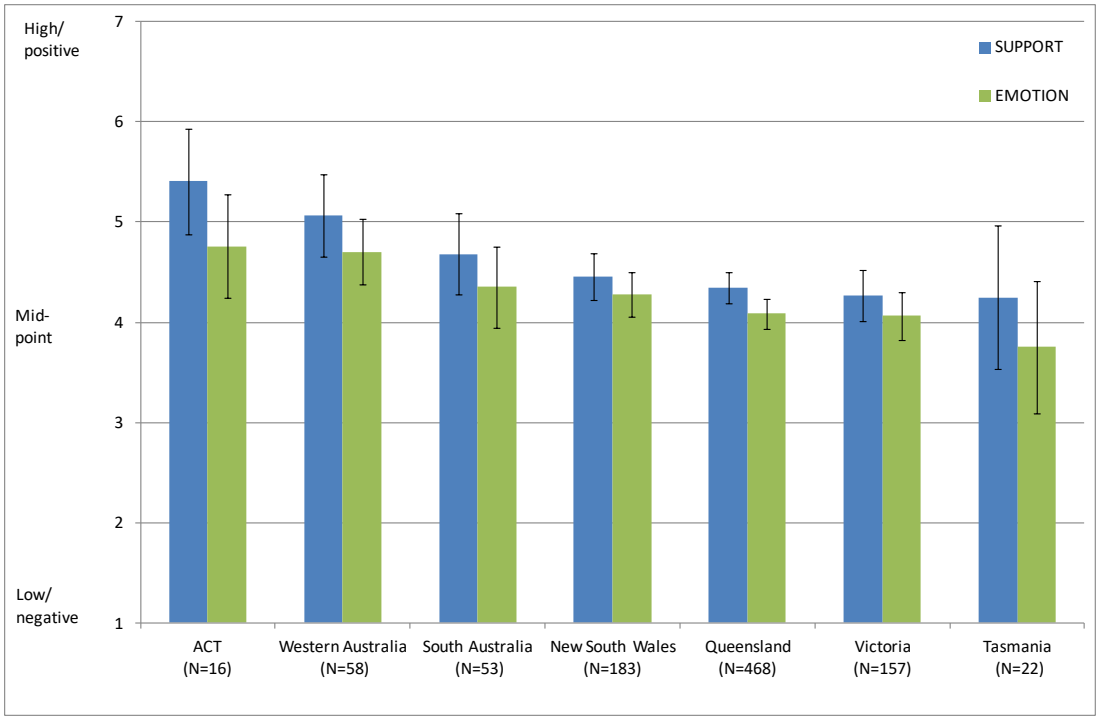

Figure 1: State differences in support and emotion: means and 95% confidence intervals.

One-way between group analysis of variance revealed significant differences between participants in different age brackets in terms of support[20] and emotion[21] towards recycled water. Post-hoc tests revealed that participants aged over 75 years recorded significantly ($p<.05$) higher mean support[22] than all other age brackets, and significantly more positive emotion[23] than all age brackets except 66-75 years. Differences in support and emotion for the different age brackets are displayed in Figure 2.

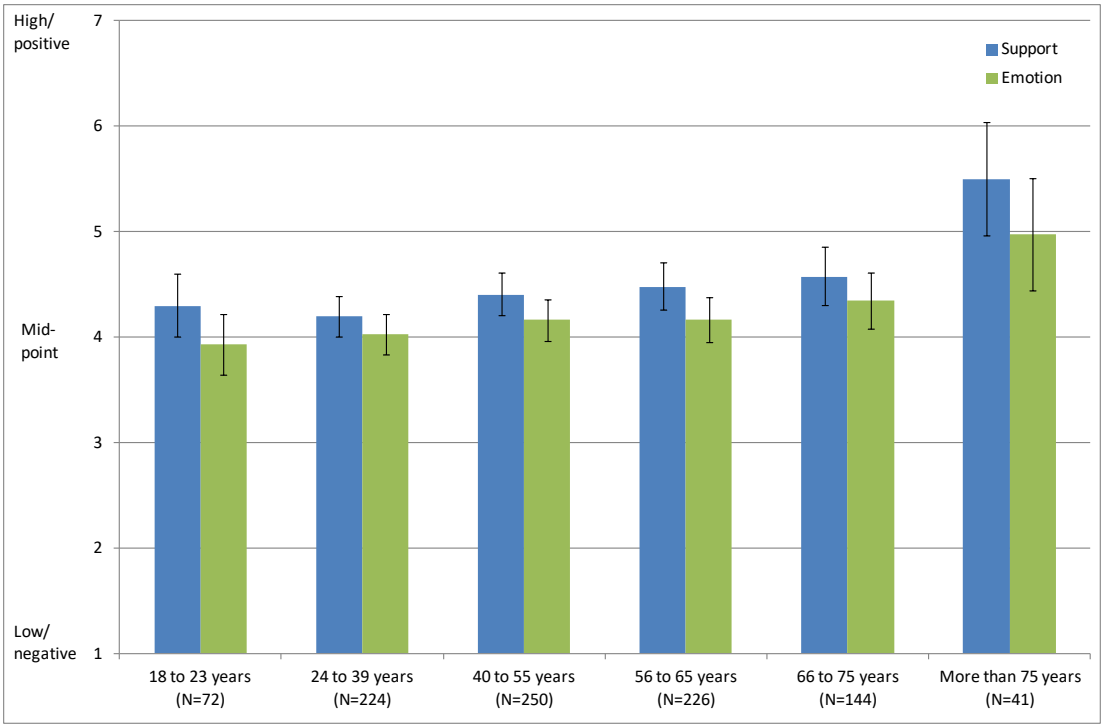

Figure 2: Age differences in support and emotion: means and 95% confidence intervals.

[20] F(5, 951)=4.67, p<.001
[21] F(5, 951)=3.29, p=.006
[22] M=5.50, SD=1.71, N=41
[23] M=4.98, SD=1.68, N=41

One-way between group analysis of variance revealed significant differences between different household income brackets' levels of support[24] and emotion[25]. Post-hoc tests revealed that participants in households earning more than $150,000 per year recorded significantly higher (p<.05) levels of support than those earning less than $30,000, earning between $60,000 and $89,999, and those preferring not to answer. Figure 3 details difference in support and emotion for the different household incomes.

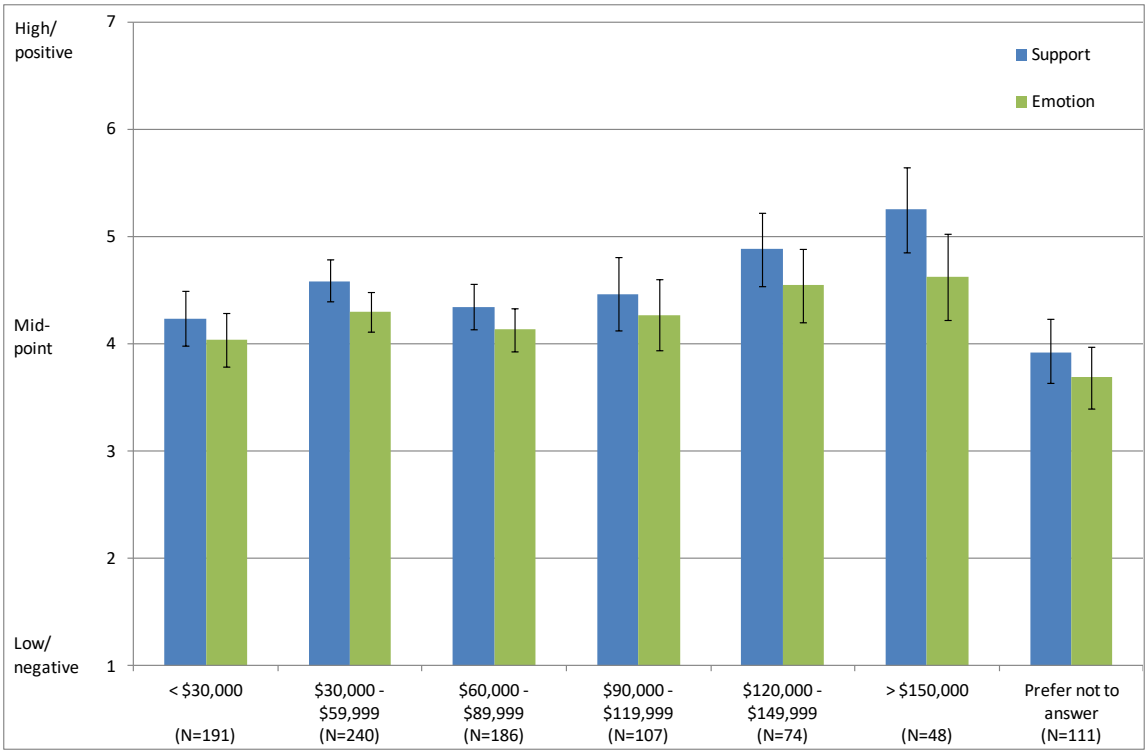

Figure 3: Household income differences in support and emotion: means and 95% confidence intervals.

Significant differences were also observed between participants with different levels of education in terms of support[26] and emotion[27]. Post-hoc tests revealed that participants with tertiary post-graduate education recorded significantly higher levels of support than those with high-school, trade/TAFE, and tertiary undergraduate educations. Participants with tertiary post-graduate education also recorded significantly more positive emotions than those with high-school, trade/TAFE, and tertiary undergraduate educations. Figure 4 details difference in support and emotion for the different education levels.

[24] F(6, 950)=5.655, p<.001
[25] F(6, 950)=3.84, p=.001
[26] F(4, 952)=7.537, p<.001
[27] F(4, 952)=5.96, p<.001

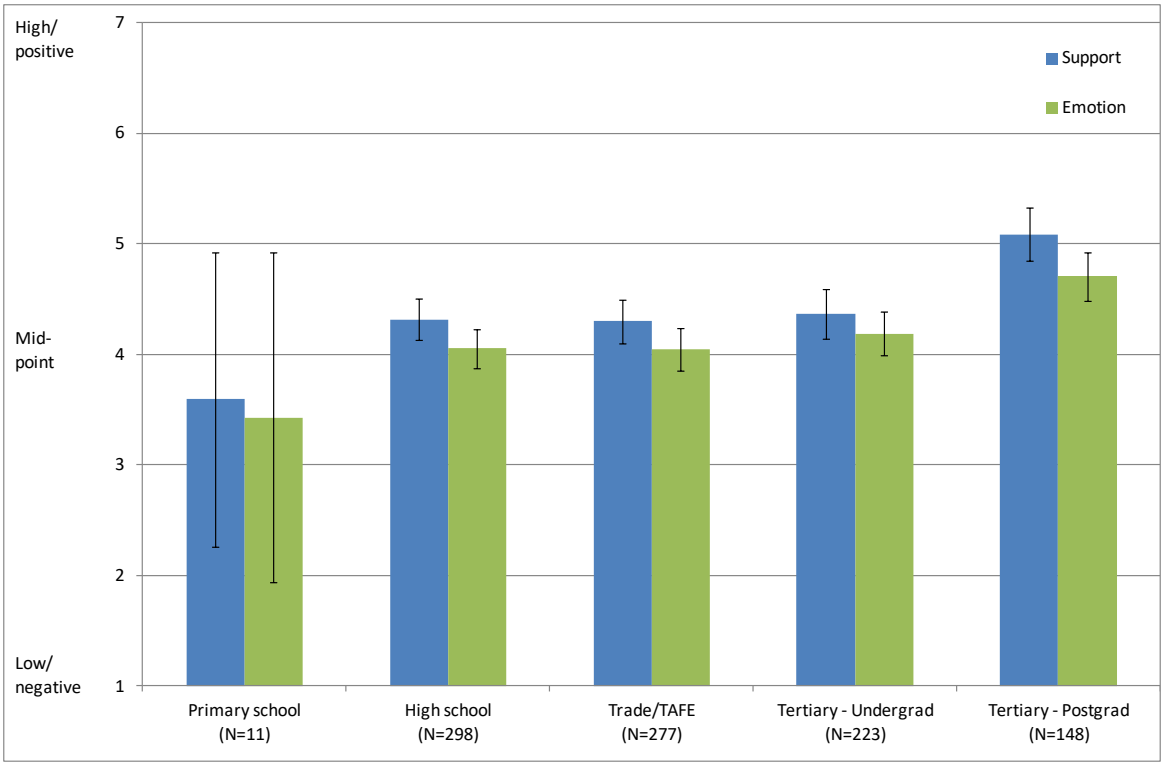

Figure 4: Education differences in support and emotion: means and 95% confidence intervals.

In summary, higher levels of support and more positive emotions towards recycled water were recorded by men, Western Australians, those aged over 75 years, from households earning more than $150,000 per year, and those educated to tertiary post-graduate level.

3.4. Testing Dual Processing Theories of Persuasion

To assess the strength of the relationships between key variables correlation analysis was performed Table 14 provides a summary of the correlations between the key variables. Correlation is assessed from -1 to 1. Scores close to 0 indicate the absence of a relationship between variables; whereas scores close to -1 represent a strong negative relationships and scores close to 1 represent strong positive relationships. Support for recycled water demonstrated a strong positive relationship with perceived benefits of recycled water ($r = .74, p < .01$), emotion towards recycled water ($r = .86, p < .01$) and quality of the information provided ($r = .67, p < .01$) and a strong negative relationship with perceived risks of recycled water ($r = -.80, p < .01$).

Table 14: Bivariate correlations of criterion, manipulation check and individual difference variables.

Variable Category	Variable	1	2	3	4	5	6	7	8	9
Criterion	Support for recycled water	-								
	Emotion	.86**	-							
	Information quality	.67**	.61**	-						
Manipulation check	Issue relevance	.26**	.27**	.33**	-					
	Perceived Benefits	.74**	.73**	.62**	.38**	-				
	Perceived Risks	-.80**	-.69**	-.65**	-.10**	-.62**	-			
Individual difference	Need for cognition	.24**	.18**	.21**	.22**	.18**	-.19**	-		
	Need for Affect	.10**	.07*	.17**	.20**	.16**	-.06	.32**	-	
	Regulatory focus	.12**	.10**	.17**	.23**	.13**	-.10**	.42**	0.53**	-
	System justification	-.22**	-.17**	-.14**	-.06	-.13**	.21**	-.04	-.02	-.07*

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

To assess the impact of the experimental conditions on the criterion variables of support for recycled water, emotion towards recycled water and perceived information quality a range of between-groups analyses of variance were conducted. The means these criterion variables recorded in each of the experimental conditions are provided in Table 15 and Figure 5 below.

Table 15: Mean scores for criterion variables by experimental condition.

Issue Relevance	Risk	Benefit	Support		Emotion		Information Quality	
			Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Low	No info	No info	4.44	1.68	4.05	1.49	4.85	1.12
		High benefit	4.53	1.54	4.33	1.49	4.72	1.15
		Total	4.49	1.61	4.19	1.49	4.78	1.13
	Low risk info	No info	4.43	1.58	4.21	1.44	4.72	1.18
		High benefit	4.65	1.61	4.43	1.49	4.79	1.10
		Total	4.54	1.60	4.33	1.47	4.76	1.14
	Total	No info	4.44	1.63	4.14	1.46	4.78	1.15
		High benefit	4.59	1.57	4.38	1.49	4.76	1.12
		Total	4.52	1.60	4.26	1.48	4.77	1.13
High	No info	No info	4.06	1.74	3.80	1.70	4.71	1.18
		High benefit	4.04	1.69	3.88	1.57	4.74	1.03
		Total	4.05	1.71	3.84	1.63	4.72	1.10
	Low risk info	No info	4.64	1.70	4.40	1.62	4.99	1.19
		High benefit	4.60	1.68	4.24	1.59	4.77	1.28
		Total	4.62	1.69	4.32	1.61	4.88	1.24
	Total	No info	4.36	1.74	4.10	1.68	4.85	1.19
		High benefit	4.33	1.70	4.07	1.59	4.75	1.16
		Total	4.35	1.72	4.09	1.64	4.80	1.18
Total	No info	No info	4.26	1.72	3.92	1.60	4.78	1.15
		High benefit	4.29	1.63	4.11	1.54	4.73	1.09
		Total	4.27	1.67	4.02	1.57	4.75	1.12
	Low risk info	No info	4.53	1.64	4.30	1.53	4.86	1.19
		High benefit	4.63	1.64	4.34	1.54	4.78	1.19
		Total	4.58	1.64	4.32	1.54	4.82	1.19
	Total	No info	4.40	1.68	4.12	1.57	4.82	1.17
		High benefit	4.47	1.64	4.23	1.54	4.76	1.14
		Total	4.43	1.66	4.17	1.56	4.79	1.15

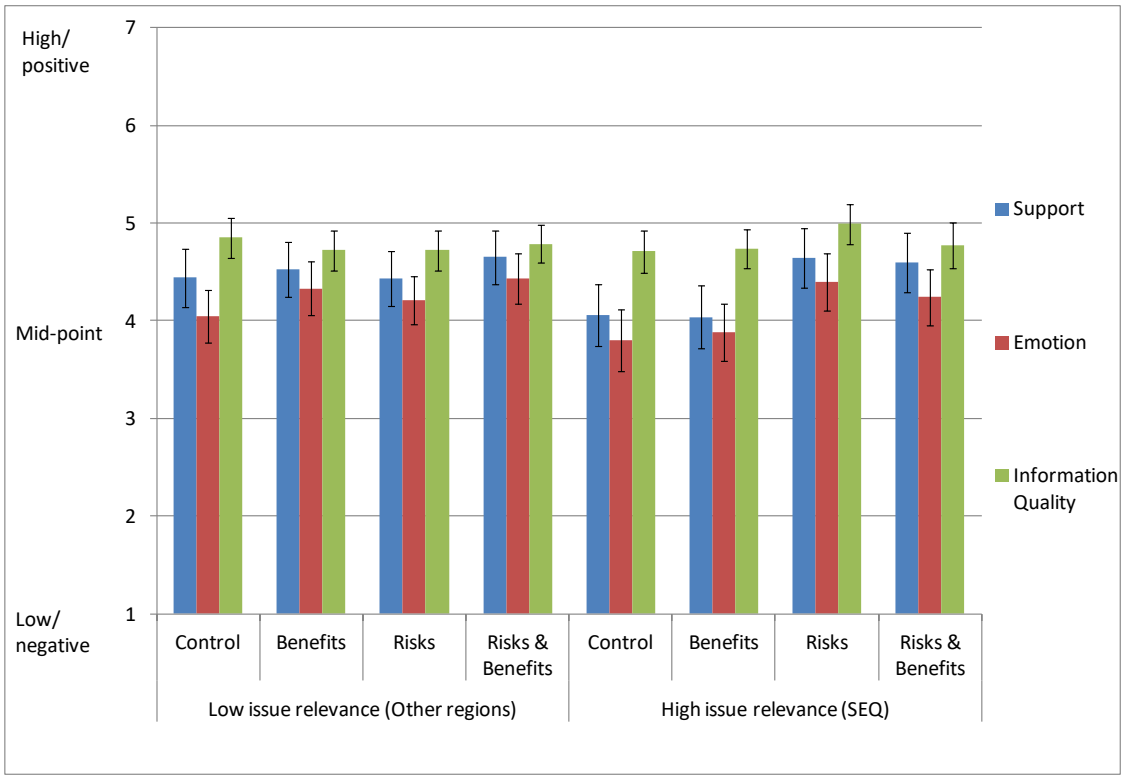

Figure 5: Support, emotion and information quality by experimental conditions: Means and 95% confidence intervals.

One-way between groups analysis of variance indicated that, overall, there was a significant difference ($p<.05$) in mean support for recycled water for participants that received no information, low relative risk information, benefits information and a combination of risks and benefits information[28]. Despite this, post-hoc tests revealed no significant differences ($p>.05$) between the information conditions, suggesting that overall messages about the benefits of recycled water are not more effective in fostering support than messages about the low risks. However, further analyses revealed evidence of issue relevance and information interacting to affect support for recycled water.

A three-way between-groups analysis of variance was conducted to explore the impact of issue relevance (High=SEQ; Low= other regions) and provision of information about risks (low risk info; no risk info) and benefits (high benefits info; no benefits info) on support for recycled water. The only interaction effect to reach statistical significance[29] was that of issue relevance and risk information[30]; however, the effect size was small (Figure 6). The only main effect to reach statistical significance[31] was for risk information[32]; however, the effect size was small.

Low issue relevance participants did not record significant differences in support for recycled water in the low risk info[33] and no risk info[34] conditions; whereas high issue relevance participants recorded significantly[35] higher support for recycled water in the low risk info condition[36] compared to the no risk info condition[37]. This suggests elaborative processing of information about the low relative risks of recycled water occurs when the issue relevant, in line with the ELM and HSM frameworks. When

[28] , $F(3, 953)=2.87$, $p=.036$
[29] The interaction effects were not statistically significant between issue relevance, risks and benefits, $F(1, 949)=.12$, $p=.727$, issue relevance and benefits, $F(1, 949)=.763$, $p=.383$, and risks and benefits, $F(1, 949)=.084$, $p=.771$.
[30] $F(1, 949)=5.84$, $p=.016$, partial eta squared = .006
[31] The main effects were not significant for benefits, $(1, 949)=.312$, $p=.58$, and issue relevance, $F(1, 949)=2.78$, $p=.096$.
[32] $F(1, 949)=8.47$, $p=.004$, partial eta squared = .009
[33] $M=4.54$, $SD=1.6$, $N=253$
[34] $M=4.49$, $SD=1.61$, $N=236$
[35] $F(1, 466)=13.11$, $p<.001$
[36] $M=4.62$, $SD=1.69$, $N=242$
[37] $M=4.05$, $SD=1.71$, $N=226$

recycled water is a relevant issue, people are more likely to centrally or systemically process information about the low relative risks and respond positively by indicating higher support. This suggests that communication of risks, when considered in relative terms, can promote rather than hinder acceptance of recycled water, provided that the issue is relevant. Participants with low elaboration likelihood (i.e. those for whom the issue is not relevant) do not respond differently to messages about benefits of recycled water by demonstrating higher levels of support. This indicates that peripheral processing does not give more weight to messages about benefits compared to risks of recycled water.

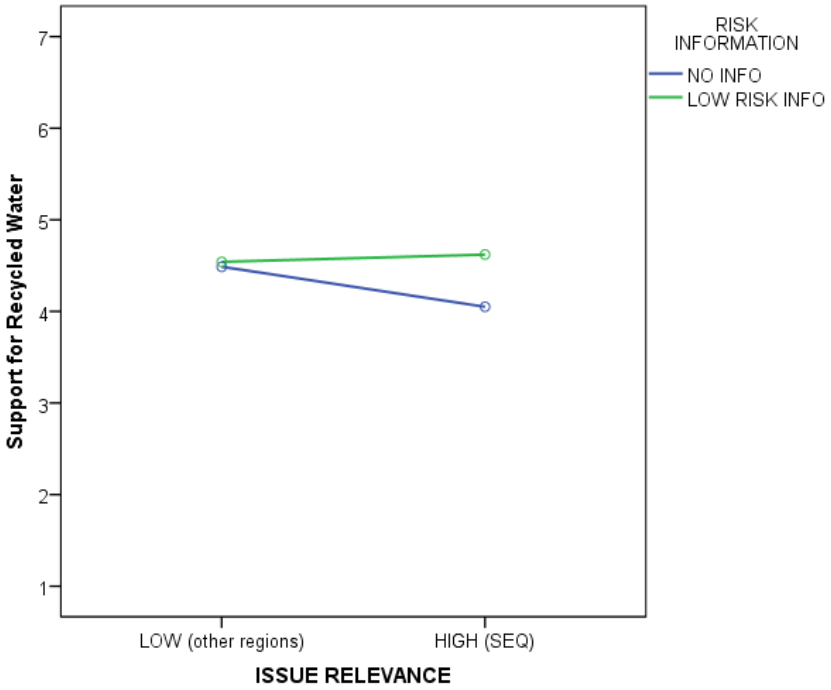

Figure 6: Support for recycled water of issue relevance and risk conditions - estimated marginal means.

A three-way between-groups analysis of variance was conducted to explore the impact of issue relevance and provision of information about risks and benefits on emotions related to recycled water. No interaction effects reached statistical significance[38]. The only significant main effect[39] was for risk information[40]; however the effect size was small. Participants recorded significantly more positive emotions relating to recycled water in the low risk info[41] compared to no risk info[42] conditions. Despite evidence of higher support for recycled water resulting from elaborative processing of risk information when the issue is relevant, people do not demonstrate more positive emotions as a function of central or systematic information processing. The non-significant main effect for issue relevance indicates that participants with low elaboration likelihood do not demonstrate more negative emotions to recycled water. As such, the results indicate that the 'yuck factor' is not a form of peripheral processing.

[38] The interaction effects were not statistically significant between issue relevance, risks and benefits, F(1, 949)=.207, p=.649, issue relevance and risks, F(1, 949)=2.92 p=.088, issue relevance and benefits, F(1, 949)=1.99 p=.159, and risks and benefits, F(1, 949)=.545, p=.461.
[39] The main effects were not significant for benefits, (1, 949)=1.13, p=.289, and issue relevance, F(1, 949)=3.142, p=.077.
[40] F(1, 949)=9.38, p=.002, partial eta squared = .01
[41] (M=4.32, SD=1.54, N=495)
[42] (M=4.02, SD=1.57, N=462)

A three-way between-groups analysis of variance was conducted to explore the impact of issue relevance and provision of information about risks and benefits on perceived quality of the information provided. The interaction[43] and main[44] effects failed to reach statistical significance for perceived information quality. This suggests that elaborative processing of risk information occurring when the issue is relevant does not affect perceived quality of the information provided in the same manner that support for recycled water is affected.

3.5. Testing the Role of Individual Differences

In order to assess the bearing of individual differences, or personality traits, on support and emotion towards recycled water further analyses were conducted. A four-way multivariate analysis of variance was performed to assess whether individual differences regarding system justification (low, high), regulatory focus (prevention, promotion), need for cognition (low, high) and need for affect (avoid, approach) had any combined influence on emotion towards and support for recycled water. There was a statistically significant difference for the combined dependent variables between those with low and high system justification[45], and those with low and high need for cognition[46]. When the results of the dependent variables were considered separately, the system justification groups recorded significant differences on emotion[47] and support[48]; and the need for cognition groups also recorded significant differences on emotion[49] and support[50]. This suggests that those who have a tendency to avoid engaging in effortful cognitive activities and to justify the system by supporting the status quo record significantly lower levels of support and more negative emotions towards recycled water.

Significant interactions were observed on the combined dependent variables between Regulatory Focus and Need for Affect groups[51], and System Justification and Need for Affect groups[52] (see Figure 7 below). This indicates that the responses to recycled water of those who tend to approach or avoid emotions is dependent on whether they are also motivated to attain positive outcomes or to avoid negative outcomes, and whether they tend to justify or oppose the system. Higher levels of support and more positive emotions towards recycled water were recorded for those who tend to approach their emotions, provided that they are also motivated to attain positive outcomes, or to oppose the system by challenging the status quo.

In order to assess whether the individual differences in regulatory focus, need for cognition and need for affect influence how people respond to messages about the risks and benefits of recycled water further analyses of variance were conducted. A three-way multivariate analysis of variance was performed to assess the combined impact of regulatory focus, and risks and benefits information on support and emotion towards recycled water. All interaction effects with regulatory focus failed to reach significance[53]. This suggests that those with a promotion focus do not respond differently to information about the risks and benefits of recycled water than those with a prevention focus.

[43] The interaction effects were not statistically significant between issue relevance, risks and benefits, F(1, 949)=2.33, p=.127, issue relevance and risks, F(1, 949)=1.5 p=.221, issue relevance and benefits, F(1, 949)=.215 p=.643, and risks and benefits, F(1, 949)=.043, p=.836.
[44] The main effects were not significant for benefits, (1, 949)=.711, p=.399, issue relevance, F(1, 949)=.178, p=.673, and risks, F(1, 949)=.80, p=.371.
[45] F(2, 839)=10.87, p<.001, Wilks' lambda =.975, partial eta squared = .03
[46] F(2, 839)=20.57, p<.001, Wilks' lambda =.953, partial eta squared = .05
[47] F(1, 840)=6.67, p=.01, partial eta square=.008
[48] F(1, 840)=17.89, p<.001, partial eta square= .02
[49] F(1, 840)=25.52, p<.001, partial eta square =.03
[50] F(1, 840)=40.64, p<.001, partial eta square= .05
[51] F(2, 839)=3.97, p=.019, Wilks' lambda =.991, partial eta squared = .009
[52] F(2, 839)=3.11, p=.045, Wilks' lambda =.993, partial eta squared = .007
[53] The interaction effects were not statistically significant between: regulatory focus, risks and benefits, F(2, 919)=.421, p=.657, Wilks' lambda = .999; regulatory focus and benefits, F(2, 919)=1.85 p=.159, Wilks' lambda = .996; regulatory focus and risks, F(2, 919)=.098 p=.907, Wilks' lambda = 1.00.

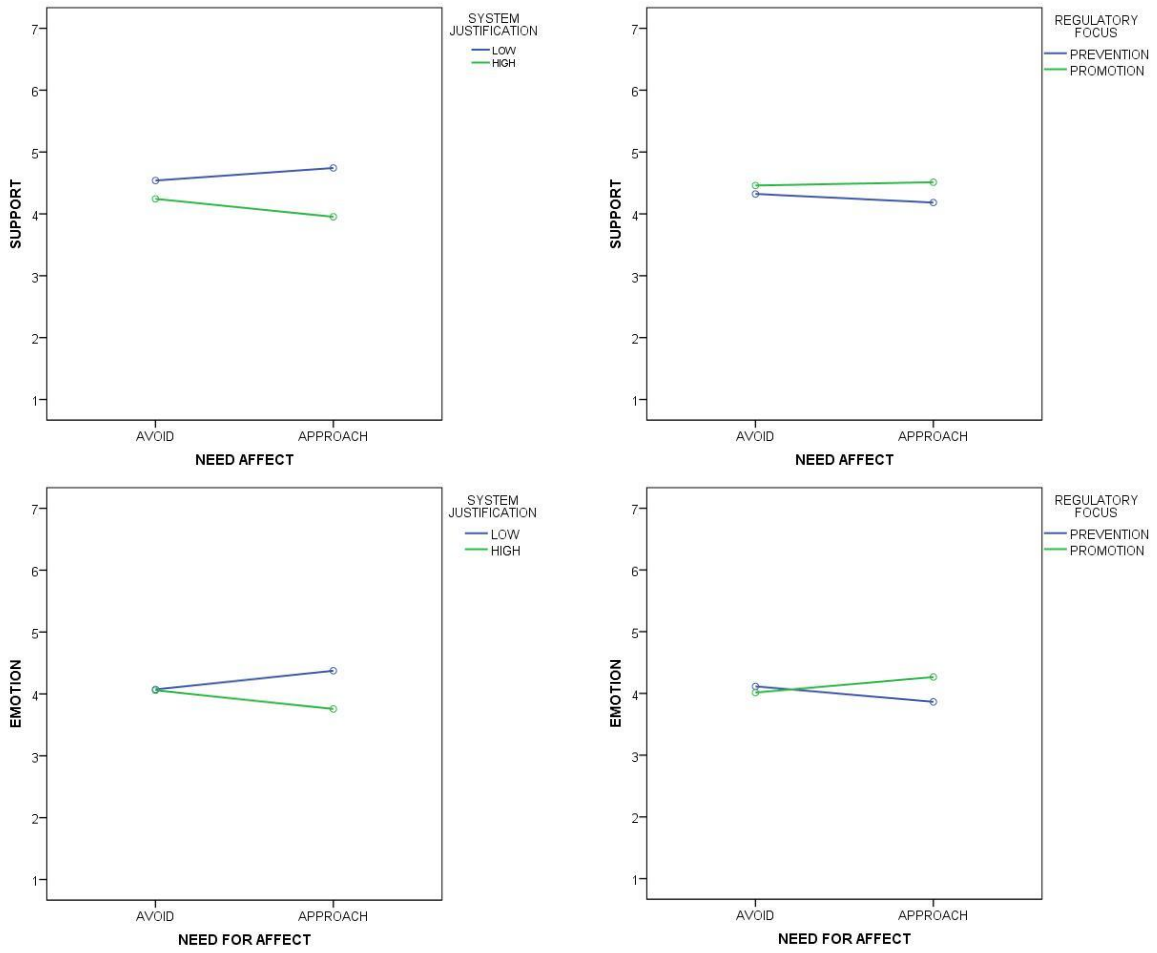

Figure 7: Interactions between need for affect and system justification and regulatory focus: estimated marginal means.

To assess whether need for cognition influences how people respond to messages about the risks and benefits of recycled water a three-way multivariate analysis of variance was performed with support and emotion as combined dependent variables. All interaction effects with need for cognition failed to reach significance[54], suggesting that those with a high need for cognition do not respond differently to information about the risks and benefits of recycled water than those with a low need for cognition.

To assess whether need for affect influences how people respond to messages about the risks and benefits of recycled water another three-way multivariate analysis of variance was performed with support and emotion as combined dependent variables. All interaction effects with need for affect also failed to reach significance[55], suggesting that those with a high need for affect do not respond differently to information about the risks and benefits of recycled water than those with a low need for affect.

[54] The interaction effects were not statistically significant between: need for cognition, risks and benefits, $F(2, 938)=.172$, $p=.842$, Wilks' lambda = 1.00; need for cognition and benefits, $F(2, 938)=2.29$, $p=.102$, Wilks' lambda = .995; need for cognition and risks, $F(2, 938)=.062$ $p=.940$, Wilks' lambda = 1.00.

[55] The interaction effects were not statistically significant between: need for affect, risks and benefits, $F(2, 948)=.378$, $p=.685$, Wilks' lambda = .99; need for affect and benefits, $F(2, 948)=.306$, $p=.726$, Wilks' lambda = .999; need for affect and risks, $F(2, 948)=.494$ $p=.610$, Wilks' lambda = .999.

3.6. Summary of Results

The results detailed in this report provide evidence that confirms some of the research questions guiding the experimental design whilst refuting others. Table 16 provides a summary of whether the research hypotheses were accepted or rejected on the basis of these results. The analyses suggest that the experimental design was largely effective. The issue relevance manipulation was particularly successful, with substantial differences observed between participants from SEQ and other regions in terms of the manipulation check variable of perceived issue relevance. The risks and benefits information manipulations were less successful however; recording only small significant differences between experimental conditions in terms of the manipulation check variables of perceived risk and perceived benefits.

A number of demographic differences were observed for the key criterion variables of emotion towards and support for recycled water. Results indicate that higher levels of support and more positive emotions towards recycled water are recorded by participants who are men, from Western Australia, aged over 75 years, from households earning more than $150,000 per year, and educated to tertiary post-graduate level.

The results support dual processing theories of persuasion, such as the Elaboration Likelihood Model and Systematic Heuristic model, providing evidence of central or systemic route processing of risk information occurring when recycled water is a relevant issue. Overall, messages about the benefits of recycled water were no more effective in fostering support than messages about the low risks; however, analyses revealed evidence of issue relevance and risk information interacting to affect support for recycled water. Low issue relevance participants did not record significant differences in support for recycled water in the low risk info and no risk info conditions; whereas high issue relevance participants recorded higher support for recycled water in the low risk info condition compared to the no risk info condition. When recycled water is a relevant issue, people are more likely to undertake elaborative processing of information about the low relative risks of recycled and respond positively by indicating higher support. This suggests that communication of risks, when considered in relative terms, can promote rather than hinder acceptance of recycled water, provided that the issue is relevant.

Participants with low elaboration likelihood (i.e. those for whom the issue is not relevant) do not respond differently to messages about benefits of recycled water by demonstrating higher levels of support. This indicates that peripheral or heuristic information processing does not give more weight to messages about benefits compared to risks of recycled water. Despite evidence of higher support for recycled water resulting from elaborative processing of risk information when the issue is relevant, people do not demonstrate more positive emotions as a function of central or systematic information processing. Participants with low elaboration likelihood do not demonstrate more negative emotions to recycled water. This indicates that the 'yuck factor' is not a form of peripheral processing. Elaborative processing of risk information that occurs when the issue is relevant does not affect perceived quality of the information provided either.

A number of individual differences, or personality traits, were found to influence responses to recycled water. The results suggest that those who have a tendency to avoid engaging in effortful cognitive activities (i.e. have a low need for cognition), and to justify the system by supporting the status quo (i.e. demonstrate high system justification), are more likely to oppose recycled water and demonstrate negative emotions. Results indicate that responses to recycled water are dependent on how individuals' personality traits interact, with their need for affect, regulatory focus and system justification demonstrating inter-relationships. Those who tend to approach their emotions are more likely to respond positively to recycled water, provided that they are also motivated to attain positive outcomes, or to oppose the system by challenging the status quo.

The analyses indicate that personality traits do not influence responses to messages about the risks and benefits of recycled water however. For instance, those with a promotion focus and high need for cognition do not respond differently to information about the risks and benefits of recycled water than those with a prevention focus or low need for cognition.

Table 16: Summary of research hypotheses accepted or rejected based on results.

Research Question	Hypothesis	Finding
Does communication of the risks, even when considered in relative terms, actually hinder rather than promote acceptance of recycled water?	Messages about the benefits of PRW should be more effective in fostering support than messages about the low risks of PRW.	Rejected
Do participants with high elaboration likelihood respond better to messages about the low risks of PRW by demonstrating higher levels of support?	When issue relevance is high people should use central processing and give more weight to messages about low risks of PRW, as such messages require rational and deliberate thought to process.	Accepted
Do participants with low elaboration likelihood respond better to messages about benefits of PRW by demonstrating higher levels of support?	When issue relevance is low people should use peripheral processing and give less weight to messages about low risks of PRW.	Rejected
Is the 'yuck factor' a form of peripheral processing?	Participants with low elaboration likelihood (low relevance), should demonstrate more negative emotions to PRW.	Rejected
Do participants with a promotion focus respond better than those with a prevention focus to messages about benefits of PRW by demonstrating higher levels of support and more positive emotions?	Participants with a promotion focus should respond better to messages about benefits than those with a prevention focus who should respond better to risk messages.	Rejected
Do participants who demonstrate a high need for cognition demonstrate different responses to recycled water?	Participants with a high need for cognition will demonstrate higher support for and more positive emotions towards recycled water, as they will rationalise the risk issues and rely less on the yuck-factor when forming opinions.	Accepted
Do participants' need for cognition influence how they respond to information about the risks and benefits of recycled water?	Participants with a high need for cognition should respond better to messages about risks than those with a low need for cognition who should respond better to benefits messages.	Rejected
Do participants' need for affect influence how they respond to information about the risks and benefits of recycled water?	Participants with a high need for affect should respond better to messages about benefits than those with a low need for affect who should respond better to risk messages.	Rejected
Do participants who justify the system demonstrate different responses to recycled water?	Participants with high levels of system justification will demonstrate lower support for and more negative emotions towards recycled water, as they will favour the status quo over new technologies.	Accepted
Do participants with a high need for affect respond differently to recycled water based on their regulatory focus and levels of system justification?	As a new technology, recycled water will be framed as a gain, and therefore attractive to those with a promotion focus, if levels of system justification are low. Participants with a high need for affect will demonstrate more positive emotions to recycled water if they have a promotion focus and don't justify the system.	Accepted

4. DISCUSSION

The results from the online communication survey demonstrate that particular communication techniques can influence people's attitudes towards and support of PRW. As part of the Elaboration Likelihood Model of persuasion (Petty and Cacioppo, 1986), this study examined issue relevance and people's responses to information about risks and benefits of PRW to investigate whether people were processing information about PRW centrally or peripherally. The most successful manipulation was issue relevance as SEQ participants had a higher mean score on the perceived issue relevance manipulation check.

High issue relevance participants also recorded significantly higher support for recycled water when they were provided with information about the low risks of recycled water, when compared to the no risk information group. Initially, it was expected that messages about the benefits of PRW would be more effective in fostering support than messages about the low risks. However, participants from SEQ were centrally processing the information provided and paying more attention to the information provided about the low risks associated with PRW, resulting in increased support. The ELM model states that when people process messages through the central route they pay close attention to the information provided and they engage in effortful processing of the messages (Petty and Cacioppo, 1984). Hence information about the low risk of PRW increased support for high issue relevance participants as they were applying more rational and deliberate thought processes. However, participants in the high issue relevance group did not demonstrate more positive emotions towards PRW. This suggests that the communication of risk can promote acceptance of PRW, provided the issue is relevant, however support does not automatically suggest positive emotions are associated with PRW.

Low issue relevance participants, those from locations other than SEQ, did not respond differently to the benefits of recycled water by demonstrating higher support. This suggests that people involved in peripheral processing do not give more weight to messages about the benefits compared to risks. Low issue relevance also did not demonstrate any significant differences in support for recycled water in the low risk information and no risk information conditions. In addition, participants with low issue relevance did not demonstrate more negative emotions.

It was initially suggested that the 'yuck' factor may have been a form of peripheral processing, something that people turn to when they are not engaged with the concept or likelihood of PRW. However, those with low issue relevance did not demonstrate more negative emotions towards PRW, suggesting it is not a form of peripheral processing. This supports claims elsewhere in the literature (Russell and Lux, 2009) that the idea of the 'yuck' factor may be outdated and that people's attitudes and understanding of PRW are more complex. As suggested by Sofoulis (2005), a different everyday water culture is emerging where the traditional one size fits all approach to water and education is no longer applicable for Australians.

The provision of low risk information also resulted in participants having more positive emotions towards PRW, compared to those with no risk information. This suggests that providing people with risk information may help to ease any concerns people may have or dispel any rumours about PRW risks and therefore increases their positive feelings towards PRW.

The results also demonstrated that a number of individual characteristics were influencing responses towards recycled water. Those with low and high system justification, as well as those with low and high need for cognition, were found to interact with the combined dependent variable: support for PRW and emotion towards PRW. Specifically, those who have a tendency to avoid engaging in effortful cognitive activities, and justify the system by supporting the status quo, record significantly lower levels of support and more negative emotion towards recycled water.

Higher levels of support and positive emotion towards recycled water were recorded for those who tend to approach their emotions, provided they are also motivated to frame PRW as a gain and challenge the current system.

Those with a promotion focus, in other words those who actively seek out information that promote achieving their goals, do not respond differently to information about the risks and benefits of recycled water than those with a prevention focus. It was expected that those with a prevention focus would respond better to risk messages. The information provided was about the low risks which may not have contained enough risky information to appeal to the prevention focus group.

Participants with a high need for cognition (i.e. those with a tendency to engage in cognitive activity; Cacioppo and Petty, 1982) did not respond differently to information about the risks and benefits of recycled water when compared to participants with a low need for cognition. One explanation for this could be that the information provided was relatively easy to process and therefore did not require any particular cognitive effort. This could suggest that the information was appealing to both high and low need for cognition groups, therefore implying it was generic and succinct information about PRW. However they did demonstrate higher support and more positive emotions towards recycled water, indicating an in-depth processing of risk information.

Participants with a high need for affect (i.e. those seek out emotional situations; Maio and Esses, 2001) did not respond differently to information about the risks and benefits of recycled water than those with low need for affect. One explanation for this could be that the information provided on risks and benefits was more factual than emotional and therefore did not evoke an emotional response from those with a high need for affect.

A number of demographic variables were shown to have an influence on support for and emotion towards PRW. Higher levels of support and positive emotion were found in men, those from WA, those aged over 75 years, participants from households earning more than 150,000 per year and those educated to post graduate level. Previous research investigating gender differences towards recycled water in SEQ demonstrated that, overall, men and women differ very little in their perceptions of recycled water (Miller and Buys, 2008). In this study by Miller and Buys (2008), women were more likely to say that they did not trust the technology or understand the process and men were more likely to be following the debate closely and having more knowledge about the process. Further, Miller and Buys (2008) suggest that this does have implications for communication as it suggests the need for science to be jargon free and for information to be disseminated more widely and via both traditional and non-traditional means. Given that the more highly educated participants were more supportive of PRW, ensuring that communication is jargon free and information is disseminated widely, as suggested by Miller and Buys (2008), may help other less educated people become more informed. More research is required to determine why the demographic differences found in this study exist and whether they are consistent over time, particularly if demographic differences are to inform communication strategies.

4.1. Research Limitations

The research presented here could only begin to tap into the myriad of techniques available for communicating about PRW. Therefore the outcomes from this communication experiment only apply to a situation where text only information about PRW is required. We recognise the importance of visual imagery in communication and suggest that future research should consider how to incorporate this into an experimental setting. However, given that all research needs boundaries, we feel that our focus on issue relevance and risk/benefit information has provided some interesting insights in the initial application of psychological communication theory, such as ELM, to the recycled water domain. Further, the individual difference measures used in this research have been widely applied in the psychology domain and therefore provide robust measurements.

Since we used geographic location as a proxy for issue relevance, it is possible that some of our findings relating to differences in relevance actually reflect other differences between participants in SEQ and the remainder of the country. An alternative manipulation of relevance would be advisable to address this concern in future research. It is hoped that this research will inform both future research in the field of communication, as well as the development of more informed communication strategies.

APPENDIX – Consent Form

Community Responses to Recycled Water

Although it may not feel like it lately, Australia is the driest continent on the planet and water is therefore a precious resource that we must learn to manage wisely. To ensure future water security in SEQ, alternative water sources to augment drinking water supplies are being used now or being considered for use in the future. These include desalinated water, rainwater and stormwater collection, and recycled water.

The purpose of this research is to gain an understanding of what SEQ community members think about these alternative water sources generally and recycled water in particular. Our aim is to understand what people currently think about these sources of water and how best to provide information about recycled water so that people can make informed decisions.

This research involves your participation in a survey that asks about your attitudes towards purified recycled water and your views on society and science in general.

This research will provide valuable information to researchers and water professionals who are keen to understand community perspectives on alternative water sources and how best to communicate about these types of water sources.

Detailed information about the study including contact details for the research team and the ethical review process are detailed here: [insert link to information page here].

Yes, I agree to take part in the research. **I understand that it involves completing a survey.** I understand that my responses will be completely confidential. I know where I can gain information about the study.

No, I do not agree to take part in the research.

Community Responses to Alternative Water Sources Study Information

Who should participate?
We need people from all walks of life who currently reside in SEQ to take part.

What do I have to do if I participate?
Take part in a survey which should take around 20 minutes to complete. We will provide you with some information about recycled water and then ask you some questions that relate to that information, as well as other background information about your attitudes towards recycled water and views on society and science in general.

Are there any risks involved in taking part in the study?
We do not anticipate any risks associated with this research as it is simply asking your opinions about alternative water sources and other general background information. If you have any concerns about any aspects of the study, please contact Dr John Gardner (see below for contact details).

What do I do if I decide I don't want to be part of the study?
You are free to withdraw from the study at any time without penalty or explanation. If you decide to withdraw, you can ask for any or all of your data to be removed from the study. Simply contact John Gardner (see contact details below).

Will my responses be kept private?
Your data will be completely confidential and will only be used for the purposes of the research project. The data will be released as summaries in which no individual's answers can be identified.

Will I receive any payment for taking part in the study?
You will [insert ORU compensation here].

How can I find out more about the study?
If you would like to receive a summary of the findings of the study, please click on the button at the end of the survey that asks to receive a summary of the research. In addition, please feel free to contact us at any time during the study.

What is the best way to contact someone about the research?
Please feel free to contact John Gardner about any aspect of this project (see below for contact details.

This study has been cleared in accordance with the ethical review processes of CSIRO. If you have any questions concerning your participation in the study feel free to contact the researchers involved. If you would like to speak to an officer of CSIRO not involved in the study, you may contact the CSIRO ethics officer on 07 3833 5693.

Thank you for your help with this very important research.

Yours sincerely

Dr John Gardner
Include position or delete position from others
CSIRO Ecosystem Sciences
Boggo Road Ecosciences Precinct
41 Boggo Road
Dutton Park Qld 4102

Melissa Green
Social Scientist
Social and Behavioural Sciences Group
CSIRO Ecosystem Sciences
Private Bag 5, Wembley WA, 6913
Tel: 08 9333 6262
Email: melissa.green@csiro.au

Zoe Leviston
Social Scientist
Social and Behavioural Sciences Group
CSIRO Ecosystem Sciences
Private Bag 5 Wembley WA 6913
Tel: 08 9333 6169
Email: zoe.leviston@csiro.au

Jennifer Price
Social Scientist
Social and Behavioural Sciences Group
CSIRO Ecosystem Sciences
Private Bag 5 Wembley WA 6913
Tel: 08 9333 6341
Email: jennifer.price@csiro.au

Dr Kelly Fielding
Senior Researcher
Institute for Social Science Research
The University of Queensland
St Lucia, Qld, 4072
Tel: 07 3346 8725
Email: k.fielding@uq.edu.au

APPENDIX – Survey

Version planning:

Survey Version	Sample	Test notification	Background info	Test of recall	Demographics
A1	SEQ	No	None	No	Yes
A2	SEQ	Yes	Risk and benefit	Yes	Yes
A3	SEQ	Yes	Risk only	Yes	Yes
A4	SEQ	Yes	Benefit only	Yes	Yes
B1	Other capitals	No	None	No	Yes
B2	Other capitals	Yes	Risk and benefit	Yes	Yes
B3	Other capitals	Yes	Risk only	Yes	Yes
B4	Other capitals	Yes	Benefit only	Yes	Yes

(Everybody sees this:)

Thank you for taking the time to take part in our research, which is about the use of purified recycled water for drinking water purposes. Purified recycled water is produced by taking water from wastewater treatment plants, and using a series of processes for removal of impurities, filtration and disinfection, to make it suitable for drinking.

In SEQ, purified recycled water is currently used to supply water for industrial uses. When combined dam levels fall below 40%, it is planned to supplement drinking water supplies by adding purified recycled water to Wivenhoe dam. If and when this occurs, SEQ's drinking water will include purified recycled water.

(Test notification)

You will be tested on what you remember from the information we are about to give you in this survey, *so please pay close attention to the following information.*

Background Information: [RISK and BENEFIT INFO]

Purified Recycled Water has a number of benefits and is very low risk. For instance, Purified Recycled water:

- Is healthy and safe**. The advanced technologies used (microfiltration, reverse osmosis and advanced oxidation) are scientifically proven across the world. The additional oxidisation process destroys contaminates small enough to get through treatment membranes.**
- Will be better than current drinking-water. **The seven treatment barriers result in 6-star drinking water of a higher standard. A much bigger range of chemicals and hazards will be monitored and very conservative guidelines put in place.**
- Treatment is monitored closely. **It takes up to 12 hours for the water to pass between each of stage of the treatment, allowing time to stop the process if something goes wrong.**
- Helps us to conserve water and the environment**. By recycling water that is already available less water will be extracted from water systems under pressure. Up to 57% of the environmentally harmful substances going into Moreton Bay from waste treatment plants will also be removed.**
- Does not contain high levels of pharmaceuticals or hormones. **A person would have to drink 2 litres daily for 138,000 years to consume 100 mg of pharmaceuticals. A man would have to drink 5 litres of water a day for 20 years to get the equivalent female hormones from 1 contraceptive pill.**
- Is an efficient and economic option. **The process is cheaper and more sustainable than other water supply options. Only one megawatt hour of electricity is required compared to 5 megawatts hours for desalinated water.**
- Risks are low compared to everyday risks. **People are far more likely to get pathogens and viruses from shaking hands or going to a day-care or school. The chance of a virus getting through the treatment is one in a billion.**
- Provides security and opportunities for growth**. SEQ's will be less vulnerable to and changes in weather conditions and climate. With the SEQ's population forecast to increase by more than 5 million by 2056 there will be less pressure on water supplies.**

Information [RISK ONLY INFO]

The risks from Purified Recycled Water are incredibly low. For instance, Purified Recycled water:

- Undergoes advanced treatment. **This includes an additional oxidisation process of adding hydrogen peroxide and UV light to destroy contaminates small enough to get through the treatment membrane.**
- Treatment is monitored closely. **It takes up to 12 hours for the water to pass between each of stage of the treatment, allowing time to stop the process if something goes wrong.**
- Will be better controlled than current drinking-water. **A much bigger range of chemicals and hazards will be monitored and very conservative guidelines put in place**.
- Does not have harmful levels of hormones. **A man would have to drink 5 litres of water a day for 20 years to get the equivalent female hormones from 1 contraceptive pill.**
- Does not contain high levels of pharmaceuticals. **A person would have to drink 2 litres daily for 138,000 years to consume 100 mg of pharmaceuticals.**
- Is very unlikely to cause health impacts. **The chance of a virus getting through is one in a billion**
- Risks are low compared to everyday risks. **People are far more likely to get pathogens and viruses from shaking hands or going to a day-care or school.**
- Will be mixed in small amounts with dam-water. **Only a small percentage of the water in Wivenhoe dam will be recycled, and the time spent in the dam ensures that all remaining contaminants are removed.**

Information: [BENEFIT ONLY INFO]

Purified Recycled Water has a number of benefits. For instance, Purified Recycled water:

- Is healthy and safe**. The advanced technologies used (microfiltration, reverse osmosis and advanced oxidation) are scientifically proven and in use across the world.**
- Is cleaner than current drinking water supplies**. The seven treatment barriers result in 6-star drinking water that is of a higher standard.**
- Results in fewer carbon emissions than desalination**. Only one megawatt hour of electricity is required compared to 5 megawatts hours for desalinated water.**
- Is an efficient and economic option. **The process is cheaper and more sustainable than other water supply options like pipelines, additional dams and water trading.**
- Reduces pollutants in the environment**. Up to 57% of the environmentally harmful substances going into the ocean around SEQ from waste treatment plants would be removed.**
- Helps us to conserve water**. By recycling instead of wasting water that is already available less water will be extracted from water systems that are under pressure.**
- Provides opportunities for growth**. SEQ's population is forecast to increase by more than 5 million by 2056 placing additional demands on water supplies.**
- Provides water security**. SEQ's water supply will be less vulnerable to changes in weather conditions and climate, such as drought and high temperatures.**

VERSION 4: No extra information

REMAINDER OF SURVEY ALL TO COMPLETE

I think that the information that I have just read is very relevant to me personally.

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

I think that the information that I have just read is very relevant to other people.

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

How relevant is Purified recycled water to you?

Not at all relevant								Extremely relevant
1	2	3	4	5	6	7	8	9

To what extent will you be impacted by purified recycled water?

Not at all impacted								Extremely impacted
1	2	3	4	5	6	7	8	9

How important to you personally is information on *purified recycled water*?

Not at all important				Extremely important
1	2	3	4	5

How interested are you personally in learning about *purified recycled water*?

Not at all interested				Extremely interested
1	2	3	4	5

How interested are you personally in finding information on *purified recycled water*?

Not at all interested				Extremely interested
1	2	3	4	5

Please list any thoughts you had while reading the information about purified recycled water?

1. _____
2. _____
3. _____
4. _____
5. _____

To what extent do you think the information was trustworthy?

Not trustworthy						Extremely trustworthy
1	2	3	4	5	6	7

To what extent do you think the information was accurate?

Not accurate						Extremely accurate
1	2	3	4	5	6	7

To what extent do you think the information was factual?

Not factual						Extremely factual
1	2	3	4	5	6	7

To what extent do you think the information was distorted?

Not distorted at all						Extremely distorted
1	2	3	4	5	6	7

To what extent do you think the information was truthful?

Not truthful at all						Extremely truthful
1	2	3	4	5	6	7

To what extent do you think the information was biased?

Not biased						Extremely biased
1	2	3	4	5	6	7

Purified recycled water has a number of risks

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

I think that I am personally at risk from *purified recycled water*.

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

I think that the average person in SEQ is at risk from *purified recycled water.*

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

People are exposed to so many risks everyday that the risk of purified recycled water is too small to worry about.

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

Purified recycled water has a number of benefits

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

I think that I will personally benefit from purified recycled water

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

I think that the average person in SEQ will benefit from purified recycled water

Disagree strongly								Agree strongly
1	2	3	4	5	6	7	8	9

Overall, do you think the benefits of purified recycled water outweigh the risks, or do you think the risks outweigh the benefits?

Risks strongly outweigh the benefits				Benefits strongly outweigh the risks
1	2	3	4	5

The following questions ask your opinion about purified recycled water for drinking water purposes.

What is your overall opinion of purified recycled water?

Very unfavourable						Very favourable
1	2	3	4	5	6	7

I support adding purified recycled water to drinking water supply

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

I do not want purified recycled water to be mixed with drinking water

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

I would drink the water that's provided by purified recycled water schemes

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

Given the choice, I would not drink water that contained purified recycled water

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

I believe that purified recycled water would be safe to use

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

Thinking about how you would *feel* when drinking purified recycled water, how would you describe the *water* on the following scale?

Repulsive						Attractive
1	2	3	4	5	6	7
Disgusting						Appealing
1	2	3	4	5	6	7
Contaminated						Purified
1	2	3	4	5	6	7
Revolting						Refreshing
1	2	3	4	5	6	7

Thinking about how you would *feel* when drinking purified recycled water, how would you describe *your emotions* on the following scale?

Tense						Calm
1	2	3	4	5	6	7
Afraid						Fearless
1	2	3	4	5	6	7
Sad						Happy
1	2	3	4	5	6	7

The following questions are about your general attitudes.

I would prefer complex to simple problems

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I like to have the responsibility of handling a situation that requires a lot of thinking

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

Thinking is not my idea of fun

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I would rather do something that requires little thought that something that is sure to challenge my thinking abilities

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I find satisfaction in deliberating hard and for long hours

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I only think as hard as I have to

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I prefer to think about small, daily projects to long-term ones

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I like tasks that require little thought once I've learned them

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

The idea of relying on thought to make my way to the top appeals to me

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I really enjoy a task that involves coming up with new solutions to problems

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

Learning new ways to think doesn't excite me very much

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I prefer my life to be filled with puzzles that I must solve

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

The notion of thinking abstractly is appealing to me

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I would prefer a task that is intellectual, difficult and important to one that is somewhat important but does not require much thought

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I feel relief rather than satisfaction after completing a task that required a lot of mental effort

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

It's enough for me that something gets the job done; I don't care how or why it works

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

I usually end up deliberating about issues even when they do not affect me personally

Very strong disagreement								Very strong agreement
-4	-3	-2	-1	0	1	2	3	4

It is important for me to be in touch with my feelings

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I think that it is important to explore my feelings

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I am a very emotional person

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

It is important for me to know how others are feeling

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

Emotions help people to g*et al*ong in life

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

Strong emotions are generally beneficial

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I feel that I need to experience strong emotions regularly

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I approach situations in which I expect to experience strong emotions

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I don't not know how to handle my emotions, so I avoid them

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I find strong emotions overwhelming an therefore try to avoid them

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

Emotions are dangerous - they tend to get me into situations that I would rather avoid

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I would prefer not to experience either the lows or highs or emotions

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

If I reflect on my past, I see that I tend to be afraid of feeling emotions

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I would love to be like 'Mr. Spock' who is totally logical and experiences little emotion

Strongly disagree						Strongly agree
-3	-2	-1	0	1	2	3

I frequently imagine how I will achieve my hopes and aspirations

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I often think about the person I would ideally like to be in the future

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I typically focus on the success I hope to achieve in the future

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I often think about how I will achieve success

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

My major goal right now is to achieve my ambitions

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I see myself as someone who is primarily striving to reach my 'ideal self' - to fulfil my hopes, wishes, and aspirations

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

In general, I am focused on achieving positive outcomes in my life

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I often imagine myself experiencing good things that I hope will happen to me

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

Overall, I am more oriented towards achieving success than preventing failure

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

In general, I am focused on preventing negative events in my life

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I am anxious that I will fall short of my responsibilities and obligations

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I often think about the person I am afraid I might become in the future

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I often worry that I will fail to accomplish my goals

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I often imagine myself experiencing bad things that I fear might happen to me

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I frequently think about how I can prevent failures in my life

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I am more oriented towards preventing losses than I am toward achieving gains

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

My major goal right now is to avoid becoming an academic failure

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

I see myself as someone who is primarily striving to become the self I 'ought' to be - to fulfil my duties, responsibilities and obligations

Not at all true of me								Very true of me
1	2	3	4	5	6	7	8	9

In general, you find society to be fair

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

In general, the Australian political system operates as it should

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Australian society needs to be radically restructured

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Australia is the best country in the world to live in

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Most policies serve the greater good

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Everyone has a fair shot at wealth and happiness

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Our society is getting worse every year

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Society is set up so that people usually get what they deserve

Strongly Agree								Strongly Disagree
1	2	3	4	5	6	7	8	9

Which of the following statements best matches your view?

1. The environment is fragile and will only be protected if there are large changes in human behaviour and society
2. The environment can be managed by the government and experts if there are clear rules about what is allowed
3. The environment can adapt to changes and technology will solve environmental problems eventually
4. The environment is unpredictable and we can't control what happens

Test of Recall

Earlier in the survey, we provided you with some information about the risks [benefits / risks and benefits] of recycled water. We're interested in how memorable you found that information. In the space below, please write down as many specific facts as you can recall from the information we provided.

<open-ended text input>

Finally we'd like to ask you some questions about yourself.

What is your gender?

Female ….. 1 Male ….. 2

Which of the following categories best describes your age?

Less than 24 years	**…….**	**1**
24 to 39 years	**…….**	**2**
40 to 55 years	**…….**	**3**
56 to 65 years	**…….**	**4**
66 to 75 years	**…….**	**5**
More than 75 years	**…….**	**6**

Which of the following categories best describes your gross annual household income?

Less than $30, 00	**…….**	**1**
$30, 000 to $59, 999	**…….**	**2**
$60, 000 to $89, 999	**…….**	**3**
$90, 000 to $119, 999	**…….**	**4**
$120, 000 to $149, 999	**…….**	**5**
More than $150,000	**…….**	**6**
I'd prefer not to answer	**…….**	**7**

How would you describe your highest level of education?

Primary school	**…….**	**1**
High school	**…….**	**2**
Trade / TAFE	**…….**	**3**
Tertiary - Undergraduate……..		**4**
Tertiary - Postgraduate	**…….**	**5**

Thank you for your help with our research – it is very much appreciated!

REFERENCES

Browne, A.L., Leviston, Z., Green, M.J. and Nancarrow, B.E. (2008). *Technical and Community Perspectives of Risks associated with Purified Recycled Water in South-East Queensland: A Q-Study*. Urban Water Security Research Alliance Technical Report No. 4.

Cacioppo, J.T. and Petty, R.E. (1982). The Need for Cognition. *Journal of Personality and Social Psychology*. 42, 116-131.

Cacioppo, J.T., Petty, R.E. and Kao, C.F. (1984). The efficient assessment of Need for Cognition. *Journal of Personality Assessment*. 48(3): 306-307.

Cohen, A.R., Stotland, E. And Wolfe, D.M. (1955) An Experimental Investigation of Need for Cognition. *The Journal of Abnormal and Social Psychology*. 51, 291-294.

Dole, J.A and Sinatra, G.M. (1998), Reconceptualizing Change in the Cognitive Construction of Knowledge. Educational Psychologist, 33, 109-128.

Frewer, L.J., Howard, C., Hedderly, D. and Shepherd, R. 1997. The elaboration likelihood model and communication about food risks. Risk Analysis 17(6):759-770.

Frewer, L.J., Howard, C., Hedderley, D. and Shepherd, R. (1999). Reactions to information about genetic engineering: impact of source characteristics, perceived personal relevance, and persuasiveness. *Public Understanding of Science*. 8, 35-50.

Green, M.J., Fielding, K., Leviston, Z. and Price, J. (2010). Communicating Scientific and Technical Information about Alternative Water Supply Options: A review of the literature. Urban Water Security Research Alliance Technical Report No. 33.

Higgins, E.T. (1997) Beyond pleasure and pain. *American Psychologist*. 52, 1280-1300.

Higgins, E.T., Friedman, R.S., Harlow, R.E., Idson, L.C., Ayduk, O.N. and Taylor, A. (2001). Achievement orientations from subjective histories of success: promotion pride versus prevention pride. *European Journal of Social Psychology*, 31, 3-23.

Hurlimann, A.C. (2007). Is recycled water use risky? An urban Australian community's perspective. *Environmentalist*, 27, 83-94.

Hurlimann, A. and Dolnicar, S. (2010). When public opposition defeats alternative water projects – The case of Toowoomba Australia. *Water Research*, 44, 287-297.

Ingram, P.C., Young, V.J., Millan, M., Chang, C. And Tabucchi, T. (2006). From controversy to consensus: The Redwood City recycled water experience. *Desalination*, 187, 179-190.

Jost, J. T., and Banaji, M. R. (1994). The role of stereotyping in system justification and the production of false consciousness. *British Journal of Social Psychology*, 22, 1–27.

Kay, A. C. and Jost, J.T. (2003) Complementary justice: effects of "poor but happy" and "poor but honest" stereotype exemplars on system justification and implicit activation of the justice motive. *Journal of Personality and Social Psychology*. 85, 823-837.

Khan, S.J. and Gerrard, L.E. (2006). Stakeholder communications for successful water reuse operations. *Desalination*, 187, 191 – 202.

Lockwood, P., Jordan, C.H. and Kunda, Z. (2002) Motivation by positive or negative role models: Regulatory focus determines who will best inspire us. *Journal of Personality and Social Psychology*, 83, 854-864.

Maio, G.R. and V.M. Esses. (2001). The Need for Affect: Individual differences in the motivation to approach or avoid emotions. Journal of Personality 69(4): 583-615.

Miller, E. and Buys, L. (2008) Water-recycling in South-East Queensland, Australia: What do men and women think? *Rural Society*, 18, 220-229.

Nancarrow, B.E., Leviston, Z., Tucker, D., Greenhill, M.P., Price, J. and Dzidic, P. (2007). *Community Acceptability of the Indirect Potable Use of Purified Recycled Water in South East Queensland and Preferences for Alternative Water Sources: A Baseline Measure.* Urban Water Security Research Alliance Technical Report No. 1.

Petty, R.E and Cacioppo, J.T (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46, 69-81.

Petty, R. E., and Cacioppo, J.T. 1986. The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* 19: 123-203. New York: Academic Press.

Petty, R.E., Haugtvedt, C.P. and Smith, S.M. 1995. Elaboration as a determinant of attitude strength: Creating attitudes that are persistent, resistant, and predictive of behavior. In R.E. Petty and J.A. Krosnick (Eds.), Attitude strength: Antecedents and consequences (pp.93-130). Hillsdale, NJ: Lawrence Erlbaum Associates.

Pierro, A., Mannetti, L., Erb, H., Spiegel, S. and Kruglanski, A.W. 2005. Informational length and order of presentation as determinants of persuasion. Journal of Experimental Social Psychology, 41, 458-469.

Po, M., Kaercher, J.D. and Nancarrow, B.E. (2003). *Literature Review of Factors Influencing Public Perceptions of Water Reuse*. CSIRO Land and Water Technical Report.

Price, J., Fielding, K.,and Leviston, Z. (2012). Supporters and opponents of potable recycled water: The influence of culture, cognition and context in the Toowoomba referendum, *Society and Natural Resources.*

Price, J., Green, M.J., Leviston, Z., Fielding, K., and Gardner, J. (2011). *Communication and Community Responses to Recycled Water*. Urban Water Security Research Alliance Technical Report No.58.

Price, J., Fielding, K., Leviston, Z., Bishop, B., Nicol, S., Greenhill, M., and Tucker, D. (2009). Community Acceptability of the Indirect Potable Use of Purified Recycled Water in South-East Queensland: Final Report of Monitoring Surveys. Urban Water Security Research Alliance Technical Report No. 18.

Qin, W., and Brown, J.L. (2007). Public reaction to information about gene technology: Effect of information formats and male/female differences. *Public Understanding of Science*. 16 (4), 471-488.

Rea and Parker Research (2011). *San Diego County Water Authority: 2011 Public Opinion Poll Report*. Report prepared by Rea and Parker Research for the San Diego County Water Authority. http://www.sdcwa.org/sites/default/files/files/news-center/2011_SurveyReport.pdf

Russell, S. and Lux, C. (2009). Getting over yuck: moving from psychological to cultural and sociotechnical analyses of responses to water recycling. *Water Policy*, 11, 21-35.

Sofoulis, Z. (2005) Big water, everyday water: a sociotechnical perspective. *Continuum: Journal of Media and Cultural Studies*. 19, 445-463.

Steg, L. and I. Sievers. (2000). Cultural theory and individual perceptions of environmental risk. *Environment and Behaviour* 32, 250-269.

Water Services Association of Australia (2005). *Testing the Water. Urban water in our growing cities: the risks, challenges, innovation and planning*. WSAA Position Paper No. 01.