

# MCA Lifejacket Wear – Behavioural Change

Client: Maritime Coastguard Agency  
& the Royal National Lifeboat Institution

By

Sally Turner BA (Hons) MSc  
Julie Wylde BA (Hons)  
Dr. Martin Langham  
Suzy Sharpe BA (Hons)  
Karen Jackson BA (Hons)

Final report submitted 08/12/2009

# Index

Document Map.....	7
Executive Summary .....	8
Objective 1: Understanding the problem, how to remedy it and who to apply the remedy to .....	10
What is an accident? .....	10
Findings from independent research.....	11
1. Maritime accident research .....	11
2. Lifejacket research .....	14
Effectiveness of lifejackets .....	14
Attempts to increase lifejacket use .....	16
3. Other protective equipment .....	17
Protective Equipment in the workplace .....	18
Bicycle Helmets.....	19
Seat Belts.....	19
4. Theoretical foundation.....	20
Findings from local research.....	22
1. Lifejacket panel review .....	22
2. Lifejacket wear .....	24
3. Arkenford participation and safety data .....	26
4. MCA & RNLI fatal incident data.....	27
5. RNLI incident data.....	30
Section summary .....	33
Stakeholder evidence & Media representations.....	35
1. Stakeholder interviews .....	35
2. Media representations of lifejacket attitudes .....	37
Objective 2: Investigating prohibitive and promoting factors in lifejacket wear .....	40
Methodology .....	40
1. Contextual reviews of eight sites .....	40
2. Measures .....	41
3. Procedure .....	43
4. Analysis methodology .....	44
Findings of pre-intervention contextual reviews .....	44
1. Sample characteristics & lifejacket wear .....	44
2. Reasons for non-wear .....	46
3. Risk perception (threat appraisal) .....	47
4. Confidence in lifejackets (response efficacy) .....	49
5. Rewards & self efficacy .....	49
6. Costs.....	49
7. Other intervening factors.....	50
8. Other findings.....	51
Summary of findings .....	51
Objective 3: Translating knowledge to action – communicating safety .....	53
1. The shape of the intervention.....	53
2. The science of warnings & warning design .....	55
3. Current safety messages in view of warning design .....	57
4. Context of safety communications .....	59

Design of intervention: safety message .....	60
Objective 4: Develop and test these theories against target audiences.....	64
Methodology .....	64
1. Contextual reviews of eight sites.....	64
2. Measures .....	64
3. Procedure .....	66
4. Analysis methodology .....	67
Results.....	68
1. Sample characteristics & lifejacket wear .....	68
2. Seeing the poster .....	70
3. Reactions to the poster .....	71
4. Confidence in lifejackets (response efficacy) .....	74
5. Understanding the message/ concept.....	75
6. Awareness & knowledge of cold water shock .....	76
7. DECIDING: relations of knowledge, threat perception and lifejacket wear.....	76
8. ACT – Intended behaviour change.....	81
Conclusions .....	83
Final conclusion .....	85
Objective 5: Produce research-based recommendations to prioritise effort and direct resource.....	86
1. Collect evidence.....	86
2. How to get the message across: real experience .....	87
3. General recommendations following this research .....	89
4. Recommendations Summary.....	92
Limitations.....	93
References .....	94
Acknowledgements.....	96
Appendix I: Research Questions for Pre-Intervention Contextual Reviews ...	97
Appendix II: Findings for Pre-Intervention Contextual Reviews .....	98
Appendix III: Final safety poster designed for Objective 3 & assessed in Objective 4.....	100
Appendix IV: Measures for the post-intervention contextual reviews .....	101

## Index of Figures

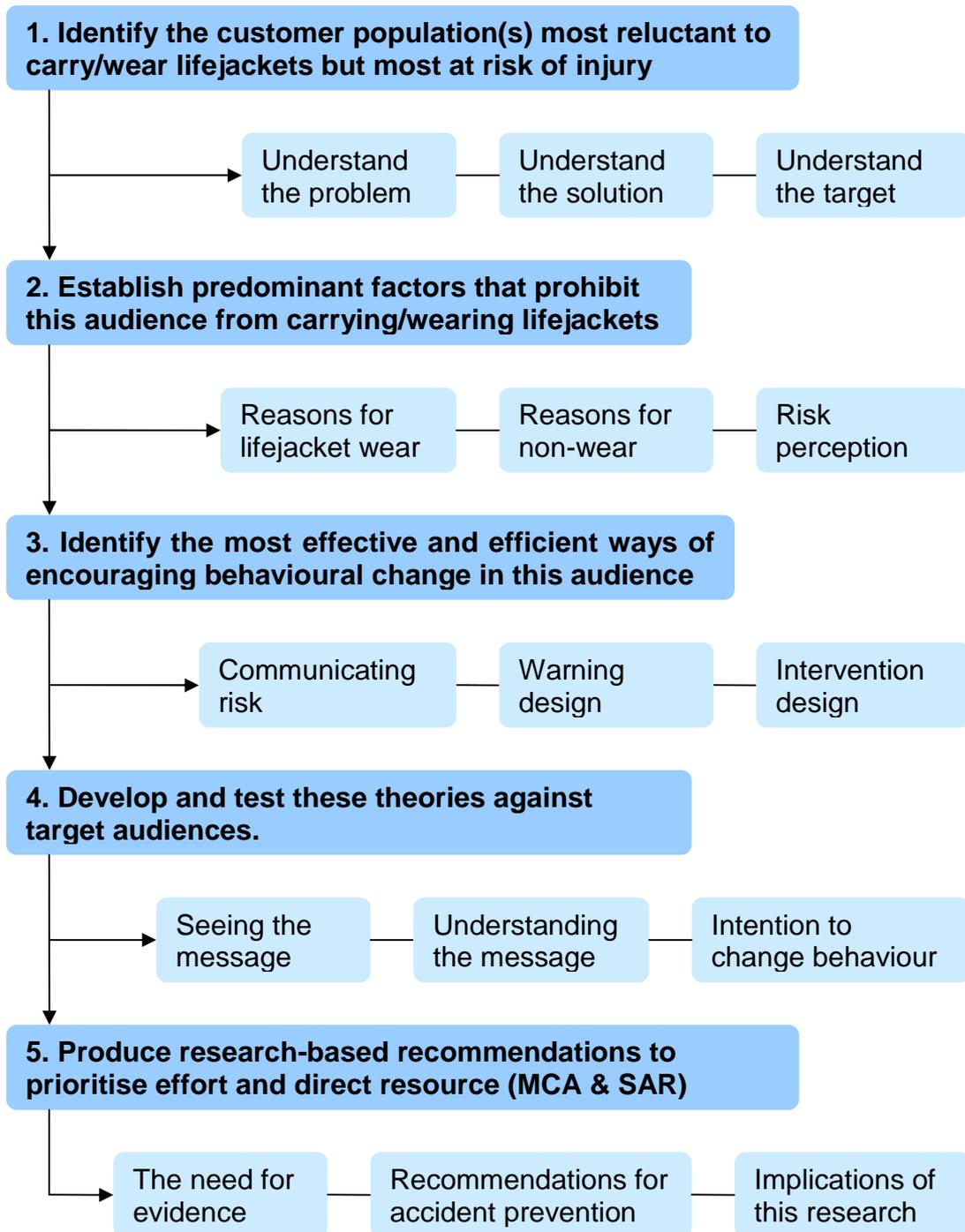
Figure 1: A photograph submitted to <i>Motor Boats Monthly Magazine</i> by a reader who was perhaps unaware of the dangers of alcohol while operating a boat .....	11
Figure 2: Personal Flotation Devices are now even available for dogs .....	16
Figure 3: The model on the front cover is not wearing a lifejacket; this could contribute to a social norm in which yacht owners do not tend to use a lifejacket ....	19
Figure 4: Protection Motivation Theory indicates that if we perceive a threat to be significant, relevant to ourselves and we can avoid it effectively with a safe behaviour, we will adopt that safe behaviour .....	21
Figure 5: Dejoy (1996) Stages of change in self-protective behaviour .....	22
Figure 6: Activities undertaken by casualties in maritime fatality incidents in 2008 where a lifejacket was judged as appropriate and capable of having a positive influence.....	23
Figure 7: Reasons people gave for not wearing a lifejacket from combined samples of the London (n = 18) and Southampton (n = 27) boat show questionnaires.....	25
Figure 8: Factors that could encourage respondents to wear a lifejacket from combined samples of the London (n = 28) and Southampton (n = 63) boat show questionnaires.....	25
Figure 9: Number of maritime recreational fatalities in 2008 that fell into specific age categories where age could be identified.....	28
Figure 10: Location of RNLi Lifeboat call outs in which lives were saved in 2008, according to whether lifejackets were worn by all, some or none of those involved (n = 60).....	31
Figure 11: Location of UK SAR fatalities from 1997 - 2003.....	32
Figure 12: The Hampshire Marine Police Unit and the RYA head office .....	35
Figure 13: The Thames RNLi lifeboat station, whose most frequent type of incident is suicide.....	36
Figure 14: A model 'solid sailing vessel' according to some interviewees.....	37
Figure 15: The front cover of <i>Motorboats Monthly</i> .....	38
Figure 16: Where lifejackets were stored on a motorboat in Chichester Marina.....	41
Figure 17: Marazion Bay (left) Falmouth Marina (right).....	41
Figure 18: Julie on the hunt for participants in Scarborough Harbour .....	43
Figure 19: Contextual reviews were undertaken in eight sites, in which participants were questioned around the pontoons and on their boats .....	44
Figure 20: Lifejacket wear varied but it was uncommon in the harbours/ marinas, as shown by these sailors in Penzance Harbour.....	45
Figure 21: There were marked differences in PFD wear according to activity, dinghy sailors were not observed without wearing a buoyancy aid .....	45
Figure 22: Some crew members wore lifejackets while moving out of the marina, while others did not, Chichester Marina.....	46
Figure 23: Summary of results relevant to protection motivation theory.....	48
Figure 24: Perceived levels of lifejacket wear (high, medium and low) in the local area by participants who usually wear a lifejacket (wearers) and those who hardly wear one (non-wearers) .....	50
Figure 25: The European Standard Buoyancy symbols tested with participants.....	51
Figure 26: Four frames of the MCA's short film communicating specific aspects of cold water shock as part of the lifejacket campaign.....	52
Figure 27: The three types of intervention - Engineering, Education and Enforcement .....	53
Figure 28: 'Sailing is the last bastion of freedom' as illustrated by this boat in Chichester Marina .....	54
Figure 29: A universal general warning symbol .....	55

Figure 30: A symbolic warning, alerting to the particular danger where no words are needed.....	55
Figure 31: A symbolic warning using words to communicate the danger and the actions needed to avoid the danger.....	55
Figure 32: MCA lifejacket editorial from Motorboats Monthly, August 2009.....	57
Figure 33: RNLI safety message, with participant arguments about oversimplification.....	58
Figure 34: Warning communications at Woolverstone Marina and Mounts Bay, Marazion.....	59
Figure 35: Weather conditions display (Woolverstone) & safety communication on the pontoons at (Chichester).....	60
Figure 36: A notice board displaying non-urgent communications, Falmouth Marina.....	60
Figure 37: Protection motivation model in combination with the See-Decide-Act model of warnings communications.....	61
Figure 38: Alternative poster designs with simple icon & Pop Art style images.....	62
Figure 39: The final safety poster design with explanations for specific features.....	62
Figure 40: The final education section of the poster.....	63
Figure 41: A selection of the locations in which posters were placed.....	67
Figure 42: Results for 'Have you seen the poster'?.....	70
Figure 43: Results for 'Where did you see the poster'?.....	71
Figure 44: Number of comments about general adjustments and adjustments to the image, method of communication or text.....	72
Figure 45: The number and percentage of responses about the meaning of the lifejacket icon.....	73
Figure 46: The lifejacket man icon featured on the safety poster.....	74
Figure 47: Results for 'How would a lifejacket save your life?'.....	75
Figure 48: Overboard experiences of lifejacket wearers and occasional/ non-wearers, sample size = 77 (wearers = 35, non-wearers = 42).....	77
Figure 49: Percentage of lifejacket wearers/ non-wearers contributing to the six categories of threat appraisal (low, moderate and high) when response efficacy is moderate or high.....	79
Figure 50: Behavioural and cognitive reactions to knowledge of cold water shock (n = 11).....	81
Figure 51: The wave pool at the RNLI Lifeboat College.....	88

## Index of Tables

Table 1: <i>Breakdown of cases by age and sex (number of cases = 1394), p. 9, McCormack et al (2008)</i> .....	13
Table 2: <i>Breakdown of cases by water area (number of cases = 1522), p. 11, McCormack et al (2008)</i> .....	13
Table 3: <i>The survival time (hour) predictions made from the UKNIIS data set, p. 27, McCormack et al (2008)</i> .....	14
Table 4: <i>Results of the Lifejacket panel review survey, LJ = lifejacket</i> .....	23
Table 5: <i>Observational data shows those wearing and not wearing lifejackets; survey data are those who claim to ‘never’ wear lifejackets or ‘only in certain conditions’...</i>	24
Table 6: <i>Age and sex of fatalities involved in fatal maritime incidents in 2008 when undertaking activities in which lifejacket use would have been expected, excluding commercial activities; NK abbreviates ‘Not known’</i> .....	28
Table 7: <i>Summary of incident data quality findings</i> .....	34
Table 8: <i>Theoretical model to guide research and intervention design</i> .....	42
Table 9: <i>Reasons why people do not wear lifejackets ranked in order of the frequency with which they were mentioned</i> .....	47
Table 10: <i>Sex, average age, type of vessel and percentage of lifejacket wear by sites visited</i> .....	68
Table 11: <i>Lifejacket wear for each site for both pre &amp; post interventions, with combined average wear rates</i> .....	69
Table 12: <i>Survival time estimations with a lifejacket (LJ), for pre and post contextual reviews, estimations with no LJ and the factor by which a LJ improves survival</i> .....	69
Table 13: <i>Negative, neutral and positive reactions to the poster</i> .....	71
Table 14: <i>Number of participants with some prior knowledge of CW shock &amp; sources of knowledge (exp = experience)</i> .....	76
Table 15: <i>Lifejacket wearers and non-wearers survival estimations with and without a lifejacket, and the factor by which a lifejacket lengthens estimations</i> .....	77
Table 16: <i>The number and percentage of lifejacket wearers and non-wearers who perceived low, moderate and high degrees of threat from cold water shock</i> .....	78
Table 17: <i>Number of overboard experiences of participants who perceived a low, moderate or high threat from cold water shock</i> .....	79
Table 18: <i>Survival estimations and factors by which a lifejacket lengthens survival, according to participants with low, moderate and high threat perceptions</i> .....	80
Table 19: <i>General and specific behavioural intentions for the future, in response to seeing the poster (n = 74)</i> .....	82
Table 20: <i>Categories of conditions when lifejackets were worn for occasional wearers, in order of the frequency with which they were mentioned</i> .....	98
Table 21: <i>Weather conditions in which lifejackets were worn, making up the ‘bad weather’ category</i> .....	98
Table 22: <i>The largest perceived threats in rank order of the frequency with which they were mentioned</i> .....	99
Table 23: <i>Costs &amp; Non costs in rank order of the frequency with which they were mentioned</i> .....	99

## Document Map



## Executive Summary

A core function of the MCA and the RNLI is to increase safety and prevent the loss of lives at the coast and at sea. This project aimed to investigate improvements to the safety of recreational maritime users, an effort that should be evident in reduced major and fatal maritime accidents. An accident is a rare, random event with unforeseen causes. Research indicates that 95% of causal factors involve some error made by the human, if these causes can be understood, the most cost-effective interventions to improving maritime safety can be identified. There is currently a lack of evidence for the causes of UK maritime accidents. Data collected from the accident scene tends to focus on operational concerns rather than accident causation. Additionally key factors, such as recording whether a lifejacket was worn by those involved are frequently not captured, leading to under-populated databases. There is evidence that lifejackets can help to prolong life in the event of a man overboard incident, giving search and rescue (SAR) professionals the chance to save life. Additionally 84% of fatalities in 2008 in which lifejacket use was judged appropriate were rated as potentially preventable by a lifejacket. Research therefore indicates that wearing a lifejacket can significantly improve probability of survival in the water. The objectives of this project were to identify why people do not wear lifejackets, develop an intervention to encourage lifejacket wear and measure the effectiveness of this intervention to inform future lifejacket campaigns.

Independent research and studies undertaken on behalf of the RNLI and MCA were reviewed to determine the recreational maritime users at greatest risk who also fail to wear a lifejacket. Factors that are associated with a risk of fatal or serious incidents include: use of alcohol and recreational drugs, type of activity, vessel used in the activity, age and sex. The persons most at risk from the reviewed research appear to be males, aged 40 years or more, who are either sailing or fishing from a boat. In general the reviewed research indicates a tendency for both sailors of motorboats and sailing yachts to have fatalities in which lifejackets could have saved them. The question of who is at greatest risk and also unlikely to wear a lifejacket is difficult to determine due to poor quality incident data. Lifejacket wear for those involved is not reliably collected at the scene of maritime incidents. Therefore areas of low observed lifejacket rates and high concentrations of fatal incidents were identified for research locations.

Protection Motivation Theory (PMT) in combination with a Stages of Change approach was used to guide both research elements of this project. This theoretical model incorporates all of the expected factors and therefore can identify problem areas that negatively impinge on lifejacket wear. It also highlights specific interventions to address those problem areas. PMT asserts if a threat is perceived to be significant, relevant to the self and the threat can be avoided effectively with a safe behaviour, that behaviour will be adopted.

Contextual reviews of eight sites around the UK were undertaken to determine the factors that deter and encourage lifejacket wear. These were marinas and harbours, in which recreational maritime users participated in

lightly structured, in-depth interviews. A total sample of 68 participants was attained. Results indicate that participants who did not tend to wear lifejackets were in the Decision-making and Hazard Appraisal stages of change. The core finding was that participants did not believe there is a high risk of falling into the water. If they did, they did not necessarily view it as a threat because many expect to be able to climb out easily or survive for a long time. Additionally participants did not always trust lifejackets to save their lives in the event of an overboard incident because they viewed hypothermia as the most prominent threat. These findings were interpreted as a lack of awareness about the initial phases of cold water immersion, especially cold water shock.

When these results are interpreted in the light of PMT, an intervention is necessary to enhance perception of the severity of the threat and beliefs of personal susceptibility. An educational intervention was developed in the form of a safety poster. This poster aimed to educate and warn about cold water shock, with a particular focus on the gasp reflex. The efficacy of lifejackets in protecting against the gasp reflex were also emphasised as PMT suggests confidence in lifejackets is just as integral to lifejacket wear as risk perception. The safety poster was developed on the basis of research into warning design and fear appeals.

The efficacy of the safety poster was assessed by undertaking contextual reviews in eight sites in the UK. These followed a similar format to the pre-intervention contextual reviews, with six of the same sites being revisited. 86 participants constituted the final sample for this set of reviews. Results indicate that the poster was very effective in attracting attention in the complex environments of the marinas and harbours. The majority of participants understood the key elements of the poster, although a significant proportion overestimated how long they would survive in the water and did not expect lifejackets to considerably lengthen their survival. Preliminary evidence was found that lifejacket wear is far more likely not only if a significant threat is perceived, but if a lifejacket is also viewed as capable of significantly reducing the threat. The results are therefore in complete support of the theoretical model. This indicates that increasing threat perception for cold water shock and simultaneously enhancing confidence that lifejackets can deal with this threat will result in substantial gains in lifejacket wear. It is however concluded that giving recreational maritime users first hand experience of cold water shock is the best way to do this.

It is recommended that future lifejacket wear campaigns consider providing personal experience of the initial phases of cold water immersion. However a more pressing recommendation is to gather incident data that enables investigation of the cause of accidents to develop more cost-effective interventions. Other suggestions are made following this research on various topics including future research methodology, the role of enforcement in increasing lifejacket wear and targeting 'at risk' recreational maritime users.

## **Objective 1: Understanding the problem, how to remedy it and who to apply the remedy to**

The aim of Objective 1 is to understand the nature of the problem faced by those involved in the maritime recreational sector. This project is focused on improving the safety of maritime recreational customers and reducing accidental incidents. This means that the core questions underpinning Objective 1 are: what are the major causes of accidents in the maritime recreational sector, how can they best be prevented, and who is most at risk and thereby most appropriate to target? The thrust of the project has been to increase safety by increasing lifejacket use. The applicability and potential effectiveness of this solution shall be challenged in this section to ensure that it is the most cost-effective way to reduce maritime accidents.

This project can be guided by information that comes from two broad sources: evidence collected by MCA/ RNLi and similar organisations and research carried out by independent bodies. This latter class is most often of an experimental or theoretical nature and has four main areas of interest:

1. Research examining the cause of fatalities in maritime activities
2. Research examining the efficacy of lifejackets and attempts to increase their usage
3. Theoretical research examining the effectiveness of approaches to change behaviour and attitudes
4. Research in similar areas looking at personal protective equipment such as ear protectors, bicycle helmets, seatbelts, etc.

First and foremost it should be emphasised that there is not a great deal of research examining the causes of recreational maritime accidents. In addition published research on efforts to increase lifejacket use is thin on the ground. It is acknowledged in the literature that boating fatalities have not been subjected to in-depth assessment in contrast to other forms of transport (O'Connor & O'Connor, 2005). It is important to go back to the basics of accident investigation therefore.

### **What is an accident?**

An accident is a rare, unforeseen, random event with multiple causes in which one or more users have failed to cope with their environment and/or equipment. Accidents have three types of causes: human, environmental and technological. Research has repeatedly shown that human error has an involvement in 95% of accidents in many contexts. It is rarely solely due to the aspects of the environment (e.g. wave height), or the equipment (e.g. hole in the boat). 1300 independent factors can potentially play a causal role in a road accident, and typically three or four come together in a single moment in time to result in adverse consequences (McKnight, 1972). There is no reason to suppose maritime accidents are any different, human error is almost certain to explain an element of why 95% of maritime accidents occur. By understanding what these factors are, preventative measures can be designed to protect against the limitations that humans inherently have. Wearing a properly fitted lifejacket in an incident is a protective factor against

drowning, but the lack of a lifejacket is not a causal factor. This distinction may seem obvious but it is of great importance to ascertaining the effectiveness of lifejackets and the possibility of preventing accidents higher up in the chain of events.

## Findings from independent research

### 1. Maritime accident research

In a review of the causes of boating fatalities in Australia, O'Connor & O'Connor (2005) found that recreational boaters tended to represent the vast majority of those killed rather than those undertaking commercial activities. These authors found dinghies were the most hazardous vessels (25% of the vessels involved in fatalities), which were prone to capsize, more likely to be overloaded and associated with the failure to wear a lifejacket. O'Connor and colleagues also found that human factors (or causes stemming from people rather than the environment or equipment) had the highest contribution to accidents, especially alcohol and recreational drugs. These authors note that alcohol had a causal role in 28% of boating fatalities (in excess of 0.05 g/100 ml), a similar contribution in comparison to the involvement of alcohol in road deaths in Australia in 2001 (26%). This could suggest that being intoxicated while operating a boat is as lethal as intoxication when behind the wheel.

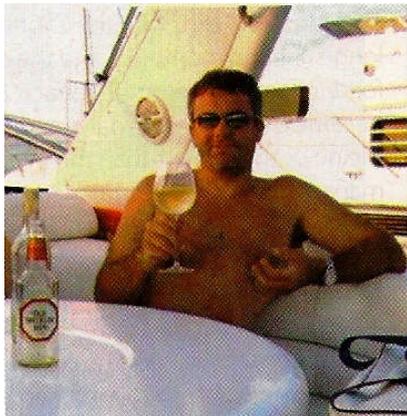


Figure 1: A photograph submitted to *Motor Boats Monthly Magazine* by a reader who was perhaps unaware of the dangers of alcohol while operating a boat

Comprehensive research studies show that the more alcohol consumed, the poorer driver performance is, i.e. a driver will react more slowly to the road environment (e.g. Maylor and Rabbitt 1993). Additionally, alcohol has greater effects on the driver as the task they are undertaking becomes more complex (review in Hole and Langham 2002). Alcohol also affects human reasoning and decision making. Overconfidence in decision making and poor risk perception is often evident. Judgment of speed and distance become difficult, while reaction time increases rapidly with alcohol consumption. Alcohol tends to narrow the field of view from which information is extracted, therefore someone who is under the influence of alcohol will be less likely to notice a hazard if it is within their peripheral field of vision (Bell, 1969, cited in Rockwell and Weir, 1974). Other physiological affects include problems with regulating body temperature, balance, hand-eye coordination, and orientation. It is easy

to see from this evidence why alcohol may contribute to the occurrence of a maritime accident, e.g. riskier decision-making, poor balance and coordination could result in falling overboard.

Only a small quantity of alcohol is needed to affect performance. The current driving limit is not set as a threshold for poor performance, but what is deemed to be a socially acceptable limitation. Small quantities (under half a pint of beer) will affect human performance in some way. It should be noted the reaction to alcohol is affected by many factors – such as gender, repeated exposure to alcohol, time of day, consumption of food, and the use of prescription / recreational drugs. These factors also interact with each other. For example, alcohol has different effects on males and females in the afternoon and early evening. American newspaper articles covering accidental submersions of persons in water reported alcohol use in 7% of their articles in 1993, which rose to 24% in 1998 (Baullinger et al., 2009). This may indicate an increasing problem with alcohol use and maritime activities over these five years. This assumption should however be taken with caution because the stories selected by newspapers are not necessarily representative of accidents as a whole.

Other research has investigated the characteristics of incidental drowning fatalities in Washington, US, between 1980 and 1995 (Quan & Cummings, 2003). They found that children of 0–4 years tended to fall into swimming pools or open water while being unsupervised, whereas children between 5–14 years had the lowest risk of all age groups for drowning. Adolescents aged 15–19 years were similar to 20–34 years olds in that drownings tended to occur while swimming or boating and alcohol was a significant factor in a substantial proportion (13% of 15-19 year olds and 33% of 20-34 year olds). 35% of 35-65 year olds had positive blood alcohol levels and they most often drowned after falling from a boat. Over 64 year olds tended to have pre-existing medical conditions and drown more often while bathing at home.

McCormack et al (2008) reviewed data for the UK National Immersion Incident Survey (UKNIIS), from 1991 to 2006, which contains almost 1600 cases. This survey was set up in 1991 and completed by Search and Rescue case responders when they made a recovery. McCormack et al (2008) found the highest death rate occurred in March (when water temperature is still cold); August in contrast has the lowest death rate even though it has the highest degree of recreational maritime activity at this time. They also found that males are more prone to accidents than females (82.6% male) and males aged 40 and older have a particular propensity to be involved in incidents resulting in death. In particular males aged 70 year or older have a much likelihood of fatality if involved in an incident. This higher death rate may represent greater physical vulnerability to the conditions, or a propensity to engage in particularly risky activities in comparison to their younger male or female counterparts. Table 1 shows a breakdown of the fatal and non-fatal UKNIIS incidents by sex, age and death rate (% deaths). As can be seen here, the number of cases peaks in the 20 – 39 age group, however the number of deaths peaks in the 40 – 49 age range for both males and females. Assumptions should be made cautiously with this data because it includes

commercial maritime users. This may have affected age trends and an overrepresentation of males.

Age Range (years)	Number of cases							
	Male				Female			
	Deaths	Alive	Total	% deaths	Deaths	Alive	Total	% deaths
0-9	4	31	35	11.4%	0	6	6	0.0%
11-19	10	207	217	4.6%	4	32	36	11.1%
20-29	22	287	309	7.1%	3	52	55	5.5%
30-39	20	226	246	8.1%	4	57	61	6.6%
40-49	34	141	175	19.4%	5	46	51	9.8%
50-59	18	85	103	17.5%	3	18	21	14.3%
60-69	8	44	52	15.4%	0	7	7	0.0%
70+	9	6	15	60.0%	2	3	5	40.0%
Total	125	1027	1152	10.9%	21	221	242	8.7%

Table 1: *Breakdown of cases by age and sex (number of cases = 1394), p. 9, McCormack et al (2008)*

Water area	Number of cases	Number of deaths	Death rate for water area	Percentage of total deaths
Inland (enclosed waters)	89	18	20.2%	11.3%
Coastal (within 100 metres)	170	23	13.5%	14.4%
Inshore (100 metres – 12 miles)	1187	95	8.0%	59.4%
Offshore (beyond 12 miles)	76	18	23.7%	11.3%

Table 2: *Breakdown of cases by water area (number of cases = 1522), p. 11, McCormack et al (2008)*

Table 2 shows the majority of incidents reviewed by McCormack et al (2008) occurred inshore whereas the highest death rate is found in offshore areas (those beyond 12 miles from shore). This may be reflective of the distance of rescuers from the casualty's location and harsher sea conditions further offshore. Those undertaking recreational rather than occupational activities tend to be found closer to the shore, accounting for the higher density of incidents.

The evidence reviewed so far indicates several characteristics of casualties and accidents that help to inform who a lifejacket intervention needs to target most. First and foremost these are males, aged 40 years and older, who are either sailing or fishing from a boat. While most incidents occur in the summer months, the riskiest time of year is March, although the exclusion of commercial maritime incidents could alter this. Almost 60% of maritime deaths occur inshore, within 100 metres to 12 miles of the shoreline. The cause of accidents is not so clear, although alcohol use could be a key contributor to accidents in as many as 35% of the target age group. Stakeholder interviews have however revealed the role of alcohol

consumption is masked by underreporting. In addition it is difficult to measure intoxication within a timeframe that would achieve reliable results.

## 2. Lifejacket research

### Effectiveness of lifejackets

In the aforementioned Australian boating fatalities review, people who survived were at least twice as likely to have been wearing a PFD (personal flotation device; O'Connor & O'Connor, 2005). Only 9% of fatalities were wearing a PFD of any sort. Only 1.3% of drowning cases reviewed by Quan & Cummings (2003) were wearing a lifejacket, although PFDs would not be used in many of these contexts (e.g. in the bath). Maritime fatalities despite PFD use were typically attributed to lifejackets restricting vital movement and 'pinning' the casualty, or hypothermia. McCormack et al (2008) found further evidence of the effectiveness of lifejackets in aiding survival. Table 3 shows the survival times in different water temperatures according to whether a PFD is worn properly or not. Their research predicts survival times to be over seven times longer if a PFD is worn, regardless of water temperature (predicted from over 1100 cases).

Water temperature	PFD not worn	PFD worn
5°C	2.2	15.77
10°C	3.3	23.86
15°C	5.04	36.09

Table 3: *The survival time (hour) predictions made from the UKNIIS data set, p. 27, McCormack et al (2008)*

McCormack et al (2008) found these four variables to be most influential on survival times: water temperature, age, PFD use, clothing and water area. They recommended that these variables were collected systematically with a particular emphasis on immersion times. Interpretation however appears to be difficult, as those further offshore tend to be better protected, but the water temperature is often cooler and they are a further distance from rescuers, resulting in complex predictions.

Furthermore Table 3 shows some high survival predictions. A survival time of five hours without a PFD or 36 hours with a PFD in 15°C water would appear to be an overestimate. Golden's (1996) work claims a lightly dressed person will die from drowning in around one hour when immersed in water of 5°C, two hours at 10°C, or within six hours at 15°C. A review of cold water survival research on the Transport Canada website argues that survival prediction curves are designed to predict hypothermia. As a result they typically overestimate survival time because they do not account for the initial stages of immersion (<http://www.tc.gc.ca/marinesafety/tp/tp13822/menu.htm>).

A great deal of research has agreed that death can occur at any one of the four stages of immersion within the associated timelines:

- Stage 1: Cold shock (3–5 minutes) – typically associated with a gasp reflex, hyperventilation (which in itself can cause muscle spasms and drowning) and a huge increase in heart rate and blood pressure, which can result in cardiac arrest (Tipton, 1989)
- Stage 2: Swimming failure (3-30 minutes) – typically affecting those who try to swim as a result of: cooling the body more quickly (it can increase the cooling rate up to 40%, Keatinge, 1969); a complication to the cardiac and breathing responses initiated in Stage 1.
- Stage 3: Hypothermia (after 30 minutes)
- Stage 4: Post rescue collapse (during or hours after rescue)

Lifejackets have the greatest efficacy in Stages 1 and 2 because they lift the airways above the water (thereby reducing the risk that water is inspired instead of air during the gasp reflex. They also remove the need to swim to stay afloat. Lifejackets do less to protect from hypothermia; dry suits are designed for this purpose: to keep cold water away from the skin. However little appears to be known about the likelihood of mortality from cold water shock or swimming failure. McCormack et al (2008) looked at the frequency of deaths within 30 minutes (before hypothermia can claim life), finding 46 deaths from a total of 160 total deaths recorded from 1993 to 2006 for the UKNIIS. This suggests 29% of deaths are within 30 minutes, or that out of all recorded immersion incidents, 3% of people die within 30 minutes. Further evidence from this research indicated that the mortality rate within one hour of accidental immersions is 6%. While this certainly confirms that death from cold water shock and swimming failure happens, these figures should be taken with caution for two reasons:

1. Only 160 deaths were recorded during 1993 to 2006 because the SAR professionals collecting the data believed the survey had ceased. In recent years, this would barely be the amount of maritime deaths observed over two years. Caution should be employed drawing conclusions from partial data sets.
2. Time of death is often difficult to ascertain in maritime incidents, especially in overboard accidents where there is likely to be a lack of witnesses. SAR professionals may have to rely on their arrival time at the scene to estimate time of death. Coroners are unlikely to investigate the time of death unless the death was suspicious. If no other information is available and arrival time on the scene is taken to be an approximate time of death, survival time in the water is likely to be overestimated.

In essence, the research indicates that cold water shock and swimming failure happens within 30 minutes of immersion, but it can not divulge the actual risk of mortality from Stage 1 or 2. This is extremely important in establishing the usefulness of lifejackets. By way of example, if the risk of cold water shock is relatively high, because lifejackets protect well against the gasp reflex and may reduce panic, thereby perhaps reducing the cardiac response, the need

to wear lifejackets for protection at sea is imperative. If the key risk is actually hypothermia, something that lifejackets do not protect against, their efficacy in addressing incidents at sea is reduced. It is acknowledged however that lifejackets have multiple other benefits such as making an overboard victim more visible, easier to pull out of the water, etc, so they are more likely to be rescued.

The research reviewed so far indicates that lifejackets are effective in reducing the risk of dying from drowning. This finding is important although should be taken with caution as it is possible that the wearing of lifejackets may increase risk-taking behaviour because people believe they are more protected than they actually are. A study investigating risk compensation with hypothetical scenarios found that children would swim in a deeper lake if they wore a lifejacket because they felt less vulnerable to injury (Morrongiello et al. 2007). This implies that children take bigger risks when they are wearing a lifejacket. Although this is not normally problematic, the wearing of a lifejacket may be disadvantageous if improperly fitted or dysfunctional. Training on lifejacket fitting and maintenance is therefore of equal importance to encouraging lifejacket wear.

### **Attempts to increase lifejacket use**

The evidence on lifejacket effectiveness indicates that they greatly reduce the probability that someone will die from drowning when immersed in water. The actual use of lifejackets will be discussed under the 'local research' section. Observational research of people on small boats in the US found that PFDs were worn by 14% of people aged over 14 years of age (Quan et al, 1998). However women were 1.5 times more likely to wear a PFD than men, and the highest PFD wear rates were observed in kayakers (78%), whereas the lowest rates were in motorboats (19%). This indicates that attempts to increase lifejacket wear should target particular ages and boat types. This research is outdated now and the reader is referred to the 'Findings from local research' section for more dependable lifejacket wear figures in the UK. Much has changed in lifejacket design which could affect wear rates, in fact as Figure 2 shows, PFDs have even been designed for dogs.



Figure 2: *Personal Flotation Devices are now even available for dogs*

The theme running through the small number of studies on increasing lifejacket use indicates that these interventions tend to achieve modest levels

of behavioural change. Early research conducted in the US found total PFD use increased from 19.8% in 1992 to 31.3% in 1994, following various educational campaigns on PFD use and boating safety (Treser et al. 1997). Efforts to specifically increase children's lifejacket wear over three years in Washington, USA attained a 9% increase if measured by observation or 14% if captured by self-report questionnaire (Bennett et al, 1999). This intervention involved transmitting several simple safety messages with a vast array of media (television news and public service announcements were most effective). The authors found parents were more likely to report their children used lifejackets around lakes, docks or pools if they felt confident in fitting it. Lifejacket use for children on boats was already high in their research so there was little improvement following the campaigns. Research in Sweden found increasing the availability of lifejackets was an important element of an intervention that managed to decrease drowning in children (Canadian Red Cross Society, 1994).

Confidence with fitting a lifejacket (termed self-efficacy) and the availability of lifejackets are important components of the theoretical model to be discussed at the end of this chapter. Although this research implies only moderate increases in lifejacket wear can be achieved through an educational intervention, adherence to safety messages depends on the quality of the message. This is where risk perception is of great importance. A good safety intervention will help people to recognise a hazard and their own personal susceptibility to it. The issue is that people are not very good at estimating their vulnerability to risk. A study examining offshore service vessels in the North Sea and Norwegian fishermen, found that even though the SMALL SMACK had an average of ten fatal accidents a year, fishermen did not perceive it to be a risky job (Bye & Lamvic, 2007). Specifically, these employees were not concerned about the risk of injury and did not believe it likely that they could be involved in an accident. Furthermore, 41% reported that they hardly ever used a lifejacket. It can not be expected therefore that people understand the risks that threaten them. Even in this extreme case where these fishermen were surrounded by evidence of the dangerousness of their occupation, many of them neglected the wear of basic safety equipment. The subject of warning design and how it can target risk perception will be covered under Objective 3 in this document.

A note of warning about the research reviewed thus far: much has been conducted outside of the UK, primarily the US, where the maritime sector differs in terms of climate and culture. It can be used to make predictions but should not rule out any considerations that may impact on this research.

### **3. Other protective equipment**

The use of other protective equipment is of interest to this project as these present analogous situations in which equipment use can reduce injury if people can be persuaded to use it. Some of these areas have been subjected to more investigation and can therefore provide insight into lifejacket wear and serve as a guide to possible interventions.

## **Protective Equipment in the workplace**

Evidence suggests the use of protective equipment is highly influenced by social processes: we are more likely to wear it if we see other people doing so and this choice is respected by friends, colleagues, etc. For example, industrial workers used equipment to protect them from carcinogenic substances more frequently if this was supported by colleagues, bosses and spouses in comparison to non-frequent users (de Vries and Lechner, 2000). Workers were also more likely to use safety equipment if they saw colleagues use it frequently. People also tend to wear protective equipment when they believe this behaviour is the accepted way of doing things for their particular social group. These beliefs are termed perceived behavioural norms. The social group that a yacht owner will identify with might be other people in his/her yacht club or other yacht owners moored at his/her marina, of a similar age and background. Miners tend to wear ear protectors if and only if they perceive this to be a social norm for their colleagues and their spouse encourages it (Quick et al. 2008). There is a lack of research on the involvement of social processes in lifejacket use, however there is no reason to suspect that people will not be influenced by the behaviour of others in a maritime context.

Several important points are clear in this research therefore, the choice to wear protective equipment is a social one. Maritime users, especially those who can be expected to wear a lifejacket (e.g. sailors, fishermen, and kayakers) appear on first consultation with stakeholders to operate in fairly close-knit groups. These may be sailing clubs or informal social groups that have emerged at a marina in which similar vessels are moored around one another. We can expect social processes to have a key influence on behaviour in the maritime environment therefore. By way of example the photograph in Figure 3 is from the Yachting Monthly magazine, in which the boater on the front cover is not wearing a lifejacket, even though a 'group test' of lifejackets is also being advertised. This sort of image might contribute to people perceiving that it is not the norm to wear a lifejacket when on your yacht.

From the reviewed evidence, an individual would be more inclined to wear a lifejacket if others are seen to wear them (similar others, e.g. fellow fishermen), if wearing a lifejacket is perceived to be 'normal' or routine behaviour in similar others and if the individual has support rather than ridicule, from significant others. The individual's spouse also appears to be an important 'significant other' in the encouragement of lifejacket use.



Figure 3: *The model on the front cover is not wearing a lifejacket; this could contribute to a social norm in which yacht owners do not tend to use a lifejacket*

### **Bicycle Helmets**

Studies investigating determinants of bicycle helmet wearing behaviour again suggest that subjective norms are important. Compared to non-users, helmet users in Australia believed more strongly that significant others used helmets and would approve of their helmet use (O’Callaghan and Nausbaum, 2006). Helmet users also had stronger beliefs that wearing a helmet is the ‘right thing to do’, and that they would be protected if an accident occurred compared to non-users. Other research has found similar factors are important in Finnish teenager’s intention to wear a helmet (Lajunen & Rasanen, 2003). It is important to remember however that people do not always do what they intend to do. Intention is the strongest predictor of behaviour when a habit of behaving in an alternative way is not yet established, otherwise people tend to follow an established behavioural pattern (Janz, 1989; Verplanken et al., 1998). The greatest challenge for encouraging lifejacket wear will therefore be in changing the entrenched behaviours of maritime users who have repeatedly undertaken maritime activities without the protection of a lifejacket.

### **Seat Belts**

Research in this area is mainly concerned with the use of enforcement to increase wear rates in contexts where the wearing of a seat belt was already a legal requirement. For example, one suggestion is that raising the level of penalties for non-wear and more active, targeted enforcement by police could increase use of seatbelts in the USA (Williams and Wells, 2004). In another US study, enhanced enforcement (increasing number of patrols and safety checkpoints) was linked to a decrease in fatal and non-fatal injuries and observed seat belt use (Shults et al. 2004).

Seatbelt enforcement was introduced here to raise the question of whether the enforcement of lifejackets may be the best way to increase wear. In an investigation commissioned by the MCA, the authors concluded that increasing monitoring and enforcement was the only way to substantially raise lifejacket wear rates (Marico Marine Group, 2007). This method may have worked for seatbelt

use although driving is highly regulated in comparison to sailing, which at present has no regulation, or means by which to punish noncompliance. The risks of having an accident while driving is also higher than that for boating, possibly due to the sheer rates of traffic on the road. Initial analyses of incident data and stakeholder interviews revealed that the persons most at risk are middle aged or older, male (see page 35). Additionally there is a widespread feeling amongst the sailing community that the benefit of this activity is in escaping the laws and restraints of everyday life (as evidenced by media representations, see page 37). This group are unlikely to respond well to enforcement. Indeed consultation with Rod Johnson (MCA, Chief Coastguard) exposed the possibility that this would have an adverse effect because he believes the target group would defy attempts at enforcement and risky behaviours would become even more entrenched.

#### **4. Theoretical foundation**

This section outlines evidence and theory that is useful to this particular behavioural change project. The first issue to address is the purpose of using a theory to guide research. In essence, a theory not only helps in the design of research questions so that the most critical information is gathered, but it is also essential to interpreting results. Unless research is conducted across time, there is no way to tell which is the cause and which is the effect. Atheoretical research tends to look at a number of factors and clump them together, but it is unable to weave a story from the results. In short, a theoretical stance was sought for this project to ensure the findings could be explained with some degree of certainty.

There is a vast wealth of theories about how to change human behaviour, some attempt to alter behaviour through attitudes, others look to the role of reward and punishment to reinforce desirable behaviours, others simply use enforcement to change behaviour directly. The most applicable type of model to this project is that which attempts to alter attitudes in order to provoke a change in behaviour. Enforcement does not appear to be an appropriate method in the context of lifejacket wear (see page 19 and 37). Additionally interventions in which rewards are used to encourage behavioural change do not tend to produce lasting results, as behaviour tends to revert once rewards are withdrawn.

Theories focusing on attitude change as a mechanism to alter behaviour are also numerous. However for brevity, Protection Motivation Theory (Rogers, 1983) is only presented because it is the most appropriate for this context and has been subjected to thorough testing. Protection Motivation Theory asserts that two processes underpin whether someone is motivated to protect themselves from a threat (protection motivation):

1. Threat appraisal: in which the threat is evaluated in terms of how much harm it could do (severity, e.g.: death by drowning), and the likelihood that it will happen (vulnerability, e.g.: how likely am I to drown?);

2. Coping appraisal: in which the safe behaviour (e.g. lifejacket wear) is considered in terms of its effectiveness to reduce the threat (response efficacy), its costs (response costs, e.g. discomfort) and whether this behaviour can be enacted properly (self efficacy, e.g. lifejacket fitting).

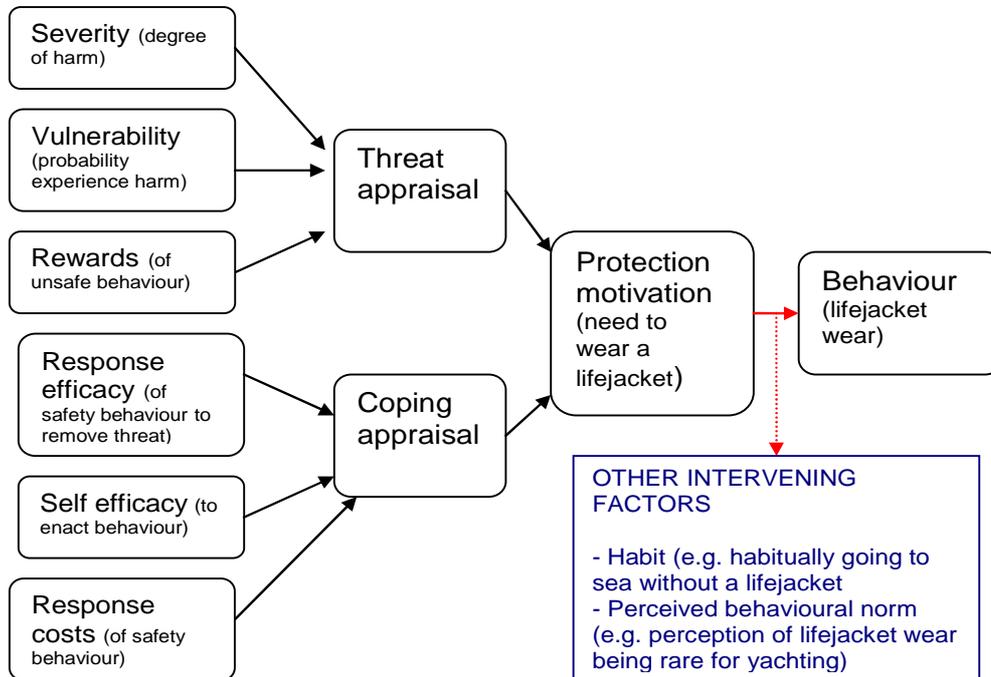


Figure 4: Protection Motivation Theory indicates that if we perceive a threat to be significant, relevant to ourselves and we can avoid it effectively with a safe behaviour, we will adopt that safe behaviour

Protection Motivation Theory has been used to guide research in encouraging the wear of ear protectors in the workplace, which has produced good support for the theory (Melamed et al., 1986; Rabinowitz et al., 1996). Other research has found this theory to be effective in both designing risk communication and increasing rates of willingness to adopt a prescribed protective behaviour to avoid a hazard (Neuwirth et al., 2000). A statistical review of 65 independent studies that had utilised Protection Motivation Theory found that interventions based on its components tended to produce significant changes in behaviour (Floyd, 2000). The general findings of this review were that when people believe a threat will have severe outcomes and they are personally vulnerable to it, they will adopt behaviours to protect themselves. However they will only adopt the prescribed behaviour if they feel it will be effective in protecting them from the threat and if they are confident that they can carry out the behaviour appropriately. As suggested previously, this indicates that training on choosing the right lifejacket, how to wear it properly and how to maintain it is integral.

Dejoy (1996) developed a framework for understanding how to initiate and maintain self protective behaviour in the context of the workplace. This framework is not only applicable to this project because it has synthesised the components of the well-researched theories of behaviour change, but it also integrates them with a stage view of behaviour change. This view assumes that there are various phases that must be undergone in turn to reach long

term behavioural change (see Figure 5). This model is explained in-depth under Objective 2 of this document as it forms part of our investigation procedures (see Table 8).



Figure 5: *Dejoy (1996) Stages of change in self-protective behaviour*

The most useful thing about this framework is that different interventions will be appropriate at different stages of change. For example when someone is unaware that a hazard even exists or does not appreciate their personal susceptibility to it, these aspects of their thinking need to be targeted to change the way they view the hazard. If they are in the decision making phase, i.e. considering the costs and effectiveness of the self-protective behaviour, significant costs need to be challenged and the effectiveness of lifejackets need to be proven. This model is a reminder that people do not change their behaviour in one large cognitive leap. Instead the initial stages of change need to be supported, in addition to providing the right conditions to let them test out the wearing of a lifejacket (Initiation), and to make a habit of wearing it (Adherence).

## Findings from local research

This section examines the local research undertaken by the MCA and RNLI. For brevity, only the key points are noted here, more detailed information of the analyses can be obtained from User Perspective:

- Methodology: a summary of how the research was undertaken
- Key findings: how this research can inform the objectives of this project
- Limitations: any reasons for doubting the findings.

### 1. Lifejacket panel review

- Methodology:

After sifting for relevant fatal incidents in which lifejacket (LJ) wear would have been expected, incidents (49 in 2007, 48 in 2008) were presented to a panel of experts. They judged the appropriateness of lifejacket wear in that scenario and the possibility that the lifejacket would have saved life.

- Findings:

Year	Total fatalities expected to wear LJ	Unlikely to have been saved by LJ	Possibly avoided with LJ	Probably avoided with LJ	No. fatalities probably/possibly avoidable	Insufficient information to judge (fatalities)
2007	42	7%	36%	33%	29	24%
2008	48	13%	35.5%	48%	26	3%

Table 4: Results of the Lifejacket panel review survey, LJ = lifejacket

29 casualties of the 49 reviewed cases in 2007 were judged as probably or possibly avoidable if the casualty had been wearing a lifejacket. Of these, angling (eight incidents, 16.3%) and motorboating (seven incidents, 14.3%) appear to have the highest avoidable rates of fatality had lifejackets been worn. It was judged appropriate for people to wear a lifejacket in 42 of these 49 cases.

26 cases of the 48 cases reviewed in 2008 were judged as probably or possibly avoidable if the casualty had been wearing a lifejacket. This is 84% of the total cases in which lifejacket use was judged as appropriate. Figure 6 indicates that sailing (ten incidents, 20.7%) and angling (seven incidents, 14.3%) appear to have the highest avoidable rates of fatality had lifejackets been worn.

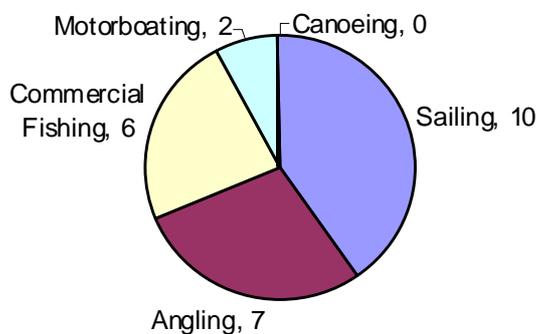


Figure 6: Activities undertaken by casualties in maritime fatality incidents in 2008 where a lifejacket was judged as appropriate and capable of having a positive influence

- Limitations:

This research generates some useful findings. It suggests that 26 of the 93 (28%) maritime fatalities occurring in 2008 could have potentially been prevented if everyone could be persuaded to wear a lifejacket. It also suggests that we could best go about achieving this by primarily targeting sailors, anglers and motorboaters. There is some fluctuation in what activities fatalities were engaged in doing when a lifejacket could have potentially saved them however, which makes it difficult to ascertain whether a targeted intervention might miss at risk maritime users. This is to be expected with such small baseline figures. Finally the core limitation of this research is that it relies on the judgement of the experts, which will inevitably be subjective.

Consultation with several members of the panel revealed that they have various factors in mind while making these judgements (such as distance from the coast, weather conditions, etc). In addition it is assumed to be impossible to draft set criteria to guide these judgements which will capture all incidents. It would appear that the question of how many people could have been saved by a lifejacket in a given year is difficult to investigate and this methodology is the most appropriate.

## 2. Lifejacket wear

- Methodology:

There are two types of methodology that have attempted to answer the question: how many people tend to wear lifejackets and what sort of activity do they engage in? This is through self-report data (asking people to fill in questionnaires at Boat Shows) at Southampton and London and observational data (the results presented here were recorded by Kirsten Pointer of the MCA by watching harbour activity).

- Findings:

	Observational data					Survey data		
	Wearing		Not wearing		Total	Certain conditions/ Never		Total
	No.	%	No.	%		No.	%	
Totals	67	<b>27%</b>	180	<b>73%</b>	247	65	<b>23%</b> (50%)	288 (lifejacket options completed)
Motorboat	22	17%	110	<b>83%</b>	132	20	<b>25%</b> (58%)	80
Rib	15	56%	12	<b>44%</b>	27	1	<b>5%</b> (39%)	21
sailing	14	21%	54	<b>79%</b>	68	43	<b>32%</b> (47%)	135 (yachts & dinghies)
others	16	80%	4	<b>20%</b>	20	8	<b>21%</b> (1%)	38 (canoe, jetski & others)

Table 5: *Observational data shows those wearing and not wearing lifejackets; survey data are those who claim to 'never' wear lifejackets or 'only in certain conditions'.*

These results can be directly compared in Table 5, as only those people who claimed they never wear lifejackets or reserve wear for certain conditions in the self-report data should have been observed 'not wearing lifejackets'. Overall, all maritime users were observed wearing lifejackets in 27% of cases, whereas if their self reports are to be believed, this figure should be closer to 77% if the 'on tender' category is to be included. This is a disparity of 50%. The greatest disparity by activity between survey and observational data is the non-wear rates of motorboats (58%) and sailing vessels (47%).

The observational data is likely to be more accurate for several reasons. Participants had just seen a lifejacket demonstration when filling out the questionnaire which will result in a tendency to answer the lifejacket questions more positively than is true in reality. Additionally ‘when do you wear your lifejacket?’ is a leading question and will cause people to answer favourably. However the self-report survey was able to ask the direct questions of why people don’t wear lifejackets and what would encourage use, as shown in Figures 7 and 8.

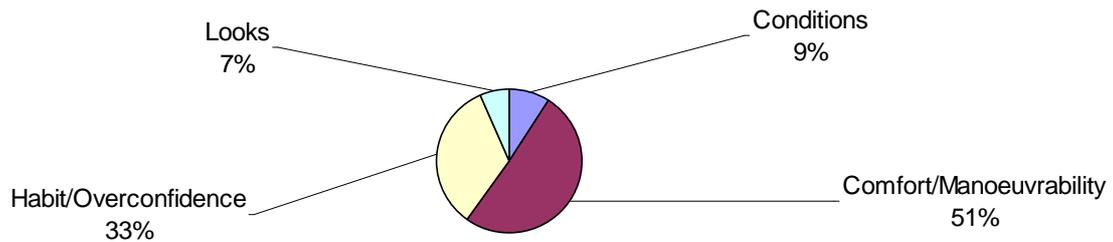


Figure 7: Reasons people gave for not wearing a lifejacket from combined samples of the London (n = 18) and Southampton (n = 27) boat show questionnaires

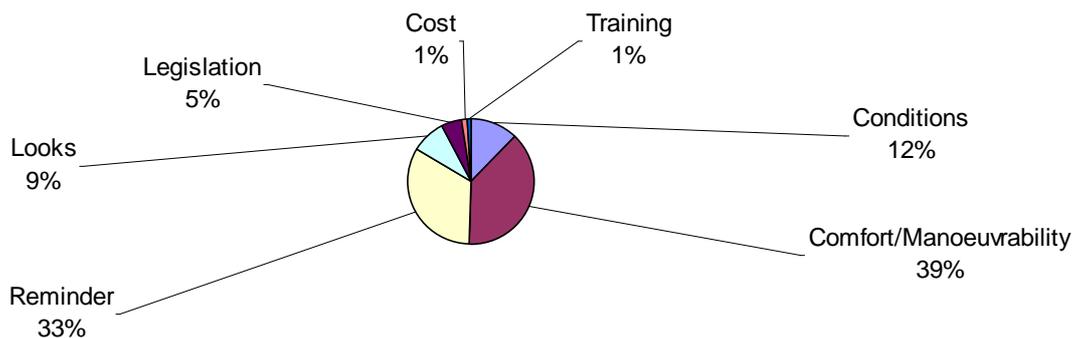


Figure 8: Factors that could encourage respondents to wear a lifejacket from combined samples of the London (n = 28) and Southampton (n = 63) boat show questionnaires

These results are reflected in the theoretical model presented on page 21. Comfort / manoeuvrability is the key factor in why people don’t wear lifejackets (51%) and what could change their behaviour (39%) in this sample. This is a cost of safety behaviour, which would require an educational intervention if people are unaware of lifejackets which could be more comfortable and allow greater movement (e.g. Spinlock), or perhaps an engineering intervention if none exist to suit the user’s needs.

- Limitations:

Although the self-report data included age categories, conclusions can not be reached about the age of the target audience as those attending tended to be within a few select age groups. The age range was therefore not representative of the recreational maritime sector. As mentioned in the previous section, ‘When do you wear your lifejacket?’ is a leading question. This and other aspects of the methodology (such as providing incentives for

survey completion) are likely to lead to dishonest reporting. The observational data therefore would seem to provide more reliable estimates of how many people do not wear lifejackets when they need to. This is essentially all the time rather than just on open water, as analysis of the incident data revealed that in 2008, several people lost their lives while mooring or being moored (see page 27). People who use yachts, dinghies and motorboats are of particular interest because their wear rates are lowest. A great deal of observational research has been carried out by the RNLI in different locations of the UK; the following have the lowest lifejacket wear rates: Morning Ferry (7%), Polruan (19.5%), Dartmouth N-S (21%), Scarborough Harbour (26%), Ifracombe (28%), and Lymington LBS (28%). These would be good areas to target with a lifejacket intervention.

### **3. Arkenford participation and safety data**

- Methodology:

This is an annual large-scale survey commissioned by the BMF, MCA, RNLI and RYA and sponsored by Yachting & Boating World, which has been carried out for the last seven years. Respondents were asked if they had taken part in each of 21 leisure based watersports activities during the twelve months preceding the survey, and how often they participated, both in the UK and abroad. For some activities only a small number of people from the surveyed sample took part, leading to very small base sizes. For each activity that a respondent indicated they participated in, they were asked ten safety questions. The two of particular interest here are:

1. "I always wear a lifejacket/ buoyancy aid when participating in this activity",
2. "I always have ready access to a lifejacket/ buoyancy aid when participating in this activity" (to which participants answer yes/no).

- Findings:

On first examination the reported PFD wearing rates seem high compared with the observational data in Table 5. For example, in 2008 57.6% of small sail boat participants say they always wear a lifejacket, but this is higher in 2007 at 64.8%. More investigation would be needed to ascertain validity and reliability, but the nature of data collection may have influenced response patterns. The research found males are at least more than twice as likely to participate in these activities: yacht racing, angling from a boat, small sail boat racing and powerboating. Many of these activities have are linked to higher fatality rates according to the research reviewed data so far, and the fatality data discussed on page 27. This suggests that there may be an overrepresentation of male fatalities because of the activities they choose, not because they behave more riskily when undertaking these activities. Additionally 35 to 54 year olds have the highest rate of participation for any sailboat activity, and any powerboat activity. This indicates that the peak in fatalities around this age group, acknowledged in Table 1, is more than likely due to participation rates rather than particular vulnerability to drowning (except in the case of persons age 70 and over).

This data may be useful for targeting interventions. For example, in several activities the cluster of participants named 'AB' appear to be less likely than other segments to wear a lifejacket, e.g. small sail boat racing, small sail boat activities and yacht cruising etc. Additionally the C2DE segment is of particular interest as they have the highest participation rates in both angling from the shore and a boat. Angling is an activity in which a significant portion of fatalities could have been prevented with a lifejacket in both 2007 and 2008 according to the expert panel review (see page 22). The life-stage information is also of interest: couples under 55 (with no children) have the highest rates of sailboat or yacht cruising and racing, single people (potentially divorced or widowed) have the highest participation rates for angling from a boat, families are the main participants in motorboating/cruising, whereas empty nesters (55-65 with no dependents) have the highest rates of angling from the shore. Club membership by activity is helpful in terms of delivering a safety message, for example locating a safety message at a club would not be effective for power-boaters (only 7% had membership).

- Limitations:

There is some useful information in this research, especially when interpreted in conjunction with the other findings reviewed under 'Objective 1' of this document. However there are several issues which make affect its validity. The location information of participation rates is too broad to aid in targeting interventions, therefore it is difficult to tell whether low lifejacket wear in certain sites is due to a prevalence of activities that tend not to require a lifejacket. The low baseline figures in many cases reduce the confidence with which 'at risk' groups can be profiled. The data also include participation in maritime activities outside of the UK which makes interpretation difficult (25% of people participating in motorboating and yacht cruising only did so abroad).

The PFD wear rates are somewhat high in this research which may indicate that the market segments could preclude people who fail to wear their lifejackets when they claim that they do. The participation data is however very useful and unlikely to provoke dishonest reporting. Frequency of engaging in particular activities (by age group, life stage, etc) is ideally needed to accompany the breakdown of participation rates by these demographic factors. This would enable the calculation of exposure, i.e. the extent to which 50-59 year olds are involved in sailing incidents is a function of the total number of 50-59 year olds who sail and how often they sail.

#### **4. MCA & RNLI fatal incident data**

- Methodology:

User Perspective categorised the majority of MCA's 2008 fatality reports into a spreadsheet designed to capture human, technological and environmental causes. 56 maritime fatal incidents were analysed (in which there were 57 fatalities). Incidents involving commercial activities or commercial fishing

were excluded. These were cross-referenced with RNLI narrative reports. The purpose of this was to draw out personal characteristics of fatalities, environmental characteristics of the incident (weather, distance to the shore, etc), lifejacket use and any contributory or protective factors to the incident.

- Findings:

43 of the 57 fatalities were male (75.4%), 6 were female (10.5%) and this information was not readily available in 8 cases (14%). This certainly indicates an overrepresentation of males. Figure 9 shows the age categories of these fatalities where their age could be classified (insufficient information in 17 cases). The highest fatality rate was seen in the 50 to 59 age group. What is important however is the age of fatalities who were involved in incidents where lifejacket wear would have been appropriate. If cliff walkers, climbers, divers, swimmers, windsurfers and walkers, those suspected of suicide and not known or miscellaneous categories are excluded, 19 recreational maritime fatalities remain. The age and sex of these fatalities is displayed in Table 6.

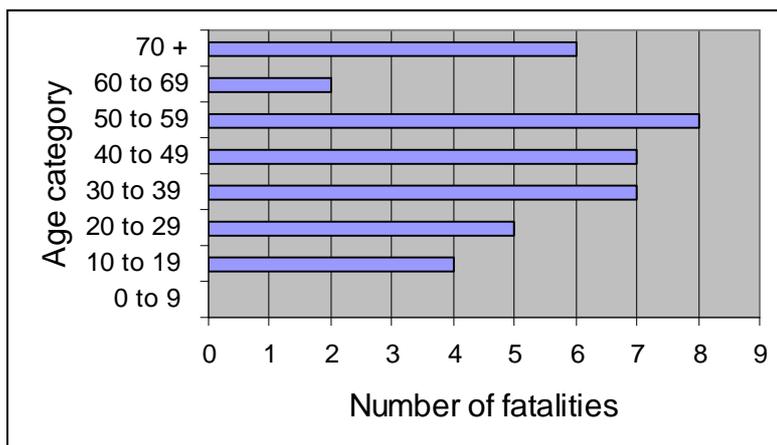


Figure 9: Number of maritime recreational fatalities in 2008 that fell into specific age categories where age could be identified

Activity	Number of incidents categorised	sex			Age category							
		Male	Female	NK	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 +	NK
Fishing	7	7				1	2	1		2	1	
Kayaking	1		1									1
Sailing	11	10		1	1		1		4	1	1	3

Table 6: Age and sex of fatalities involved in fatal maritime incidents in 2008 when undertaking activities in which lifejacket use would have been expected, excluding commercial activities; NK abbreviates 'Not known'

Table 6 shows the fatal incidents in which lifejacket would be appropriate. Only the activity of swimming (12 fatalities) had a comparable level of fatalities to those shown above. Both sailing and fishing fatalities were almost entirely male. The age of the fishing fatalities are fairly dispersed with a mean average age of 47 years. Sailing fatalities peak in the 50 to 59 age group, except for one 19 year old fatality who died after capsizing on an inflatable ('toy') dinghy. The average age of sailing fatalities was therefore calculated with the exclusion of the 19 year old (this fatality appears fairly unrepresentative of most sailing fatalities), resulting in a mean average age of 57 years. The most common vessel to be involved in sailing fatalities was yachts, followed by dinghies. Although if all fishing incidents are included, yachts and dinghies had an equal prevalence in incidents. A lifejacket was worn in one of the fatal sailing incidents, whereas two very old lifejackets were found in a plastic bag on a 6 metre dinghy that was involved in a fishing incident, but not worn. Lifejackets were either definitely not worn (9 of 57 fatalities), or not clearly specified in the remainder of incident reports (46 of 57 fatalities).

This analysis also found some evidence to suggest incapacity was a potential contributory factor in a significant portion of cases. In three incidents physical incapacity (such as proneness to fits) could have contributed to the accident and/or death. Medication was a possible contributory factor in two incidents and alcohol potentially contributed to ten accidents (18%). There was witness testimony that fatalities were intoxicated in nine of these incidents, three of which were sailing incidents and five were incidents in which fatalities were either swimming or climbing rocks by the water. Alcohol was found aboard a fishing vessel in the one remaining incident.

- Limitations:

This activity did not result in a list of primary, secondary and tertiary causes as expected, because some of the vital information for deciphering cause was not available or clearly expressed in the incident reports. A clear categorisation of contributory and protective factors for each fatal incident report, such as sea state, blood alcohol levels, lifejacket use, etc, is ideally needed. This would enable the establishment of accident causation, which will inevitably lead to the design of more effective interventions to reduce accidents. This activity has however helped to clarify some of the personal characteristics of the group who are involved in accidents where a lifejacket may have saved their lives. Some interesting findings have emerged, such as the predominance of older males having fatal accidents when sailing/ fishing, the predominance of yachts and dinghies in fatal accidents and the role of alcohol in sailing and swimming incidents. Several stakeholder interviews have revealed that the role of alcohol is likely to be understated by this data due to underreporting and difficulty in measuring intoxication.

It is acknowledged that many parties (e.g. Police, Ambulance service, Coroners) are involved in the investigation of accidents and cause of death, making the compilation of essential information difficult. The WAID database, which is currently in development, is tackling this issue by compiling these

sources of information from different parties into a single database. This is an excellent step forward for the investigation of maritime incidents.

## **5. RNLI incident data**

These questions were posed to Roger Aldham (Data Quality Supervisor, RNLI) so he could produce reports from the RNLI incident data set:

- a) The location of incidents where lives were lost & saved, showing whether lifejackets were worn by all, some or none of those involved.
- b) The types of vessels in incidents where lives were lost & saved, in which lifejackets were worn by all, some or none of the persons on the vessel.
- c) The age ranges of people involved in incidents where lives were lost & saved (under 12/ teen/ adult), and whether lifejackets were worn by all, some or none of those involved.
- d) Whether alcohol was involved in incidents where lives were lost & saved, and whether lifejackets were worn by all, some or none of the persons involved.
- e) Whether any medical conditions were present in incidents where lives were lost & saved, and whether lifejackets were worn by all, some or none of those involved.
- f) Whether lifejackets have a greater tendency to be worn according to sea state, and if these conditions in combination with lifejacket use might show a pattern in the number of lives lost and saved.

- Findings:

The questions posed of the RNLI incident data set all involved lifejacket usage. The limitation of this requirement was that in all cases, only a subsection of the data could be included because lifejacket usage is not actually recorded in the majority of cases. Confident conclusions can not be drawn about this research therefore because of small sample sizes and the possibility that excluded data could significantly alter the findings. In addition people will tend to put their lifejackets on when they call the Coast Guard. Lifejacket wear as measured by the observations of SAR professionals upon their arrival to an incident may therefore be inaccurate.

### **a) Location of incidents:**

The lives lost map is not shown because it only shows the locations of thirteen incidents in which lifejackets were worn by all (4), some (1) or none (8) of the people involved. Another 80 incidents occurred in 2008 where RNLI lifeboat assistance was required and lives were lost, in which lifejacket usage was not recorded.

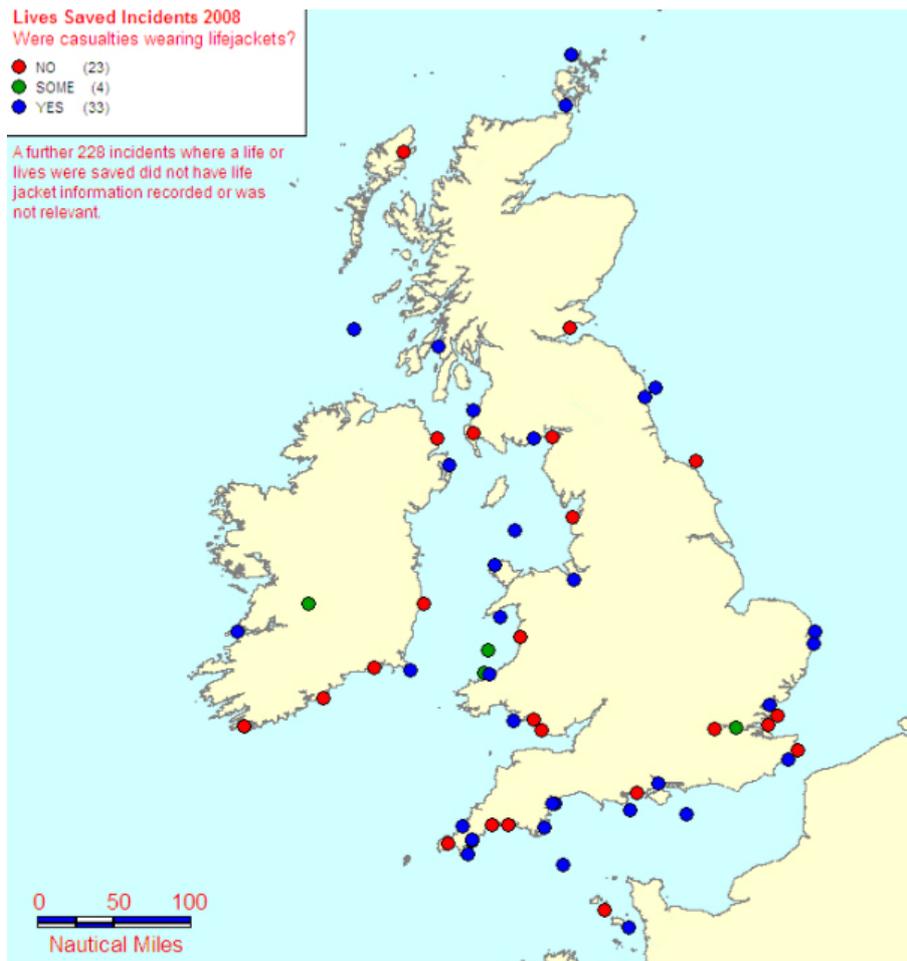


Figure 10: Location of RNLi Lifeboat call outs in which lives were saved in 2008, according to whether lifejackets were worn by all, some or none of those involved ( $n = 60$ )

Figure 10 shows locations in which lives were saved in 2008 where RNLi lifeboats were called out. It also shows whether lifejackets were worn by all, some or none of the persons involved. Again this data can not really inform of 'hotspots' in which incidents are high and lifejacket wear is low, because data is missing for 228 of these 288 incidents (79%).

The MCA have compiled location information for fatal maritime accidents in the UK from 1997 to 2004 (including commercial accidents). This is shown in Figure 11 because there was sufficient data collected during this period to allow conclusions to be drawn about accident hotspots. It does not however advise of areas where both the risk is high (high concentration of fatalities), and lifejacket wear is low.

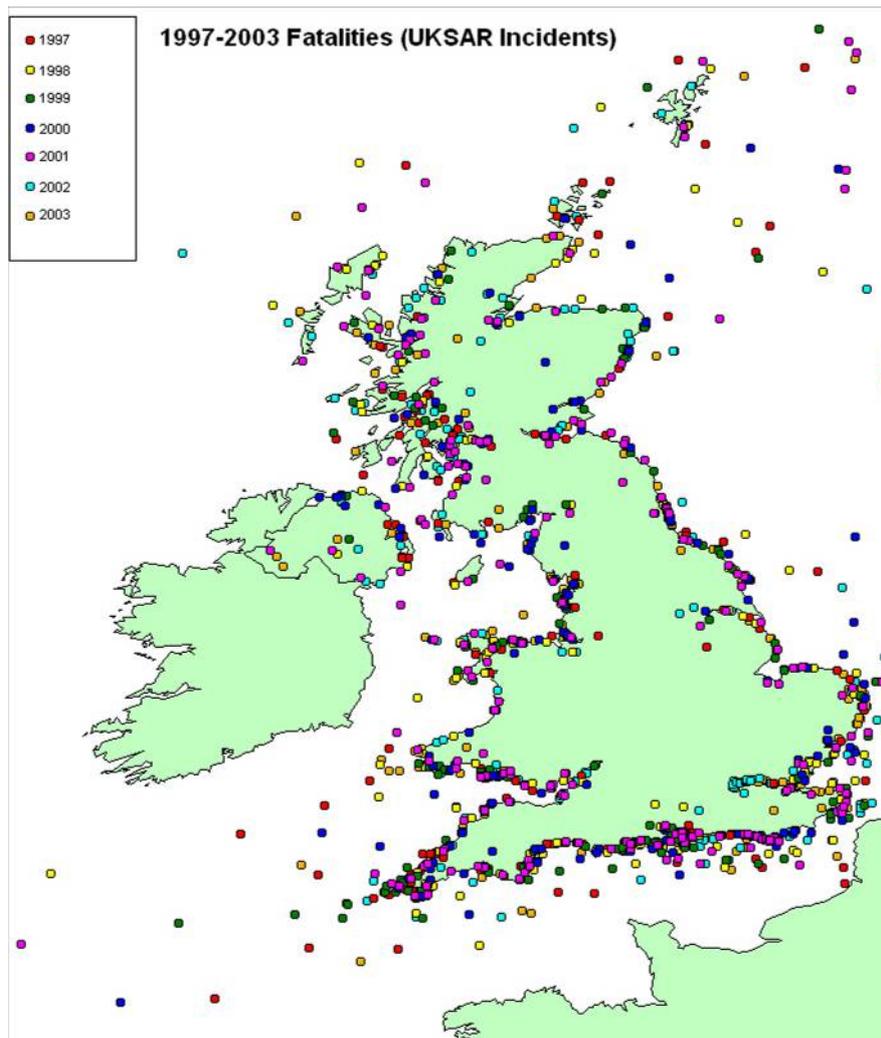


Figure 11: Location of UK SAR fatalities from 1997 - 2003

The majority of incidents during this seven year period occurred on the coast, particularly in the Solent area. There is also a particular cluster in the Cornwall area and in the southern part of Suffolk.

**b) Types of vessels involved in incidents:**

- In the lives saved records for 2008, there appears to be a lack of lifejacket usage on manual pleasure-craft (except canoe/ kayak) and on small open powerboats;
- In the lives lost records for 2008, sail pleasure-craft have a slight propensity to fail to wear lifejackets.

Figures are not quoted here because of the small frequencies involved and again the amount of missing data. Data is lacking in 110 lives saved incidents, and 80 lives lost incidents. Again the danger is that the lacking data could provide a very different picture to what is apparent from this analysis.

- **Limitations:**

Analyses C to F are not reported due to missing data making interpretation potentially hazardous. If the research for Objective 2 targets particular pleasure-craft on the basis of these findings it could exclude those at highest risk. Additionally there is the issue that only certain types of pleasure-craft users will expect to wear a lifejacket. By way of example, persuading children who are using an inflatable dinghy to wear lifejackets is far less realistic than persuading the skipper of a powerboat. Conclusions about age can not be drawn from this data because the categories are too wide to provide any fidelity. The role of lifejackets in influencing the frequency and type of incident can not be reliably determined from this incident data. This is due to a lack of data collection, and that observations made by SAR professionals may be unreliable because people are likely to put their lifejackets on in preparation for their arrival. Also due to underreporting, the role of alcohol is unlikely to reveal its true influence on maritime incidents in the RNLi data.

However some location information can be drawn from Figure 11. Several areas where fatal incidents have a higher concentration are apparent. The implication of these findings is that the research for Objective 2 should be concentrated in these areas. The high volume of incidents indicates these are areas of particular risk, possibly due to the higher volume of recreational maritime activities undertaken in these localities.

## **Section summary**

- ✓ **Evidence for lifejacket efficacy**

- The UK National Immersion Incident Survey (UKNIIS), from 1991 to 2006 indicates survival times in the water with a lifejacket are over seven times longer, regardless of water temperature.

- ✓ **Some indication of contributory factors & at-risk characteristics**

- Alcohol (nearly 30% in O'Connor's 2005 study) and recreational drugs feature as contributory factors in the reviewed research. Older males are particularly at risk. Risk also varies with the type of vessel used. First and foremost these are males, aged 40 years and older, who are either sailing or fishing from a boat. In general the reviewed research indicates that motorboats and sailing yachts both have the propensity to have fatalities in which lifejackets could have saved them. Certainly none of the research has established that either type of vessel has a greater risk of incidents.

- ✓ **Some UK fatalities could be prevented with lifejackets**

- The lifejacket panel review suggests that 28% of maritime fatalities occurring in 2008 could have potentially been prevented if everyone could be persuaded to wear a lifejacket.

- ✓ **Selection of a tested theoretical model**

- This section has also identified a well tested and applicable theoretical model. Protection Motivation Theory was therefore employed to guide the

research in combination with a Stages of Change approach. This theoretical model incorporates all of the expected factors and therefore can identify problem areas that negatively impinge on lifejacket wear. It also highlights specific interventions to address those problem areas, thereby being a particularly useful framework for this research.

**o Research on increasing Lifejacket use based in the U.S**

- The only research that could be identified on lifejacket wear interventions was mainly conducted in the United States. Additionally this research has only achieved modest increases in lifejacket use (10 - 15%). However most of these studies used self-report questionnaires. This review has identified large differences in self-reported and observational studies of lifejacket wear. Therefore these prior interventions in lifejacket wear are likely to be based on inaccurate findings.

**o Lack of research**

- The fundamental finding from this review is there is a lack of research in all key areas. Research into cold water survival knows far less about the initial stages of cold water immersion than hypothermia. This raises issues for advising the sailing public of their actual risk of harm from falling overboard. There is also a severe lack of data from Search and Rescue (SAR) agencies, which addresses the cause of maritime incidents. The MCA data is of a poor quality and is only collected for fatalities. The RNLI data is under-populated, where key information such as lifejacket wear is rarely collected. Table 7 provides a summary of our conclusions about the quality of the incident data reviewed. It also includes a comparison against the Marine Accident Investigation Branch data (not reported in full as it was intended for comparison purposes). For the MCA and the RNLI data sets, the capture of accident cause is poor, especially in comparison with other transport sectors. The MAIB's core function is to investigate accidents. Although investigations are thorough there is a lack of emphasis on the human factor and reports summarise causation poorly.

Source	Range of incidents reported	Information sought	Information completed	Capture of cause
<b>MCA</b>	Only fatalities	Largely resource information	Automated – lack of consistency	Poor – compared road/rail, etc
<b>RNLI</b>	All incident types but only when RNLI involved	Excellent database asking good questions	Poor population - 79% of data in LJ wear category	Poor - compared road/rail, etc
<b>MAIB</b>	Mainly commercial	Appears to focus on equipment & phenomena	Thorough investigations	Generally poorly summarised

Table 7: Summary of incident data quality findings

# Stakeholder evidence & Media representations

## 1. Stakeholder interviews



Figure 12: *The Hampshire Marine Police Unit and the RYA head office*

The following stakeholders were interviewed: Michael Vlasto (Head of Operations, RNLI), Rod Johnson (Chief Coastguard, MCA), Guy Addington (Lifeboat Coxswain, Margate RNLI Lifeboat station), Janet Kelly (Tower Lifeboat Station Manger, RNLI), Captain Martin Willis (Scarborough Harbour Master), James Stevens (RYA Head of Training) and the Hampshire Marine Police Unit. The following themes were present:

- 1. Segregated approach to investigating maritime accidents** - little information gets fed back to the RNLI and the relationship between the marine police & the MAIB does not facilitate information sharing.
- 2. Primary responsibility seen as rescue (RNLI & MCA) or counter-terrorism (Marine Police)** – there is a lack of clear responsibilities for who should be investigating maritime accidents.
- 3. Causes of maritime accidents: weather, poor preparation, lack of risk perception** - it was widely agreed that a failure to appreciate how quickly the environment can change (tidal currents on the Thames and at the Coast) is a major cause of incidents. In essence some pleasure boaters fail to appreciate that they are on a moving body of water, know little about remedial action due to a lack of experience and training and also neglect to keep updated on the weather.
- 4. Alcohol estimated to feature in 30% to 90% of accidents** - 90% of overboard accidents involve alcohol according to Hampshire Marine Police in events like the Hamble where alcohol use is widespread. 30% of general incidents are estimated to involve alcohol according to a RNLI Lifeboat Coxswain. It is also widely agreed that incidents involving alcohol are widely underreported.
- 5. Fatal incidents on the water are low** - maritime fatalities are not considered to be a problem in comparison to road accidents.



Figure 13: *The Thames RNLi lifeboat station, whose most frequent type of incident is suicide*

6. **A lack of facts: establishment is difficult & information sharing is poor** – opinions in stakeholder interviews diverged considerably. This is probably due to all parties having a different experience, and the fact that they might collect data but it is not widely disseminated. Of course it is also difficult to establish facts in the marine environment.
7. **Inconsistency in reasons for non-wear** – there was widespread diversity in perceptions of why people do not wear lifejackets. The Marine Police Unit and the Scarborough Harbour Master felt this was because lifejacket wear is not enforced. Others assumed that it was because lifejackets are uncomfortable and cumbersome, and people lack of knowledge about what to buy. The contextual review reported under Objective 2 did not support these latter assumptions.
8. **Historical inconsistency in advice on lifejacket wear** – in the past there was some inconsistency in what advice was given to pleasure boaters about wearing their lifejackets. The RYA recommended that they were worn when the need emerged, whereas the MCA & RNLi recommended at all times on the water. The three organisations are now working on a joint campaign with consistent messages about lifejacket wear.
9. **At risk maritime users** – stakeholders described various attributes when defining at risk maritime users. It was agreed these tend to be fair weather sailors, with little training, who tend to have an over-reliance on technology. A lack of training and preparation also seem to be key reasons for why people get into trouble when sailing. However several interviews revealed the specific ‘holiday mentality’ where typically ‘safe’ people developed a lazier attitude towards safety while on holiday in an unfamiliar place. New money was also mentioned as a factor delineating risky maritime users, which appears to be linked to the lack of experience and training theme (see point 3, page 35).
10. **Motorboats & power boats seen to be more problematic than sailing yachts** – stakeholders also saw particular categories of vessel to be more at risk of accidents. There seems to be a class issue with assumptions about motorboats and sailing yachts and indeed between

different boats within the same group. This finding was not only a theme to emerge from the stakeholder interviews but was also supported by research from the contextual reviews reported under Objectives 2 and 4 of this document. The boat in Figure 14 encapsulates the model 'solid sailing vessel' for some interviewees.



Figure 14: A model 'solid sailing vessel' according to some interviewees

- 11. Wear rates best increased by:** making lifejackets 'cool', more comfortable or through enforcement. There was a great variation in how stakeholders felt lifejacket wear would be encouraged. The pre-intervention contextual review disagrees with some of this because lifejackets were not generally seen as uncomfortable or 'uncool', in fact many people scorned the fact they had become a fashion accessory.
- 12. Huge variation in whether greater legislation for boats & safety equipment is perceived to be necessary/acceptable** – legislation was generally advocated by those with greater enforcement responsibility such as the Scarborough Harbour Master and the Hampshire Marine Police Unit. In contrast the spokesman for the RYA believes enforcement would be ineffective because pleasure sailors do not favour regulation, tending towards anti-establishment attitudes.
- 13. Types of incidents vary with location** – for example mechanical callouts in Margate and suicides on the Thames. Lifejacket use will vary in its efficacy to remedy particular types of incidents.

## 2. Media representations of lifejacket attitudes

The attitudes on website forums towards lifejacket wear appear to broadly divide into three camps, those who:

- Wear jackets all the time (*'[I wear a lifejacket] at all times on deck. It is a rule that is easy to follow and enforce with all the usual family crew. Then there are no debates about it'*);

- Only wear them when circumstances dictate, e.g. weather, depending on the type of craft (such as the tender), when acting as an example to others or when lacking experience (*'It is a universally accepted rule of sailing that you don't need a lifejacket when it is warm and sunny'*);
- Do not wear lifejackets when sailing alone as there is no chance of getting rescued (*'if he fell in ... sea temperatures were such that survival time was in the order of minutes, life jackets (which got in the way of working) couldn't keep his head above water in big waves ... why prolong the inevitable'*). This quote illustrates the 'I would rather die quickly' attitude, a theme found in the research reported on page 47.

The aesthetic and comfort aspect of lifejacket wear also seems to be very strong, for example one of the themes running through these forums is that people do not wear lifejackets because it prevents them from getting a suntan.

This quote is from the editor of Yachting Monthly (YM) magazine in response to a reader's letter urging them to publish more photographs featuring people wearing lifejackets aboard a boat. It reflects the previous discussion on lifejacket enforcement (see page 19).

*'In the absence of 'seatbelt-type' legislation, we feel that most readers don't want YM to be an agent of the 'nanny state' imposing on the last bastion of freedom - the sea - and turning into a hand-holding PC safety manual.'*

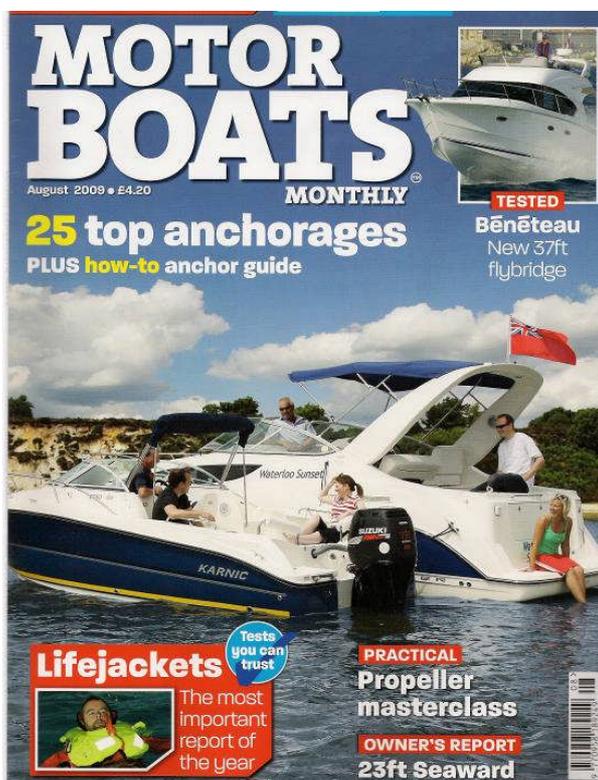


Figure 15: The front cover of Motorboats Monthly

Mixed messages in magazines are common, Figure 15 is the front cover of Motorboats Monthly, in which a test of lifejackets was advertised as 'The most important report of the year', except none of the people in the main picture are wearing a lifejacket.

The attitudes towards lifejackets discussed in the Media Representations section are mirrored in the contextual reviews undertaken for the fulfilment of Objective 2, the next topic of this report.

## **Objective 2: Investigating prohibitive and promoting factors in lifejacket wear**

The aim of this objective was to investigate the perceptions, attitudes and behaviours of recreational maritime users. This information was sought to enable some identification of why people do not wear lifejackets to enable the identification of interventions which would encourage them to change their behaviour. This process was essentially repeated under Objective 4 to measure the efficacy of the intervention developed at this stage.

### **Methodology**

#### **1. Contextual reviews of eight sites**

Contextual reviews were adopted as the method of enquiry to investigate why people do and do not wear lifejackets in eight locations in the UK. A contextual review is essentially a lightly-structured interview (meaning it is guided but not completely constrained by set questions). The benefit of a contextual review over a questionnaire is that because it is undertaken face to face, the researcher can probe the participant. The opportunity to probe is invaluable if either researcher or respondent have misunderstood something, if there is some aspect of the situation or conversation that warrants further exploration, or if it appears that the participant may not be conveying the entire truth. The key strength of questionnaires is that they enable a vast quantity of data to be collected quickly. In short they are a cheap method. They are not generally suitable for investigating complex areas of human cognition because they constrain participant responses to a small set of options. They are also not ideal for use in situations where there is a socially-desirable response: for some people being asked whether they wear a lifejacket promotes an automatic response of 'yes' regardless of their usual behaviour. Contextual reviews, while being a relatively time-intensive method, enable the ability to clarify, question and explore the participant's thinking on the participant's own terms.

The other benefit of contextual reviews is that they are conducted in context, i.e. in the situation that is being explored. There are two advantages here, firstly being in situ aids memory retrieval, therefore participant's responses are less likely to be affected by trying to recall partial and fuzzy memories. Secondly, conducting the research in context means that the researcher can see some physical evidence of the subject matter. For example, one participant who did not wear his lifejacket as a rule but 'kept it close to hand' showed us his lifejackets. These were kept underneath a clutter of other safety equipment in a cupboard that was fairly difficult to access (see Figure 16). His version of 'close to hand' was very different to how others would define it, something that could not have been ascertained by questionnaire.



Figure 16: Where lifejackets were stored on a motorboat in Chichester Marina

Locations were selected upon the basis of the lifejacket wear observational research and the MCA's records of fatal incident locations reviewed on pages 24 and 32). A balance between targeting areas with low rates of observed lifejacket wear and areas of high incident occurrence was therefore attempted, and the following locations were visited during July and August 2009: Scarborough Harbour, Falmouth Marina, Penzance Harbour/Marazion Bay, Chichester Marina, Port Hamble Marina, Port Solent Marina, Southsea Marina and Woolverstone Marina. A variety of locations was sought, from the unmonitored mooring areas of Marazion Bay to the controlled environment of the marinas, such as Falmouth Marina (see Figure 17).



Figure 17: Marazion Bay (left) Falmouth Marina (right)

## 2. Measures

A total of fifteen questions were asked of participants (see Appendix I). The questions were taken from the Stages of Change model shown in Table 8 on the next page and Protection Motivation Theory (see page 21). Table 8 shows interventions relevant to each stage of change. Attempts were therefore made to identify what stage participants were in with regards to shifting their behaviour towards greater lifejacket wear.

Description of stage of change	Most direct interventions
<b>HAZARD APPRAISAL</b>	
<p>In this stage the individual assesses:</p> <ul style="list-style-type: none"> <li>- Their susceptibility to the hazard (e.g. likelihood of falling overboard and struggling in the water);</li> <li>- The severity of the hazard (e.g. drowning);</li> <li>- The effectiveness of a protective measure to mitigate that danger (wearing lifejackets to prevent drowning).</li> </ul>	<ul style="list-style-type: none"> <li>a) Increase perceptions of personal susceptibility</li> <li>b) Emphasize the severity of potential outcomes if lifejackets are not worn (e.g. drowning)</li> <li>c) Provide trusted information on how effective lifejackets are in reducing the threat.</li> </ul>
<b>DECISION MAKING</b>	
<p>In the decision making stage:</p> <ul style="list-style-type: none"> <li>- The costs and benefits of alternate courses of action are being weighed up (i.e. the costs of buying, wearing and maintaining a lifejacket are compared with how much protection a lifejacket is believed to provide);</li> <li>- People will consider how effective they will be in choosing the right lifejacket, maintaining and activating it, etc.</li> </ul>	<ul style="list-style-type: none"> <li>a) Change perceptions of the costs &amp; benefits of lifejacket wear</li> <li>b) Change the reality of the costs &amp; benefits of lifejacket wear (e.g. redesign, pricing)</li> <li>c) Provide training for choosing, putting on and maintaining a lifejacket correctly</li> <li>d) Again giving information on exactly how lifejackets reduce the threat.</li> </ul>
<b>INITIATION</b>	
<p>In the initiation stage, there is a greater focus on the environmental and social factors that support the self-protective action. Therefore a lifejacket may not be worn if:</p> <ul style="list-style-type: none"> <li>- Wearing a lifejacket makes carrying out a particular activity difficult (e.g. racing);</li> <li>- Lifejackets are not perceived to be worn by similar others in the maritime group;</li> <li>- Lifejackets are difficult to buy/maintain.</li> </ul>	<ul style="list-style-type: none"> <li>a) Alter training of certain groups (e.g. kayakers) so wearing a PFD is commonplace among both novices and experts</li> <li>b) Increase availability of lifejackets and products such as replacement CO2 cartridges</li> <li>c) Seek to achieve cultural change rather than individual change.</li> </ul>
<b>ADHERENCE</b>	
<p>This is the phase in which changed behaviour becomes long-term. Ideally lifejacket wear develops into a habit in which all persons at risk wear and check their lifejackets in an automatic fashion. Increased lifejacket use might revert back to infrequent or non-use if:</p> <ul style="list-style-type: none"> <li>- People do not have the opportunity to experience the benefits of their lifejackets working in the context for which they were intended (i.e. in the water);</li> <li>- Particular activities are hindered by lifejacket use;</li> <li>- Again if there is the perception that lifejackets are not commonly worn by maritime users who are seen as similar.</li> </ul>	<ul style="list-style-type: none"> <li>a) Allow people to have a real experience of using their lifejackets in a challenging but safe environment (such as the RNLI wave pool)</li> <li>b) Give people a virtual experience of how lifejackets have saved lives/ or a lack of them has led to loss of life by widely communicating incidents.</li> </ul> <p>Also important to this stage:</p> <ul style="list-style-type: none"> <li>c) Identify situations in which people would not wear a lifejacket and try to change behaviour so it is consistent in all conditions.</li> </ul>

Table 8: *Theoretical model to guide research and intervention design*

The aim of the below research questions was to explore the issues posed by the theoretical framework. The questions actually asked of participants are presented in Appendix I (see page 97).

1. What do they perceive to be the biggest threat on the water?
2. How much of a hazard do they perceive falling overboard to be?
3. How susceptible do they believe they are to falling overboard and dying as a result?
4. What are their barriers to using lifejackets and the rewards for not wearing one?
5. Do they believe a lifejacket is effective in preventing death from drowning?
6. Do they feel they can choose, fit and look after a lifejacket well enough to ensure it works like it should?
7. How do their peers view wearing lifejackets?
8. How do they believe their peers behave with regards to lifejacket wear?

### 3. Procedure

Interviews with participants lasted approximately 40 minutes on average, although due to the nature of this methodology, they ranged from anywhere between 20 minutes to 75 minutes. The contextual reviews were run from the 21<sup>st</sup> July to 13<sup>th</sup> August 2009, and were typically undertaken in the afternoon, or on Saturday mornings. For seven out of the eight contextual reviews, the weather was fine and warm. Water temperature varied between 16 to 18 °C. A separate report for each review, with collated qualitative data is available upon request.

Two researchers undertook any one contextual review to enable extensive notation of participant responses. Participants were approached around the mooring areas and asked if they would be willing to take part in research on sea safety. Interviews took place on the pontoons (or the banks in harbours without pontoons) or on the interviewee's boat. After completion of the interview, participants were fully debriefed and given the researcher's contact details in the event they had queries or complaints.



Figure 18: Julie on the hunt for participants in Scarborough Harbour



Figure 19: Contextual reviews were undertaken in eight sites, in which participants were questioned around the pontoons and on their boats

#### **4. Analysis methodology**

The data obtained was of a qualitative rather than quantitative nature, except for estimations of survival time in the water. Each comment relevant to the research questions was noted, even when they were not in response to a specific question. Both a qualitative and quantitative analysis was undertaken. Scripts from each participant were read and key themes were collated for each research question. These particular contextual reviews were exploratory in nature, therefore some themes were extracted that had not been directly addressed with the interview questions. In these cases, interpretation of the results should be addressed with caution because a low frequency count does not necessarily mean that the majority of participants disagreed with this response. With this kind of data the assumption should be that participants mention the key elements of a particular topic that are important to them. Assumptions can not necessarily be made about the elements they neglected to mention.

Participant comments were then coded into categorical data to enable comparisons to be made and quantitative data to be extracted. Some of these results are presented in rank order of the frequency with which each theme was mentioned. A frequency count for some items could be misleading for the reasons mentioned above.

### **Findings of pre-intervention contextual reviews**

#### **1. Sample characteristics & lifejacket wear**

A total sample of 68 participants was gained from the eight contextual reviews. The majority of these were males (72.1%), whereas 19 were females (27.9%). The average age of participants was 53 years of age, and

37% wore their lifejackets most of the time. For the purposes of this report, a lifejacket 'wearer' shall be defined as someone who wears their lifejackets most of the time, but not necessarily in the harbour or moored at the bay or pontoons. Non-wearers (or occasional/non-wearers) are those who either do not wear lifejackets at all, or only do when certain conditions demand. Interestingly, the average age of lifejacket wearers (47.7 years, with under 16's excluded) was more than ten years younger than the average for non-wearers (58.4 years). Figure 20 to Figure 22 illustrates some of the variations of lifejacket wear observed while undertaking the contextual reviews.



Figure 20: *Lifejacket wear varied but it was uncommon in the harbours/ marinas, as shown by these sailors in Penzance Harbour*



Figure 21: *There were marked differences in PFD wear according to activity, dinghy sailors were not observed without wearing a buoyancy aid*



Figure 22: Some crew members wore lifejackets while moving out of the marina, while others did not, Chichester Marina

Table 20 (Appendix II) shows that ‘bad weather’ was the most frequently cited type of situation that provokes participants to wear a lifejacket, followed by ‘rough conditions’. Although these may have similar connotations, sea state conditions were separated from weather conditions. This is because several stakeholder interviews revealed that people do not necessarily perceive worsening conditions from a changing sea state, but a lack of sunshine and light rain can influence the perception of ‘rough conditions’ even if it has no effect on sea state. This finding is very much linked to risk perception, the topic of Section 3 (page 47). Wind was most frequently mentioned as a key criterion for bad weather (see Table 21).

## 2. Reasons for non-wear

The reasons why people do not wear lifejackets most of the time were not addressed directly with a question. This is because it was felt that such a direct question would alienate participants and reduce their honesty. Instead comments relating to this theme were drawn from participant’s responses to other questions. This data was ranked in terms of what reasons for non-wear were mentioned most frequently (1st = most frequent). The joint 10<sup>th</sup> place contains reasons that were mentioned equally as frequently (a low frequency) but seemed important reasons for non-wear for the individual participants. This analysis is presented below in Table 9.

Rank	Reasons why people do not wear lifejackets
1st	Do not perceive a substantial threat
2nd	Would only go out in good conditions and would not wear a lifejacket unless conditions got rough
3rd	Lack of confidence in lifejackets to save their lives (may use harnesses instead and careful movement around the boat)
4th	Habit or laziness

Rank	Reasons why people do not wear lifejackets
5th	Because lifejackets are restrictive
6th	They would rather die quickly and have little hope of getting rescued
7th	Do not sail offshore
8th	Because lifejackets are uncomfortable, especially chaffing the neck
9th	The 'on holiday' mentality
Joint 10th	Because they trust the skipper to keep them safe
	Do not do anything on the boat that would risk falling overboard
	Because lifejackets are a hassle to maintain
	Because lifejackets prevent an even suntan
	Because lifejackets are a hassle when changing other clothing (as they always need to be on top)

Table 9: *Reasons why people do not wear lifejackets ranked in order of the frequency with which they were mentioned*

### 3. Risk perception (threat appraisal)

The key findings of particular interest lay within the area of risk perception, or how people view the particular hazards of sailing and whether they consider themselves at risk of harm. Firstly is the question of what people considered to be the key threat while on the water. Table 22 in Appendix II shows that weather (failing to prepare, fog and wind) is a key perceived threat, because it was mentioned by more participants than any other category (n = 21). However this threat was mentioned almost as frequently as other boats (n = 20), in which risks such as reckless skippers, ignorant crew and not being seen were seen to be the greatest threat on the water. Falling overboard was only directly mentioned by 7 participants, in which the boom, drowning and hypothermia were seen as major threats. While man overboard (MOB) situations only ranked 4<sup>th</sup> in the greatest perceived threats on the water, both 'other boats' and 'weather' could result in falling overboard. MOB situations may therefore be recognised as the most prominent risk at sea, although people most often focus on the cause of this phenomenon in their decision making.

Figure 23 shows the diagram of protection motivation theory presented on page 21. Participants were directly questioned around the elements that according to this theory complete their decision-making when making a threat appraisal about falling overboard. These are the severity of an overboard situation, i.e.: 'how long would I survive in the water if I fell in outside of the harbour?', and one's personal vulnerability to it: 'is it a particular risk to me?'

Participants varied in their estimations of survival times if they fell in the water (in current conditions) without a lifejacket. This ranged from 'I would die immediately' to 24 hours. On average participants estimated they would survive for 90 minutes (61 minutes excluding outliers). This may be an

underestimation of the degree of harm that might come from falling into the water. However threat appraisal was also affected by perceived vulnerability. While the majority of participants felt that this threat was applicable to everyone, some felt the likelihood of coming to harm from falling overboard was low (vulnerability). Reasons mentioned here were there was little chance of falling overboard or getting back aboard would be easy due to the design of the boat. Additionally people felt that their training and/or experience would reduce the likelihood of an overboard situation, or protect them from coming to harm if they fell overboard.

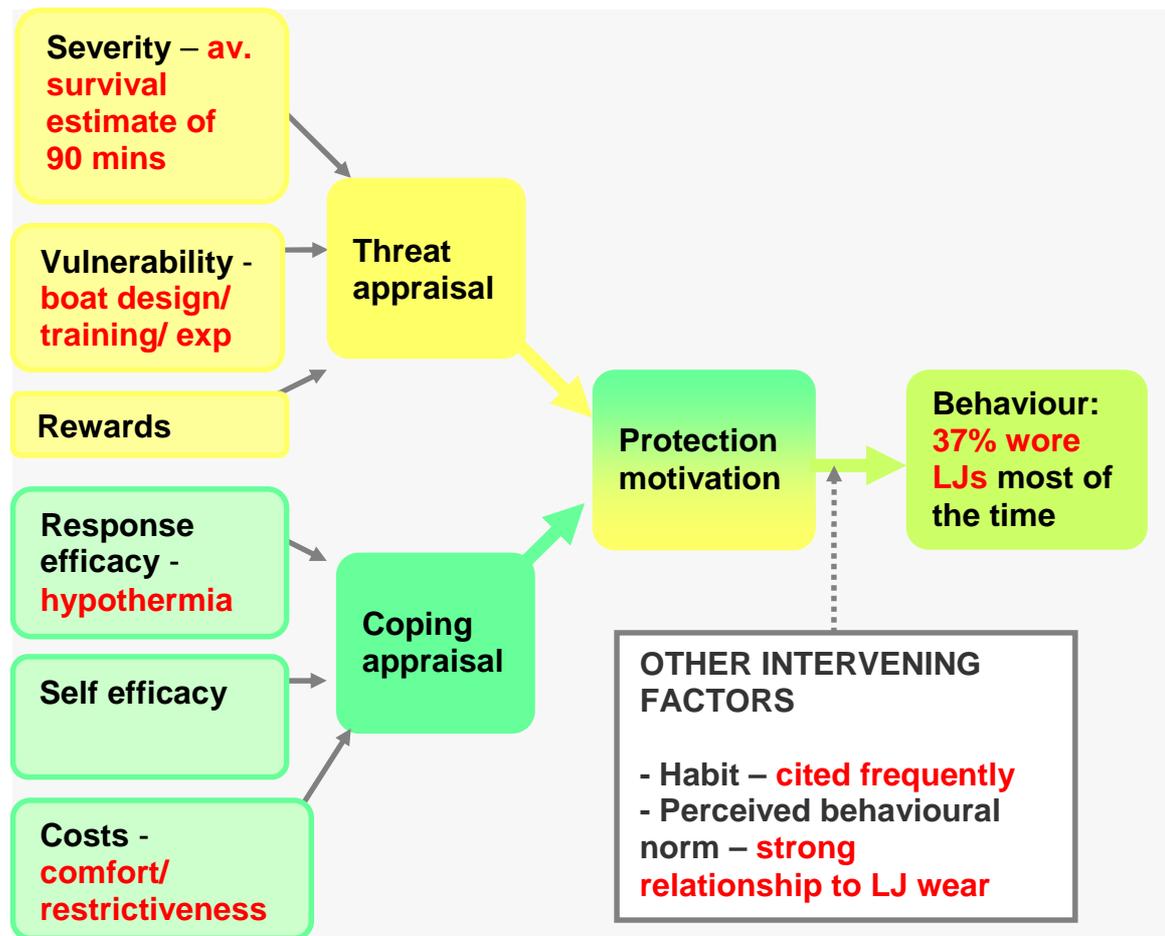


Figure 23: Summary of results relevant to protection motivation theory

The probability of falling in the water from a boat has not been quantitatively assessed within this project but our review data suggest that this is commonly experienced and perceived as low. However, within the PMT model a threat must be perceived or identified before there can be an evaluation of coping options to initiate the coping process. Therefore, a real and serious risk of serious injury/death should be pivotal in communicating a potential threat. No participants directly mentioned an initial physiological shock response, namely cold water shock (CW shock) when considering the threat of falling into the water. Research indicates that short term deaths (less than 30 minutes of immersion, due to either cold water shock or drowning) occur in 2.9% of total accidental immersions or 28.8% of deaths from accidental immersions in UK waters (McCormack, 2008). Indeed predictions of survival

indicate that people have a 90% chance of survival if they have been immersed in 10 °C water for thirty minutes. This chance is higher at higher water temperatures (McCormack et al, 2008). While the probability of death by cold water shock appears to be low, it is a serious threat that lifejackets can protect against (keeping the head above water throughout the gasp reflex).

#### **4. Confidence in lifejackets (response efficacy)**

An issue found in the process of carrying out this review is when people are motivated to protect against threats on the water (protection motivation), they do not necessarily wear a lifejacket to protect themselves. Pleasure boaters appear to use multiple strategies, such as harnesses, avoiding going out in bad weather, and learned behaviours such as 'one hand for the boat and one for yourself'. If participants felt that falling overboard was a serious threat, they did not necessarily wear a lifejacket to protect themselves if they believed another safety behaviour was more effective. In some cases participants felt lifejackets were unable to protect them from the 'real' threat they perceived from falling overboard: hypothermia. Lifejackets could not protect them from the cold (response efficacy) and so they adopted other behaviours to avoid falling overboard. This implies that people do not understand what lifejackets can protect them from: cold water shock, and how hypothermia typically does not threaten survival for 5 hours in water temperatures of 15°C (McCormack, 2008).

#### **5. Rewards & self efficacy**

According to protection motivation theory, the following can undermine the initiation of a 'protection motivation' state:

- High intrinsic/extrinsic rewards for not wearing a lifejacket (comfort, peer acceptance, effort, thrill-seeking);
- Low self-efficacy (perceived ability) in being able to choose, wear and maintain a lifejacket correctly;
- High costs (costs in money, time, comfort or effort).

There were no clear themes of participants feeling that there were rewards for not wearing a lifejacket. Peer acceptance was not mentioned as a theme even though what other people are perceived to do (perceived behavioural norm) shows the expected pattern with lifejacket wear (see below). Self-efficacy also did not appear to contribute to lifejacket wear, as participants generally claimed that they had no issue with choosing, fitting and maintaining their lifejackets.

#### **6. Costs**

Discomfort and restricting movement were the two most often mentioned types of costs of wearing a lifejacket (n = 7; see Table 23, Appendix II). However participants who claimed lifejackets were uncomfortable were outnumbered by those who said they were *not* uncomfortable (n = 19).

## 7. Other intervening factors

Habit was mentioned several times when people acknowledged that they should wear a lifejacket, but chose not to. Research indicates that intervening in this situation is difficult because behaviour is not driven by logical decision-making but by patterns of established behaviour. Habit was not a core theme however, it was only mentioned by seven people as a reason for not wearing a lifejacket. In contrast perceiving the threat to be relatively insignificant was a more predominant reason for failing to wear a lifejacket (see Table 9). This is encouraging because misperceptions can be more easily tackled with a brief intervention than habit.

Perceived behavioural norm appears to show a strong relationship to lifejacket wear (see Figure 24). Perceived behavioural norm is one's perception of what similar others tend to do in an analogous situation, similar others for example could be yachties of a similar age, who moor at the same marina. As the graph below shows, this perception has a pattern with lifejacket wear. Most people who wore a lifejacket all the time perceived there to be a high degree of lifejacket wear in the area (12 participants), while less participants felt that there was a medium (3) or low (2) amount. The opposite is true for people who do not tend to wear lifejackets, for them, most people thought the degree of lifejacket wear in the area was low (14 participants) or medium (13), whereas only two participants believed lifejacket use to be high. According to the Theory of Planned Behaviour (Ajzen, 1985), perceived behavioural norm influences intention, which influences behaviour. This indicates participants who believe similar others do not wear lifejackets do not feel a strong intention to wear a lifejacket, which is likely to be reflected in their behaviour.

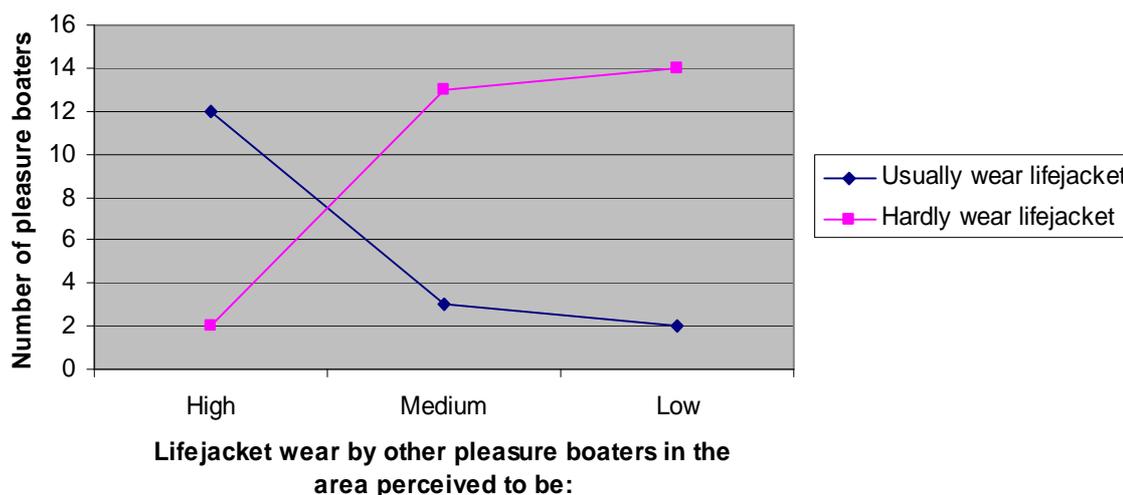


Figure 24: Perceived levels of lifejacket wear (high, medium and low) in the local area by participants who usually wear a lifejacket (wearers) and those who hardly wear one (non-wearers)

## 8. Other findings

- The vast majority of MOB incidents that were described occurred in mooring areas around marinas or harbours.
- There was no clear difference between motorboats versus sailing yachts, but many anecdotes of reckless motor-boaters were recounted.



- The European standard buoyancy symbols did not fare well in this research. There was a low rate of recognition, meaning that most people had not seen them before. Additionally when people tried to interpret them they believed they symbolised distance from the coast.
- The use of these symbols (if improved so they require minimal interpretation) would be for more effective if they were displayed consistently. By way of example, the relevant symbol should appear on every lifejacket.

Figure 25: *The European Standard Buoyancy symbols tested with participants*

## Summary of findings

- Lifejacket wear is social - associated with what similar others are perceived to wear.
- A lack of confidence in lifejackets to save life was often accompanied by believing hypothermia would kill in a MOB situation.
- Overestimation of the length of time people would survive in the water was common.
- People were largely unaware of cold water shock and the effects of cold water on their muscles, i.e.: swimming failure.
- Certainly no one mentioned the following stages of immersion when making their survival estimates:
  - Stage 1 Cold shock (3–5 minutes)
  - Stage 2 Swimming failure (3-30 minutes)
  - Stage 3: Hypothermia (after 30 minutes)
  - Stage 4: Post rescue collapse (during or hours after rescue).

- People protected themselves against the main threats they perceived, for example if they were most concerned about engine failure they protected themselves by carrying a spare engine, as would be predicted by protection motivation theory.
- Participants estimated an average survival time of 60 minutes in the water, and the main concern with accidental immersion was hypothermia. Lifejackets can not protect against the threat of hypothermia (although they may protect from drowning in the moderate phase).
- It stands to reason that if people recognised the threat of initial accidental immersion (Stages 1 and 2), and were aware of how lifejackets could protect against cold water shock and swimming failure, they would feel a greater need to wear lifejackets.

In short, the main barriers to lifejacket wear appear to be a lack of appreciation of the threat posed by the water. For some participants a lack of understanding about how lifejackets can protect them was also a pivotal barrier. Costs of wearing a lifejacket, rewards for not wearing a lifejacket and confidence in being able to wear a suitable and maintained lifejacket do not seem to be problematic. There is therefore a clear need to address the lack of knowledge about cold water shock and use it as a lever to encourage behavioural change in lifejacket wear. The MCA are currently using film to educate people about the initial stages of accidental immersion. There appears therefore to be wide agreement that maritime users require more information on this topic. Four frames of the MCA's film are shown below.

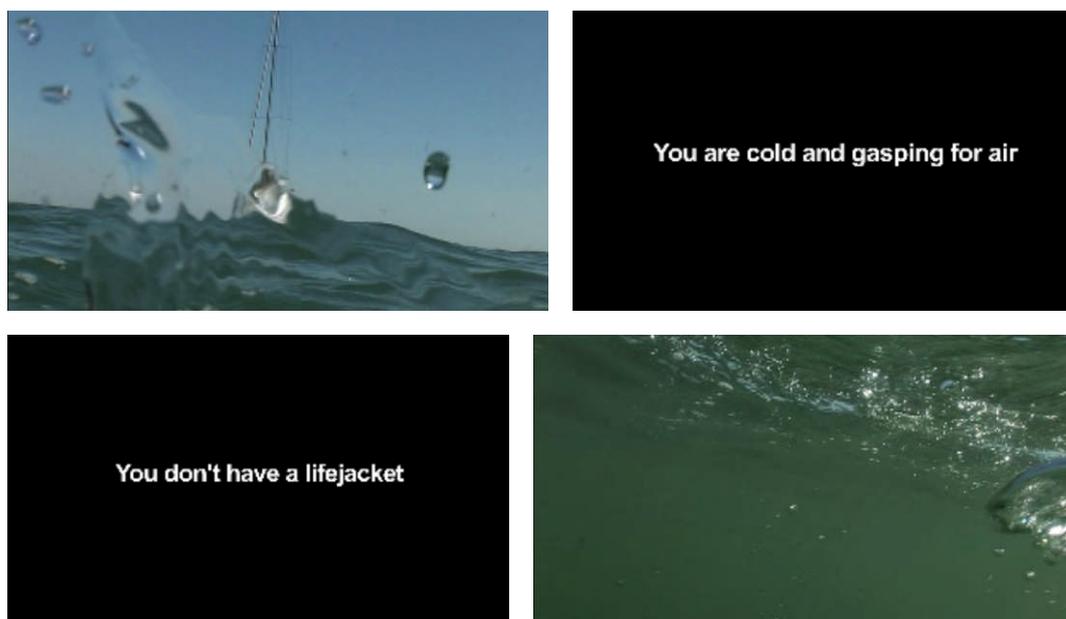


Figure 26: Four frames of the MCA's short film communicating specific aspects of cold water shock as part of the lifejacket campaign

## Objective 3: Translating knowledge to action – communicating safety

This section shall address the issue of how the results from Objective 2 were conceptualised into an intervention to enhance lifejacket wear. In sum, the threat (cold water shock/drowning) and a lifejacket's ability to deal with that threat need to be enhanced as much as possible. .

### 1. The shape of the intervention

#### The three E's

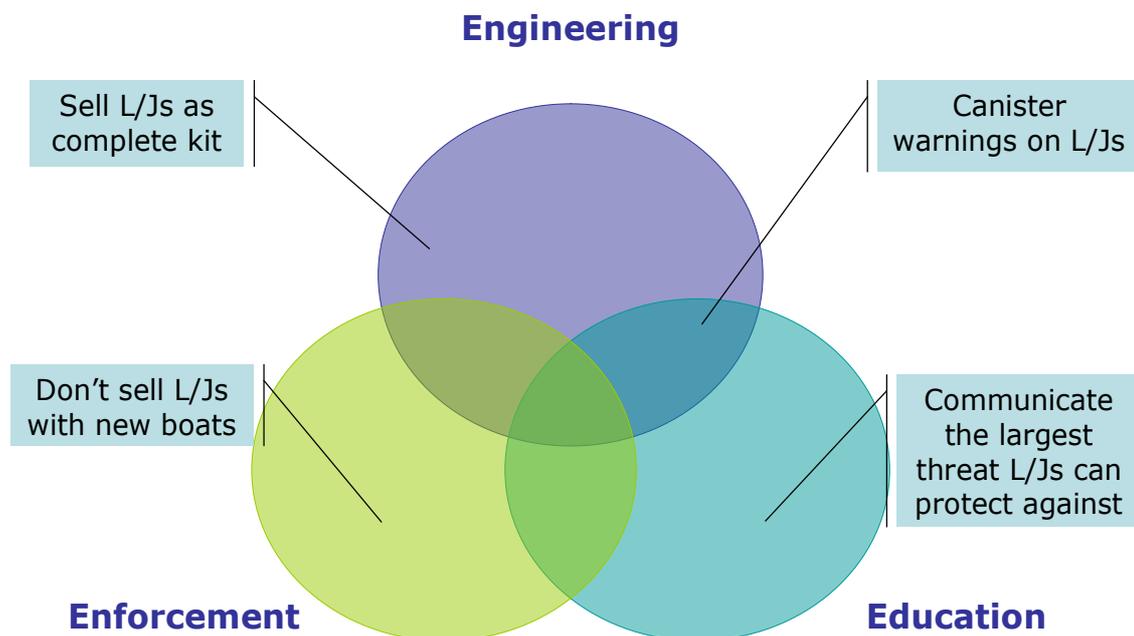


Figure 27: *The three types of intervention - Engineering, Education and Enforcement*

The core finding from the previous section is that people do not believe there is a high risk of falling into the water. If they do, they do not necessarily view it as a threat because many expect they could climb out easily or survive for a long time. This indicates a lack of awareness about the initial phases of cold water immersion, especially cold water shock. As this is essentially a lack of knowledge, the best way to intervene is with an educational intervention.

Forcing people to wear lifejackets (enforcement) would not address the issue of educating them about what lifejackets can do to protect against the initial stages of cold water immersion. Additionally enforcement is a politically unpopular solution as illustrated by Figure 28. An engineering solution could have been effective to increase lifejacket wear if more participants had claimed they are cumbersome or uncomfortable. However, several different types of intervention could be applied to increase safety on the water – such as using a mix of education and engineering to put canister warning labels on lifejackets. Many automatic lifejackets are sold without the canister screwed

in properly which could reduce their effectiveness. The enforcement intervention of selling lifejackets with new boats should not be attempted because the act of selecting a lifejacket also leads to knowledge about how they should be fitted and maintained according to the contextual reviews. Finally, an engineering solution of selling lifejackets as complete kit (with crotch straps and spray hood) will go some way to ensuring they are effective in keeping people afloat with their airways clear of water in rough conditions. Selling lifejackets without these accessories gives the impression that they are unnecessary and lifejackets will be effective without them. All of these different types of intervention are summarised in Figure 27.

### **Education**

The results from the contextual reviews suggest that the most effective intervention to meet the findings is educational. The aim of this education will be two-fold: to enhance perception of risk (water survival) & provide evidence of how lifejackets can mitigate the risk. Research indicates that fear appeals are particularly effective in increasing risk perception. In a meta-analytic review, Witte & Allen (2000) found that fear appeals result in the perception that the threat is severe and that the individual is considerably likely to fall foul of the threat (high susceptibility). If people are also led to believe that a safety behaviour is effective in reducing the threat, this research indicates that take-up of that safety behaviour is highest. Using a fear appeal about cold water shock would therefore be an effective way to enhance lifejacket wear according to this research. If however, we successfully communicate the threat of cold water shock and do not emphasise how lifejackets can mitigate this threat, people tend to react by ignoring the message (Witte & Allen).

### **How the message needs to be communicated**

This message needed to target the specific recreational maritime audience who are educated and intelligent. Many of them are expert sailors. This means that the message needed to communicate facts in a simple way as this audience is likely to argue with supposition. The essential aims of the message were for it to enhance perception of risk about cold water shock and provide evidence of how lifejackets can mitigate the risk. As mentioned previously, lifejackets are particularly protective of the gasp reflex involved with cold water shock as they keep the airways higher above water. Within the confines of this research, the gasp reflex is best conveyed with imagery (audio was not feasible).



Figure 28: 'Sailing is the last bastion of freedom' as illustrated by this boat in Chichester Marina

## 2. The science of warnings & warning design

Warnings have two key roles; firstly to grab our attention and secondly to deliver the right information so that the user can complete the appropriate cost / benefit analysis and make the decision to comply with the warning. In its broadest sense the warning is an attempt to influence behaviour.

Warnings are representations of risk, so a symbol such as Figure 29 is a general, universal warning that there is some risk ahead. At this stage the symbol is simply alerting us to something but the observer does not know what the risk is or what action might need to be taken.



Figure 29: A universal general warning symbol



Figure 30: A symbolic warning, alerting to the particular danger where no words are needed

Once the risk has alerted of possible danger, the warning will need to inform of what that danger is. Informing the observer can take many forms:

- Symbolic, where no words are needed (see Figure 30),
- Or more explicit where additional specific information is required in order to inform decision making and the actions required (Figure 31).



Figure 31: A symbolic warning using words to communicate the danger and the actions needed to avoid the danger

Warnings need to be seen, read, understood and encoded (remembered at the right time). There is a great deal of knowledge in the past fifty years of research into the science of warnings which can help a warning achieve these four aspects. When designing a warning to be seen, read, understood and encoded it is important to focus on:

- the type of text used.
- the size and shape of the warning,
- the location,
- the use of colour versus monochrome,
- the use of borders, shape and icons,
- the type and style of language used.

Each of these can influence whether a warning is noticed and complied with.

However, there is a key issue with warning compliance. Accidents are generally rare, random events and in daily life few of us encounter someone who has suffered either minor or serious injuries through ignoring a warning instruction. This is a crucial aspect within warning research: however effectively the warning has been designed, people do not always comply, generally because they do not believe that the benefits are outweighed by the cost of compliance. Humans assess their environments using previous knowledge, and cues from the product, situation or warning sign itself. Other influences include personal bias, fatigue, alcohol and the behaviour of those we are with. It is these individual, complex personal assessments which affect compliance.

Such cost / benefit behavioural issues need to be considered. A warning based intervention can be designed, based on previous scientific research as outlined above. However the message that needs to be conveyed to encourage effective lifejacket wear is complex. Not only must a pleasure boater wear a lifejacket to protect themselves against cold water shock, but they must select the right lifejacket for their activity, use crotch straps and if sailing far offshore a spray hood. Additionally a lifejacket has to be regularly serviced to ensure it is still effective. Cold water shock is also not a simple hazard to convey, especially as the message needs to combat the misconceptions that swimming ability can ameliorate the risk of mortality and that hypothermia is the most imminent danger. In short, effective use of lifejackets and the danger posed by cold water shock are not simple messages. For this reason, the intervention will feature a visual section designed to grab attention and communicate the key aspects of these messages in addition to an education section which goes into greater detail.

### **Summary – warnings research**

- Warnings have two functions: to grab attention and to give information to aid decision-making.
- Text should feature: simple language, be in an easy font to read and there should be as little text as possible
- Colour: **red** conveys most danger, followed by **orange** and **yellow**.
- Imagery: pictures are encoded more quickly than words.

### 3. Current safety messages in view of warning design

The next section will review two examples of current lifejacket wear campaign messages from the context of warning design research to further illustrate how these principles can be applied.

**LIFEJACKET ADVERTORIAL**

## Why wouldn't you wear one?

**MCA**  
Maritime and Coastguard Agency

**R**egardless of whether you're an experienced skipper or a passenger along for the ride, the Maritime and Coastguard Agency (MCA) wants you to wear a lifejacket when you take to the water.

The MCA's chief executive, Peter Cardy, is a keen boater who always makes sure that he wears his lifejacket. Peter says, "Lifejackets are lifesavers. No-one intends to end up in the water, but as we all know, accidents can and do happen. Good training and common sense help, but the facts are that several boaters' lives could be saved every year if they wore a correctly fitting, well maintained lifejacket."

The MCA has joined forces with the RYA and the RNLI to reinforce the message that **lifejackets are useless unless worn.**

Statistics from actual incidents show that the probability of long-term survival is more than doubled when a lifejacket is worn.

While people are beginning to get the message that a good lifejacket can make the difference between life and death, they often do not appreciate the many ways a lifejacket can aid the wearer. Here are just some of the benefits:

- A lifejacket helps to prevent drowning by keeping the airways clear of the water during the dangerous first minutes of immersion, when 'cold shock' and involuntary gasping are at their worst.
- A lifejacket prevents exhaustion by letting you rest rather than having to swim to stay afloat.
- Crotch straps will prevent you from slipping through your lifejacket when you start to weaken.
- A sprayhood will help prevent drowning by protecting the airway.

if you become unconscious through hypothermia.

- A luminous lifejacket with a light, whistle and reflective tape will make you identifiable in the water.
- A lifting strop will help rescuers get you out of the water.
- A lifejacket will give you confidence, significantly extend your survival time and increase your will to survive. So why wouldn't you wear one?

Remember that lifejackets are lifesaving devices and should be inspected before and after use, as well as serviced annually.

Further advice is available from [www.mcga.gov.uk/c4mca/lifejackets](http://www.mcga.gov.uk/c4mca/lifejackets)

Equally important as wearing a lifejacket is selecting the right product. Look for the 'Wheelmark' and the 'Kitemark', which indicate a quality product, and purchase lifejackets from a reputable source.

**mbmclub.com August 09 75**

Figure 32: MCA lifejacket editorial from *Motorboats Monthly*, August 2009

Will this advert be seen, read, understood and encoded (remembered at the right time), as warning science demands it should?

1. Seen:
  - a. This depends where it is placed on the page of the magazine although the amount of text may detract attention.
  - b. The use of red as a major colour should enhance how much the advert is seen, because red is innately perceived to be a warning signal.
2. Read:
  - a. There is too much text here to encourage people to read the advert. Explicitness and simplicity are essential. This amount of text will actually make people disinclined to read it.
  - b. The question 'Why wouldn't you wear one?' invites many responses (as observed in on-line forums, see page 37), many people have their own views on whether lifejackets are important or not.
3. Understood:
  - a. The picture is not particularly representative of the message. It is not informing, it does not let the viewer immediately know what they should be looking at.

- b. This advert targets families through the image, although research indicates that men aged 40 and above who are aboard their vessels without their family are less likely to be wearing a lifejacket.
  - c. The heading 'LIFEJACKET ADVERTORIAL' immediately indicates to a reader that it is not a warning.
4. Encoded.
- a. The likelihood that the message will be remembered at the right time, i.e.: when setting out to sea, is low because the message is unlikely to go through the initial stages of being 'seen' and 'read' for most readers.

Figure 33: RNLI safety message, with participant arguments about oversimplification

The safety message above fulfils many of the requirements of warning design:

- It is simply put and easy to see. In terms of text type this is fairly clear. However Verdana and Sans Serif are the most effective because they can be read from the greatest distance and are the easiest to encode in comparison to other fonts.
- The use of red is excellent in emphasising the key simple message and communicating danger.
- The use of a single symbol, the lifejacket, is likely to facilitate a purely visual communication of the message (rather than verbal). According to warning design research this will enable the message to be understood more quickly even for readers whose first

language is English. However, this may be a more effective image if the lifejacket is worn by a person or a human silhouette, to add some context and emphasise the ‘put me on’ message.

- The big issue is: is the message trusted. The blue boxes in Figure 33 represent aspects of this safety message that were questioned by participants when this was shown at Port Hamble Marina. For example: a safety line made people feel more safe than a lifejacket; a lifejacket can not protect from hypothermia; it is not simply enough to just put a lifejacket on – it must be worn properly and maintained, and the right buoyancy level must be selected.

#### 4. Context of safety communications

There were two options for spreading the safety message: through leaflets dispensed by direct mail shots to marina/ harbour berth-holders, or by a poster placed around marinas and harbours. The former was rejected because of data protection issues (obtaining berth-holder contact details), and because a self-report questionnaire would have been the only viable evaluation methodology. Placing posters around marinas enabled a contextual review to be carried out which was considered advantageous for several reasons. The response rate would be higher, the complexity of decision making around lifejacket wear could be captured and responses could be probed. Additionally it enabled the results from the pre-intervention contextual reviews to be compared to the post-intervention contextual reviews.

The issue with this form of delivery is the volume of safety communications that are already displayed at the marinas and harbours visited in the research for Objective 2. The issue here was ensuring that the safety posters would be seen in the environmental context. As these photographs show, this was expected to be quite a challenge.



Figure 34: Warning communications at Woolverstone Marina and Mounts Bay, Marazion



Figure 35: Weather conditions display (Woolverstone) & safety communication on the pontoons at (Chichester)



Figure 36: A notice board displaying non-urgent communications, Falmouth Marina

### Design of intervention: safety message

The Protection Motivation model is shown in Figure 37, in context of the See-Decide-Act model of warning communications. The message aims to influence boat users to ACT, i.e. to use an adaptive coping response by

wearing a lifejacket. Within the model the poster fits within the ‘environmental information’ component as a form of persuasion. The aim is to enhance threat appraisal of cold water shock and the degree to which lifejackets protect against it (coping appraisal). Factors that impact on the intrapersonal component can not be directly assessed although their influence should be acknowledged. By way of example, someone who has a risk or sensation-seeking personality is unlikely to feel the need to protect themselves from cold water shock. This is because risky situations are actually rewarding for these individuals and they purposefully seek them out.

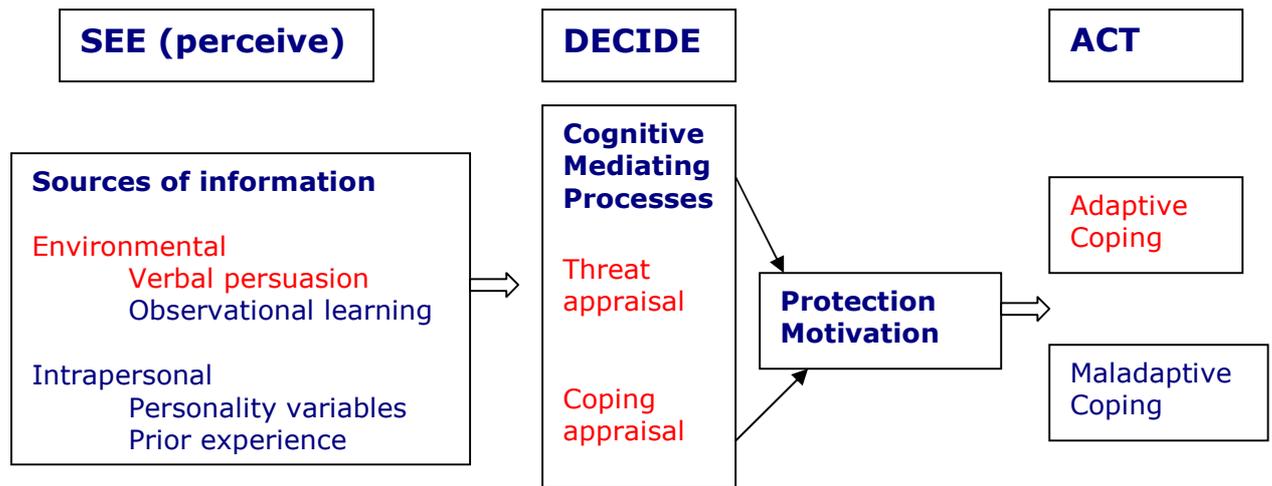


Figure 37: Protection motivation model in combination with the See-Decide-Act model of warnings communications

The final poster design is shown in Figure 39 with justifications for the broad features. The way in which lifejackets protect the wearer from the gasp reflex (keeping airways clear of water) was deemed to be particularly immediate and understandable. The gasp reflex aspect of cold water shock was therefore selected to be the key focus of the poster. The literature on the science of warnings clearly indicates that an effective image will transmit a concept to a reader more quickly than words and of course transcends language barriers. A photographic image was selected above a conventional or Pop Art style iconic image (see Figure 38), because it was expected to afford greater personal relevance. The subtitle ‘Wear a lifejacket’ was originally designed to provide a succinct instruction on how to avoid the hazard that could be read from a distance. However it was felt that such a directive message would be ignored and reduce the reader’s engagement with the poster because of the volume of prior communications which have taken this directive stance. This subtitle was replaced with ‘Cold water shock kills’ (see Figure 39), which was aiming to clarify the severity of the threat.

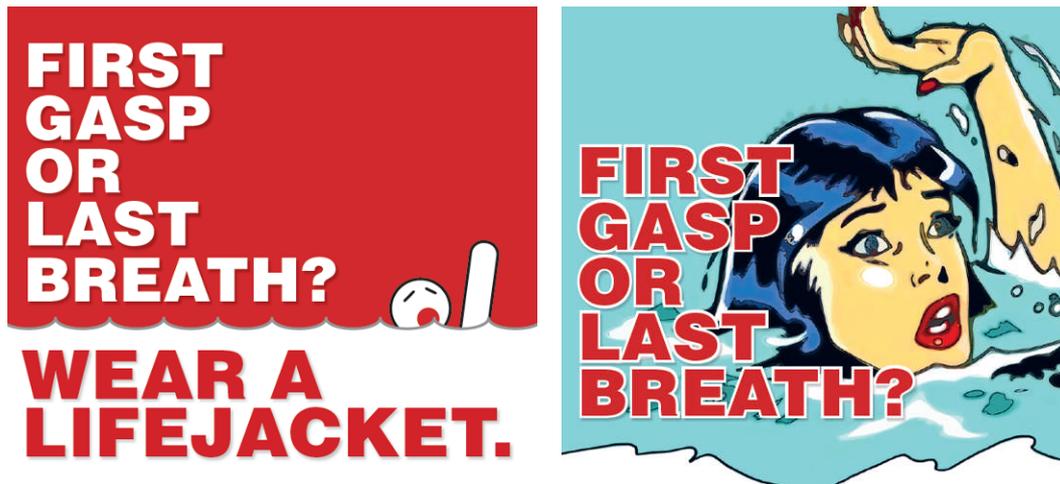


Figure 38: Alternative poster designs with simple icon & Pop Art style images

The use of red in the final design is intended to convey urgency. The short phrases aim to grab attention and provide clarification on what is happening to the person in the photographic image. The ‘facts’ title was added to ensure readers would accept the information as facts rather than supposition. Providing an evidence-based argument was expected to be important when communicating with this group. Finally the icon image intends to show how a lifejacket raises the wearer’s position in the water. The poster is therefore intended to convey the key messages with a few words and two images so it can be read from a distance. However an information section was deemed necessary to clearly represent the complexity of the message (see Figure 40).

**FIRST GASP OR LAST BREATH**

**COLD WATER SHOCK KILLS**

**FACTS:**

- Falling into water will result in a **gasp reflex: uncontrolled breathing and panic.**
- One gasp of water could **kill you in seconds.**
- UK waters are cold enough to cause cold shock and being a strong swimmer will not save you.**
- A **lifejacket keeps your head safely above water** – ensuring you gasp **air.**
- Wear your lifejacket **correctly** – **make sure your first gasp is not your last.**

**USELESS UNLESS WORN**

[uselessunlessworn.org.uk](http://uselessunlessworn.org.uk)

This is part of a research project by:  
User Perspective Ltd

Short phrase to convey gasp reflex & to gain attention – aiming to direct reader to info section

Short phrase to convey the threat of CW shock

‘Facts’ header designed to assure the reader info is evidence-backed

Info section educates about:  
1. CW shock,  
2: L/J efficacy

Photographic image to convey gasping water & personal threat

Red font to convey urgency

Icon to convey raised position in water with L/J

Figure 39: The final safety poster design with explanations for specific features

## **FACTS:**

- **Falling into water will result in a gasp reflex: uncontrolled breathing and panic.**
- **One gasp of water could kill you in seconds.**
- **UK waters are cold enough to cause cold shock and being a strong swimmer will not save you.**
- **A lifejacket keeps your head safely above water – ensuring you gasp air.**
- **Wear your lifejacket correctly – make sure your first gasp is not your last.**

Figure 40: *The final education section of the poster*

The education section of the poster is featured in Figure 40. The aim of this section was to give as much information as possible about a key aspect of cold water shock that lifejackets can protect against: the gasp reflex. Arguments against the potential for cold water shock, such as UK waters are not cold enough to cause it, and being able to avoid it with strong swimming abilities are intentionally targeted. The key messages are emphasised in bold. The last two bullets aim to describe how lifejackets help to protect against cold water shock if they are worn correctly. These are emboldened with red, again to enhance perception of urgency and to visually separate this section from the initial three bullets which purely inform on the dangers of cold water shock. The final poster is featured in Appendix III.

## **Objective 4: Develop and test these theories against target audiences**

This section of this report describes the testing of the intervention designed for Objective 3, which took into account the research undertaken for Objectives 1 and 2. A thorough investigation of reactions to the intervention was judged to be essential for ethical reasons and to enable evidence-based recommendations for future lifejacket campaigns.

### **Methodology**

#### **1. Contextual reviews of eight sites**

Contextual reviews were undertaken at eight sites in order to investigate the efficacy of the safety poster. As mentioned on page 40, this was favoured as a methodology because being conducted in situ aids memory retrieval, thereby resulting in more accurate data. This method also enabled participants to be questioned with a copy of the poster to hand and their responses to be probed. Again this type of methodology was regarded to be essential in order to capture the depth of decision-making underpinning threat perception, confidence in lifejackets and safety behaviour. Other options for investigating the efficacy of the safety message involved self-report questionnaires. These would have been conducted over the internet following the posting of the safety message on the Premier Marinas website. Or alternatively the testing could have been undertaken by directly mailing marina berth-holders with the safety message and a freepost paper-based version. These methods were not selected because the response rate was expected to be low, resulting in a small and potentially biased sample (i.e. those particularly conscientious about maritime safety) and for the reasons stated above. Additionally, conducting a second set of contextual reviews enabled comparisons to be made with the pre-intervention contextual reviews where the same locations were revisited.

Six of the same locations for the pre-intervention contextual reviews were revisited: Scarborough Harbour, Chichester Marina, Port Hamble Marina, Port Solent Marina, Southsea Marina and Woolverstone Marina. Falmouth Marina and Penzance Harbour-Marazion Bay were not revisited because a paucity of available participants were found in these locations considering they were reviewed on a Friday and Saturday during the summer holidays. Instead Whitby Harbour and Brighton Marina were visited for the post-intervention contextual reviews. Whitby Harbour was selected upon the basis of recommendation from the Scarborough Harbour Master, while Brighton Marina was expected to provide a good sample due to the volume and variety of the pleasure boaters mooring there.

#### **2. Measures**

There were six key research areas, most of which were drawn from the theoretical model and the results from the pre-intervention contextual reviews. The purpose of using a theoretical model to structure the research questions

is to aid interpretation of results. With cross-sectional data (where questions are asked of a participant at one time, rather than at two different points in time) it can be difficult to ascertain which variable influences another. By way of example, protection motivation theory predicts that if a person feels they are particularly vulnerable to suffering cold water shock, they will be more likely to wear a lifejacket to protect themselves. Without this theory underpinning the findings, the opposite could be argued with equal feasibility: if a person always wears a lifejacket it causes them to justify the behaviour by developing particular supportive attitudes. In this case it would not be effective to alter perceptions of susceptibility because these are the result of, rather than the cause of lifejacket wear. The following bullets refer to research questions following from protection motivation theory and the See-Decide-Act model.

- Current lifejacket wear - addressed to determine the participant's current behaviour, so links with attitudinal measures can be made, and so current and intended lifejacket wear can be compared to establish a measure of behavioural change (see ACT below).
- SEE – the degree to which participants saw the poster, i.e. the amount of attention it attracts, and what location the poster was seen in. If the poster had failed to be seen it would have fallen at the first hurdle of communicating safety according to the See-Decide-Act model.
- DECIDE
  - Understand – a key aspect of measuring the poster's efficacy is whether it has been understood. Ideally this would be measured with a comprehension test. This of course would have the potential to annoy and alienate participants in this context. Therefore participants were asked to talk around what information they had picked up from the poster and their prior knowledge of cold water shock. Comments from multiple questions tended to inform the judgment of whether participants had understood the message or not.
  - Threat appraisal – how people perceive the threat of cold water shock and how the poster has helped to provide information to aid with the decision to protect themselves from it. Several questions were asked such as:
    - Perception of vulnerability to cold water shock,
    - Estimations of survival times in local waters with & without a lifejacket (thereby looking at the severity of the threat),
    - Whether elements of threat appraisal have changed with knowledge of cold water shock.
  - Coping appraisal – how people view the efficacy of lifejackets in dealing with the threat of cold water shock. This was addressed with two direct questions. Additionally the extent to which a lifejacket is perceived to improve survival time in the water is also a measure of lifejacket confidence. Self-efficacy, or confidence in being able to use a lifejacket effectively was not measured as the results from the pre-

intervention reviews indicate that this is not a substantial problem for recreational maritime users.

- ACT – intended lifejacket behaviour was measured in terms of whether participants planned to wear a lifejacket more often, choose a more buoyant lifejacket, buy crotch straps, do maintenance checks more regularly, etc. Additionally a question aimed at understanding whether they would search out other information was asked to determine if they were planning to undertake behaviours to initiate behaviour change (Initiation, see Table 8, page 42).

The final range of questions asked of participants is featured in Appendix IV.

### 3. Procedure

Contextual reviews were undertaken from the 26<sup>th</sup> September to 25<sup>th</sup> October 2009. Interviews lasted approximately 25 minutes on average, ranging between 15 to 45 minutes. Every effort was made to undertake these reviews at times where the biggest pool of participants would be available. Five reviews therefore took place between Friday and Sunday afternoon, one was undertaken during a sailing regatta, and all were planned to take place in good weather wherever possible.

A3 posters (and if space demanded A4 posters) were placed in the following areas in most sites subject to permission from Marina Managers and Harbour Masters: on pontoon gates and posts, on restaurant entrances, on general notice boards and in berth-holder toilets. Posters were mounted before the commencement of the contextual reviews, the time range for this varied within 1.5 days to one hour before participants were interviewed. Posters were then taken down unless at the specific request of the Marina Manager following completion of the review. The following images illustrate the variety of places in which posters were mounted.





Figure 41: A selection of the locations in which posters were placed

Participants were approached around the mooring areas and asked if they would be willing to take part in research on sea safety. Interviews took place either on the pontoons or on the interviewee's boat if the researchers were invited aboard. Participants were shown an A4 copy of the poster during each interview, and the concept of cold water shock was explained to them if they had little prior knowledge of it. This explanation only took place after assessing understanding of the poster. After completion of the interview, participants were fully debriefed and given the contact details of one of the researchers in the event they had queries or complaints.

#### 4. Analysis methodology

The data obtained was of a qualitative rather than quantitative nature, except for estimations of survival time in the water. Each comment relevant to the research questions was noted, even when they were not in response to a specific question. Participant comments were directly entered under the specific question they related to in an Excel spreadsheet, thereby being organised into their relevant themes. These were then coded into categorical data to enable comparisons to be made and quantitative data to be extracted.

Coding was categorised blind by two analysts, and general agreement between categories was achieved. The post-intervention contextual reviews featured a more structured interview format than the pre-intervention contextual review. Therefore frequencies can be directly compared with greater confidence. The majority of the results present the frequency of a category of response, rather the rank of each category.

## Results

### 1. Sample characteristics & lifejacket wear

Site	Sample				Type of vessel			Lifejacket wear	
	Total	Male	Female	Av. age	Sailing yacht	Power-boat	Other	Non-wearer *	Wearer *
Chichester	16	11	5	54.7	12	4	0	31.3%	68.7%
Port Hamble	10	7	3	38.1	6	0	4	100.0%	0.0%
Port Solent	14	12	2	35.9	1	1	6	57.1%	42.9%
Southsea	13	10	3	48.6	8	4	1	61.5%	38.5%
Woolverstone	15	8	7	51.3	12	3	0	53.3%	46.7%
Scarborough	6	6	0	52.0	4	2	0	33.3%	66.7%
Whitby	5	3	2	67.5	3	2	0	60.0%	40.0%
Brighton	7	5	2	69.5	1	6	0	57.1%	42.9%
<b>TOTALS</b>	<b>86</b>	<b>62</b>	<b>24</b>	<b>52.2</b>	<b>47</b>	<b>22</b>	<b>11</b>	<b>56.70%</b>	<b>43.30%</b>

Table 10: Sex, average age, type of vessel and percentage of lifejacket wear by sites visited

\*Non-wearer indicates someone who would never wear a lifejacket or does on occasion, wearer indicates someone who wears a lifejacket most of the time, but generally not when moored

A total sample of 86 participants was gained from the eight post-intervention contextual reviews. The majority of these were males (72.1%), whereas 24 were females (27.9%). Interestingly this is exactly the same male to female ratio as was found in the pre-intervention test. The average age of participants was also very similar: 52.2 years of age (compared to an average of 53 years in the pre-intervention test. There was not a ten year age gap between wearers and non-wearers in this sample, on average non-wearers (46 years of age) were five years younger than wearers (51 years). The reverse was found in the pre-intervention contextual reviews. Slightly more people claimed to wear their lifejackets most of the time in this sample, with a percentage of 43% in comparison to 37%. Table 11 displays lifejacket wear in each site visited for both tests. This can be used for comparative purposes where sites were visited twice.

Site	Lifejacket wear pre-intervention review		Lifejacket wear post-intervention review		Combined lifejacket wear		
	Non-wearer	Wearer	Non-wearer	Wearer	Total sample	Non-wearer	Wearer
Chichester	69.2%	30.8%	31.3%	68.7%	29	50.3%	49.7%
Port Hamble	100.0%	0%	100.0%	0.0%	15	100.0%	0.0%
Port Solent	22.2%	77.8%	57.1%	42.9%	23	39.7%	60.3%
Southsea	70.0%	30.0%	61.5%	38.5%	23	65.8%	34.2%
Woolverstone	37.5%	62.5%	53.3%	46.7%	23	45.4%	54.6%
Scarborough	69.2%	30.8%	33.3%	66.7%	19	51.25%	48.75%
Falmouth	100.0%	0.0%	-	-	5	100.0%	0.0%
Penzance	33.3%	66.6%	-	-	6	33.3%	66.6%
Whitby	-	-	60.0%	40.0%	5	60.0%	40.0%
Brighton	-	-	57.1%	42.9%	7	57.1%	42.9%
<b>AVERAGE</b>	<b>62.7%</b>	<b>49.8%</b>	<b>56.7%</b>	<b>43.3%</b>	<b>155</b>	<b>60.3%</b>	<b>49.7%</b>

Table 11: *Lifejacket wear for each site for both pre & post interventions, with combined average wear rates*

Table 11 emphasises how the sample differed in terms of lifejacket wear when the site was visited twice. Only Port Solent reliably appears to be an area where lifejacket wear is extremely low.

Site	Survival Times (minutes)			
	(A) No LJ Post intervention	(B) No LJ Pre intervention	(C) With LJ Post intervention	(D) Factor LJ improves survival
Chichester	35.5	N/A	72.7	2.7
Port Hamble	49.3	N/A	126.3	3.0
Port Solent	30.3	23.3	223.0	5.1
Southsea	69.6	60.0	185.8	3.6
Woolverstone	56.8	136.7	136.8	3.6
Scarborough	21.7	36.6	37.5	19.0
Whitby	6.7	N/A	71.7	8.5
Brighton	16.6	N/A	140.0	15.1
<b>AVERAGE</b>	<b>35.8</b>	<b>64.2 (61)</b>	<b>124.2</b>	<b>7.6</b>

Table 12: *Survival time estimations with a lifejacket (LJ), for pre and post contextual reviews, estimations with no LJ and the factor by which a LJ improves survival*

\* *Outliers extracted where very high survival times skewed the average*

Table 12 shows the average estimations of survival times at each site for the post-contextual reviews. Participants were asked to make these survival estimations while considering the possibility of falling into the water outside of the marina/harbour, in the conditions on the day the review was undertaken. When participants considered falling in without a lifejacket (Column A) their survival times are much lower (an average of 35.8 minutes) in comparison to estimations made with a lifejacket (Column C, average of 124.2 minutes). Column D shows on average, participants felt that a lifejacket would improve

their length of survival in the water by 7.6 times, however this factor ranged from 2.7 to 19. Research reviewed on page 14 indicates that people who are wearing lifejackets properly are predicted to survive over seven times longer than those wearing ineffective lifejackets or those not wearing them at all. These results indicate that on the whole, people may have a fairly accurate degree of confidence in lifejackets to help them survive in the water. However the range is considerably wide, affected by the high factors by which lifejackets improve survival found in Brighton and Scarborough. Finally Column B shows the survival time estimations (without a lifejacket) collected for each comparable site in the pre-intervention contextual reviews. The average estimated survival time without a lifejacket was 61 minutes in the pre-intervention reviews, whereas it is 35.8 minutes in the post-intervention reviews. Pre-intervention estimations are not reliably higher for each site however, so the lower average post-intervention estimations can not be attributed to the effect of the safety poster educating participants.

## 2. Seeing the poster

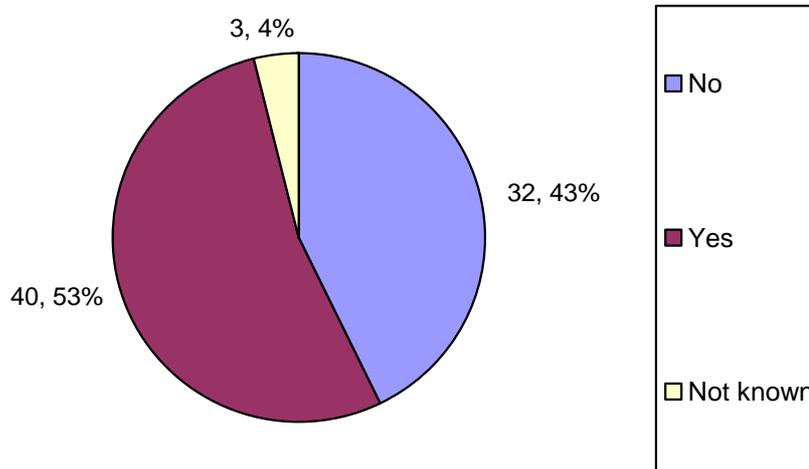


Figure 42: Results for 'Have you seen the poster'?

53% of participants saw the poster in comparison to 43% who did not. 11 participants were excluded from these results as they had not yet been ashore so were unable to see the poster. This result is actually very high in comparison to other research in which warning posters have been placed in relatively busy and complex environments. As Figure 34 to Figure 36 demonstrate, a great deal of other warning communications and notices are displayed in these environments. The poster therefore did exceptionally well at attracting attention in context.

Figure 43 indicates that most posters were seen on the pontoon areas (59%). 15% of people who had seen the poster did not recall where they had seen it, 13% remembered the location inaccurately (for example believing they had seen it in the chandlery, and 15% saw it in other locations such as the toilets. This indicates that the most effective location for displaying these posters is in and around the pontoons. Qualitative comments indicate that placing posters on the entrance to pontoons is likely to be effective because it will remind

people to wear their lifejackets at the optimum point: when they are about to board their vessels.

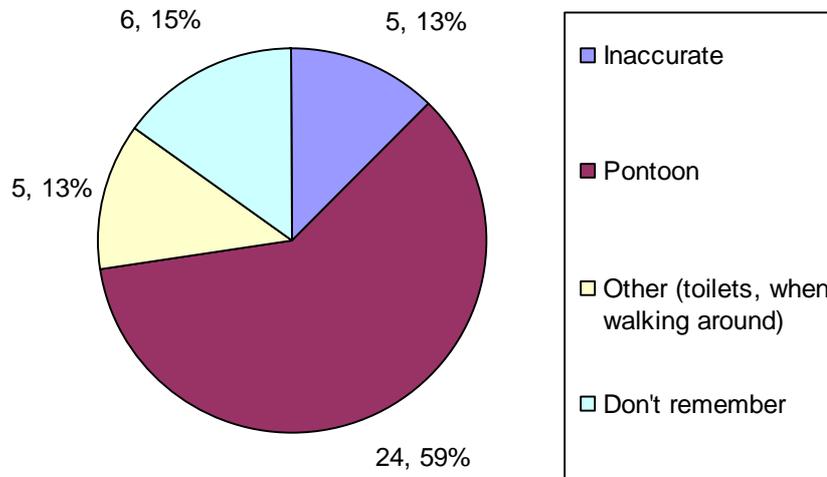


Figure 43: Results for 'Where did you see the poster?'

### 3. Reactions to the poster

Negative (30.4%)			Neutral (11.8%)	Positive (57.8%)				
Not rep. of overboard/gasp	Weather too fine	Not shocking enough	Suitably shocking/	Evocative & attention grabbing	Informative	Good image/poster	Rep.	Very effective
21	4	6	12	7	10	17	20	5

Table 13: Negative, neutral and positive reactions to the poster

\*Rep = representative

Table 13 displays the number and nature of negative, neutral and positive reactions to the poster. There were a total of 102 comments (some participants made multiple comments that fell into different categories), the majority being positive or neutral (70%) rather than negative. The majority of negative comments essentially stated that the image was not representative of falling overboard or a gasp reflex. These participants tended to suggest more emotive imagery would be effective, such as making the model look lifeless and starved of oxygen, putting him underwater, or showing the boat in the distance. Other negative comments were that the weather in the image was too sunny to create a sense of danger, or that the image was not shocking enough (6%). However 12% of the total comments in this area indicated that while the image was not distressing it was suitably shocking. In general the majority of participants felt the image needed to be shocking to get the message across.

Positive comments in order of frequency were: feeling the image was particularly representative of the subject matter, that the image or poster was 'good' in general, the poster was informative, evocative and attention grabbing and very effective. Care should be taken when extrapolating meaning from

these figures, as just because someone felt the poster was 'informative' it does not necessitate that they would not also describe it as 'very effective'. Purely negative feedback was rare and the feeling from the majority of participants was that the poster achieved its objective in informing about the risks of cold water shock.

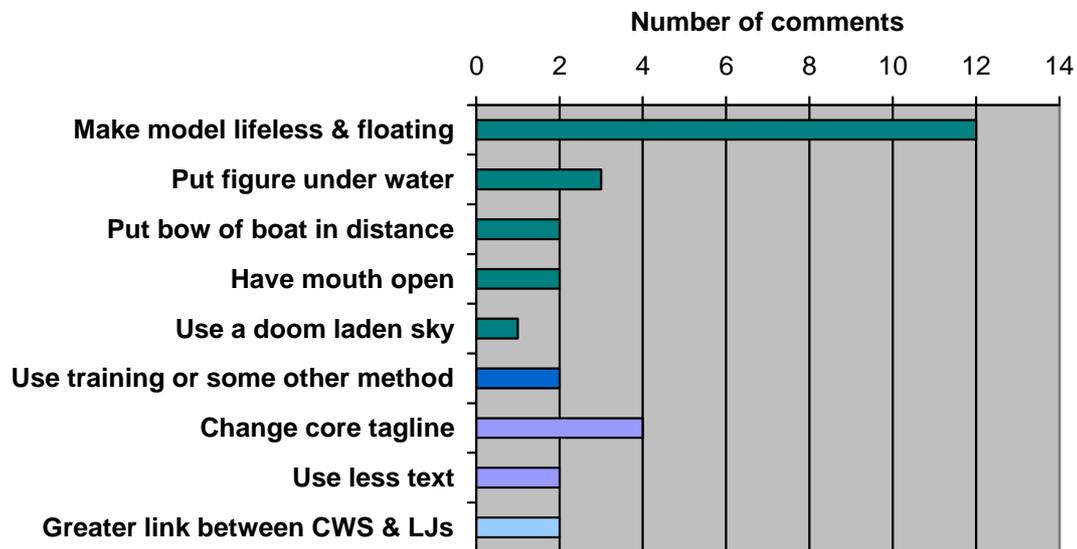


Figure 44: Number of comments about general adjustments and adjustments to the image, method of communication or text

Dark green categories in Figure 44 refer to the adjustments suggested for the image, a total of 20 comments fell into this category. 12 participants suggested that the model should be made to look more lifeless, for example by floating in the water. However this would not be recommended in future campaigns to communicate cold water shock as it could indicate any stage of drowning. There were three comments about changing the image so the figure was under water and two suggesting he had his mouth open. These adjustments may be advisable to make the image look more like he is taking a big gasp of water. Additionally two people suggested featuring the bow of a boat in the distance, which could clarify that this person has fallen overboard. Qualitative data indicated that some participants felt the image could easily have been a swimmer rather than an overboard victim. Finally one person suggested using a doom laden sky, however the temptation to increase the sense of danger by darkening the sky was rejected at the design stage. The reason for this decision was that participants were expected to attribute the risk of cold water shock to poor weather conditions if these were shown in the poster.

The dark blue category refers to adjustments suggested to the method of communicating a cold water shock warning. Two people felt that the poster would be ineffective because an actual physical experience gained through training was thought necessary to get the message across. The light blue categories refer to changes that were suggested to the text. Four people felt

that the key tagline 'First gasp or last breath' should be changed, and two suggested there should be less text in general. Finally the turquoise category is a general adjustment to the poster, in which it was recommended that the connection between cold water shock and the benefit of wearing a lifejacket is further emphasised (two participants).

Another general adjustment that may be necessary for future lifejacket wear interventions is concerned with the further information source on the poster: the 'Useless unless worn' website. This website address was not generally noticed which indicates that it needs to be made more conspicuous. There were various suggestions to increase its visibility: using underlined blue font (which typically indicates an internet address) and printing it in larger font. A few responses also suggest this website is too long to be remembered, although others recognise it as the RNLI slogan which should aid recall.

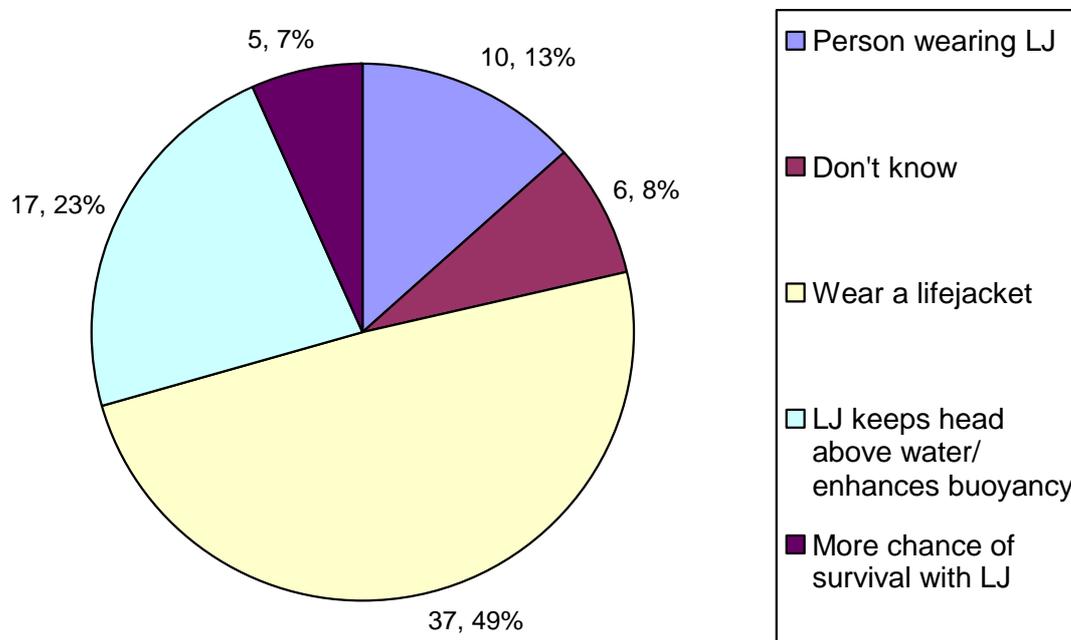


Figure 45: The number and percentage of responses about the meaning of the lifejacket icon

The vast majority of participants thought the lifejacket icon (see Figure 46) meant 'wear a lifejacket', as shown in Figure 45. Only 6 people (8%) did not know what this icon represented and 13% thought its meaning was simply a person wearing a lifejacket. 7% of respondents to this question thought the icon showed there was more chance of survival when wearing a lifejacket and 23% thought it meant a lifejacket keeps the head above water and/or enhances buoyancy. 30% of people therefore understood the specific meaning that this icon was intended to carry and 62% partially comprehended it. One participant was concerned that the symbol exaggerated how high a lifejacket holds you in the water. It may be necessary to make adjustments to this icon if it is intended for further use in illustrating the key way in which a lifejacket protects against cold water shock.



Figure 46: *The lifejacket man icon featured on the safety poster*

#### **4. Confidence in lifejackets (response efficacy)**

84% of responders (n = 70) believed a lifejacket could save their lives, whereas 16% (n = 13) felt a lifejacket could possibly save them. No one held the belief that a lifejacket would do nothing to aid their survival in the event of an overboard incident.

##### **a) Qualifications to a lifejacket possibly saving life**

The following circumstances were given in which a lifejacket would save life if participants felt a lifejacket could potentially save them. The number of participants holding each opinion is given in brackets:

- If hit unconscious by the boom and the lifejacket is automatic (3)
- If there is nothing to swim to (3)
- If rescue is possible (2)
- If crotch straps are worn (2)
- If the lifejacket is maintained or not faulty (2)
- If the overboard incident does not occur in rough conditions - the spray can drown you even with a lifejacket (1)
- If the lifejacket is kept down with the wearer's arms so it does not knock them out (1)
- If the buoyancy level of the lifejacket is high enough (1)

##### **b) Beliefs about how a lifejacket would save life**

Figure 47 shows the number of responses that fell into different categories for how a lifejacket would save life. The most common response was that a lifejacket keeps you afloat (39%), followed by 'it raises the body up and keeps your head above water' (21%). Participants also mentioned the fact that a lifejacket helps the wearer conserve energy (15%), flips them face up in the water (11%), increases chance of rescue (7%), and increases the wearer's visibility (6%). Only one participant (1% of responses) felt a lifejacket would save them in particular because of his poor swimming ability.

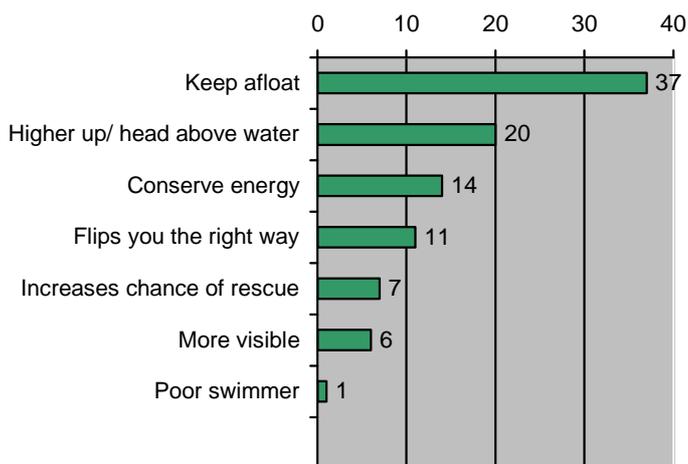


Figure 47: Results for 'How would a lifejacket save your life?'

## 5. Understanding the message/ concept

68 participants (82%) claimed they understood the message or this understanding was signalled by their general responses. 11% (n = 9) understood the message when it was their first exposure to information about cold water shock (CW shock). However the following suggest that the implications of CW shock were not properly realised in those who understood the message:

- 22 people made survival estimates when immersed in water with no lifejacket of 45 minutes or more (32% of those who understood the message).
- 3 people felt they had some immunity to CW shock due to activities that had desensitised them to cold water (4.4% of those who understood).
- 2 people believed the water would not be cold enough to provoke CW shock (3% of those who understood).

15 participants (18%) seemed to have a partial understanding of CW shock. 6% had learned about CW shock for the first time with this poster and only had a partial understanding of the concept (n = 5). Participant responses that contributed to a misunderstanding of cold water shock include:

- Believing swimming could help in that situation (33% (n = 5) of those with a partial understanding)
- Getting hypothermia confused with CW shock (20% (n = 3) of those with a partial understanding)
- Believing survival time would not vary much with the temperature of the water (13%, n = 2)
- Believing they have a natural hardiness or immunity from cold water (7%, n = 1)

## 6. Awareness & knowledge of cold water shock

Participants were questioned about their prior knowledge of cold water shock and where they had gained this knowledge from. The results are presented in Table 14, which show 80% of participants had some knowledge about cold water shock. 16% admitted they had no knowledge of cold water shock, and evasive responses prevented this from being known (NK) in 4% of participants. Knowledge about cold water shock is most predominately from personal experience (56%): through sailing experiences such as reactions to cold water and training courses. Other strong sources of cold water shock knowledge were magazine articles and television programs (14%), word of mouth from the sailing community (13%) and from the serious experience of another person (8%). These findings may suggest that training programs could be the best way to convey cold water shock, in which trainees undergo personal experience of falling overboard in simulated conditions. The note below Table 14 indicates one case in which knowledge of cold water shock was lost after undergoing training. However in general personal experience appears to embed an understanding of what cold water shock is and the effect it can have.

Prior awareness of CW shock			Sources of knowledge about CW shock						
Some	None	NK	Personal exp (falling in/training)	Don't know	Word of mouth	Other exp (injury, fatality)	Magazines / TV	RNLI sea check	Inaccurate
69	14	3	40*	4	9	6	10	1	1**

Table 14: Number of participants with some prior knowledge of CW shock & sources of knowledge (exp = experience)

\* One person did a sea safety course that should have covered CW shock but he had apparently not retained any knowledge of it

\*\*Categorised as inaccurate as participant claimed his knowledge of CW shock was drawn from emerging from the sea, shivering as a child

## 7. DECIDING: relations of knowledge, threat perception and lifejacket wear

The following section links various elements of risk perception on the water to the threat appraisal of cold water shock and lifejacket wear. The questions heading each subsection follow directly from the theoretical model drawn from protection motivation theory.

### a) Do people who tend to wear lifejackets perceive more risk in terms of survival estimates in the water?

Table 15 indicates participants who wear lifejackets most of the time make lower survival estimates on average than non-wearers, but only when considering falling overboard without wearing a lifejacket. Wearers do not perceive survival time to be higher where a lifejacket is worn in comparison to

non-wearers/ conditional wearers. Additionally the factor by which lifejackets are expected to increase survival times in the water is considerably lower for wearers than non-wearers. This may suggest lifejacket wearers tend to perceive a higher risk from falling overboard regardless of lifejacket wear.

LJ wear	Average survival estimates		
	Survival time in water no LJ (mins)	Survival time in water with LJ (mins)	Times LJ improves survival
LJ wear most of the time	31.12	117.70	4.52
LJ wear conditional/ not worn	44.43	152.38	7.74 *

Table 15: *Lifejacket wearers and non-wearers survival estimations with and without a lifejacket, and the factor by which a lifejacket lengthens estimations*

\* Outlier removed

**b) Do people have a greater tendency to wear lifejackets when they have had more overboard experiences?**

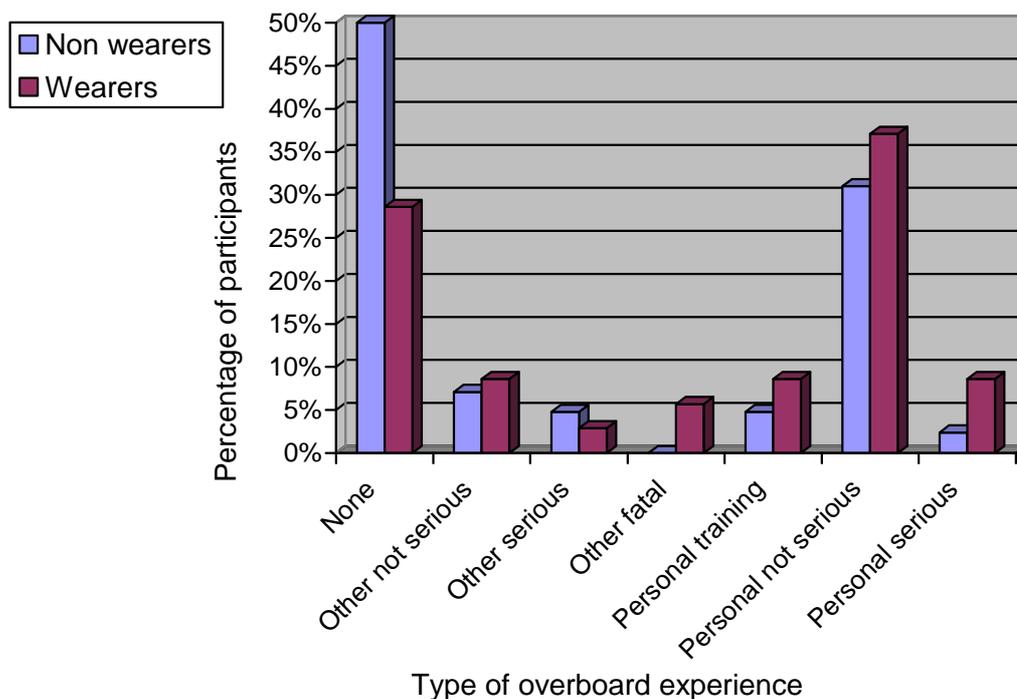


Figure 48: *Overboard experiences of lifejacket wearers and occasional/ non-wearers, sample size = 77 (wearers = 35, non-wearers = 42)*

The percentages shown in Figure 48 give some support to the supposition that people who wear lifejackets most of the time have had more overboard experiences than occasional or non-wearers. 29% of the former claimed to have never fallen overboard, in contrast to 50% of non-wearers. There does not seem to be a clear pattern for types of overboard experience, even though it was expected that more serious overboard experiences would be accompanied by higher rates of lifejacket wear. It is clear from the qualitative

data that an unserious personal overboard experience, i.e.: falling off the boat or pontoon does not consistently encourage lifejacket wear. This might be to do with the ease of getting back aboard, if it is easy then this experience may actually lower risk perception and therefore the tendency to wear a lifejacket.

**c) Do people who perceive a greater degree of threat tend to also report wearing lifejackets most of the time?**

LJ wear	Degree of threat perceived from CW shock					
	Low	Low %	Moderate	Mod. %	High	High %
Non-wearer	24	92.3%	9	50.0%	14	34.1%
Wearer	2	7.7%	9	50.0%	27	65.9%
<b>TOTALS</b>	26	-	18	-	41	-

Table 16: *The number and percentage of lifejacket wearers and non-wearers who perceived low, moderate and high degrees of threat from cold water shock*

Most people who perceived a low degree of threat from CW shock did not wear a lifejacket (92%), whereas there was an equal split in lifejacket wear from those who perceived a moderate threat (see Table 16). The majority of people who perceived a high degree of threat from CW shock wore lifejackets most of the time (66%), in comparison to non-wearers (34%). This provides excellent support for the theoretical model drawn from protection motivation theory.

However our theoretical model also predicts that people who wear lifejackets should have a high degree of confidence in a lifejacket to prevent cold water shock (response efficacy). Figure 49 shows the percentage of lifejacket wearers in each combination of confidence in lifejackets (moderate and high) against the perception of threat from cold water shock (low, moderate and high). Participants who perceive a high threat and have high confidence in lifejackets are far more likely to wear lifejackets most of the time (71%, n = 22) rather than never or occasionally (29%, n = 9). In contrast, when confidence in lifejackets is only moderate but perceived threat is still high, a lower proportion of wearers (33%, n = 3) to non-wearers (67%, n = 6) is evident. This graph shows the pattern of responses that would be expected, with the moderate confidence in lifejackets and low threat from cold water shock category consisting entirely of non-wearers (n = 4). Sample sizes are particularly low in the moderate response efficacy categories however. The spread of perceptions for response efficacy has a low range, with most people having high confidence levels. The results therefore indicate that further research may be necessary to explore the role of response efficacy on lifejacket wear. However these findings imply that improving perceptions about how lifejackets protect from cold water shock should be a lever to enhancing lifejacket wear.

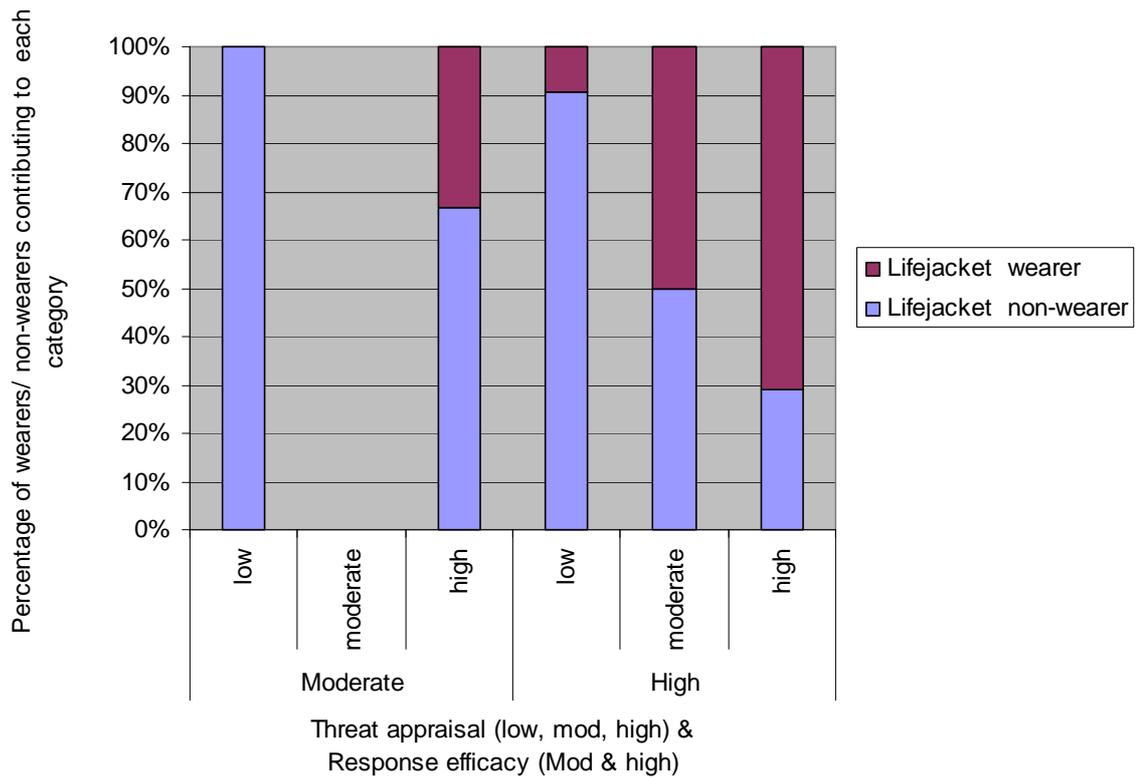


Figure 49: Percentage of lifejacket wearers/ non-wearers contributing to the six categories of threat appraisal (low, moderate and high) when response efficacy is moderate or high

**d) Have those in the high threat perception groups had more or different types of overboard experience than those who perceive CW shock to be a minimal threat?**

Overboard experience	Degree of threat posed by CW shock		
	Low (n = 25)	Moderate (n = 15)	High (n = 39)
None	13	6	13
Other not serious	0	2	4
Other serious	1	2	4
Personal not serious* includes training	9	5	16
Personal serious	2	0	2
<b>TOTAL overboard experiences/ % of threat group</b>	<b>12 48%</b>	<b>9 60%</b>	<b>26 67%</b>

Table 17: Number of overboard experiences of participants who perceived a low, moderate or high threat from cold water shock

There does not seem to be a pattern for what types of overboard experiences are reported by people who were categorised as having a low, moderate or high perception of threat from cold water shock. A bigger sample size would be necessary to ascertain this properly, due to the low numbers of serious overboard experiences (both other & personal). However Table 17 does

show that 67% of those who perceived a high threat from cold water shock had some form of overboard experience, in comparison to 48% of the low-threat group. The difference in these figures gives some support to the supposition that having the experience of falling overboard, even if this is through the experience of another or simulated in training, increases threat perception.

**e) Do those in the different threat groups make different estimates for survival in the water?**

Survival estimates (mins)	Significance of threat posed by CW shock		
	Low	Moderate	High
Without a lifejacket	57.31	44.18	26.36
Factor lifejacket lengthens survival	3.40*	5.23	8.63

Table 18: *Survival estimations and factors by which a lifejacket lengthens survival, according to participants with low, moderate and high threat perceptions*

*\*Two outliers have been removed*

Table 18 indicates that when the threat from cold water shock is perceived to be high, the average survival estimate is under half of those who perceive a low threat. Participants in the high threat group also believe a lifejacket will have the greatest effect on their survival time, believing they will survive in local waters for 8.5 times longer when wearing a lifejacket. People who perceive a low or moderate personal threat from cold water shock appear to underestimate the degree of assistance a lifejacket will provide. According to research reviewed on page 14, lifejackets when worn properly will increase survival time by a factor of at least seven. These results may indicate that beliefs about survival time in the water without a lifejacket affect the overall perception of threat posed by cold water shock. The implication of this is that any intervention aiming to educate people about the risks of cold water shock should emphasise how long someone would realistically survive in the water.

**f) Supporting information to aid decision making – demand for useless unless worn website**

No one felt they needed more information on lifejackets, except for two people. One thought he might need advice, and the other required information on the shelf-life of automatic lifejackets that have been stored in dry conditions. Caution should be applied with taking this result as an absolute indicator of the requirement for a central repository of information on lifejackets. People might need information but they may be unaware of the gaps in their knowledge.

Respondents who answered the question of ‘Would you use a website like this?’ had the following reactions:

- 40 (49%) would use the website if they needed information
- 35 (43%) would not use a website or a website like this
- 7 (8%) would possibly use the website

Of the people who would not use the website, the following sources of information would be used to find out about lifejackets instead:

- Chandlers (21%)
- Magazines (19%)
- People with experience, such as the RNLI (16%)
- A different website, e.g. lifejacket manufacturer or the RNLI (14%)
- Google (12%)
- Lifejacket supplier (9%)
- Word of mouth from peers, crew members (9%)

## 8. ACT – Intended behaviour change

This section addresses two key questions:

1. Did prior knowledge about cold water shock result in increased lifejacket wear or other changes in safety behaviours;
2. Did the poster have any impact on intended changes to lifejacket wear or other safety behaviours.

Figure 50 indicates that for 27% of the relevant sample, finding out about cold water shock made no difference to their wear of lifejackets or other safety behaviours. Another 27% became more cautious on the boat, 18% realised they would not survive so long in the water and 18% encouraged their whole crew to wear lifejackets more often. The knowledge of cold water shock for 1 person (9%) made him realise that he should give up sailing before he gets too frail. For the majority of the sample for which these themes emerged, 54% either behaved more cautiously or planned to make changes when they would feel vulnerable.

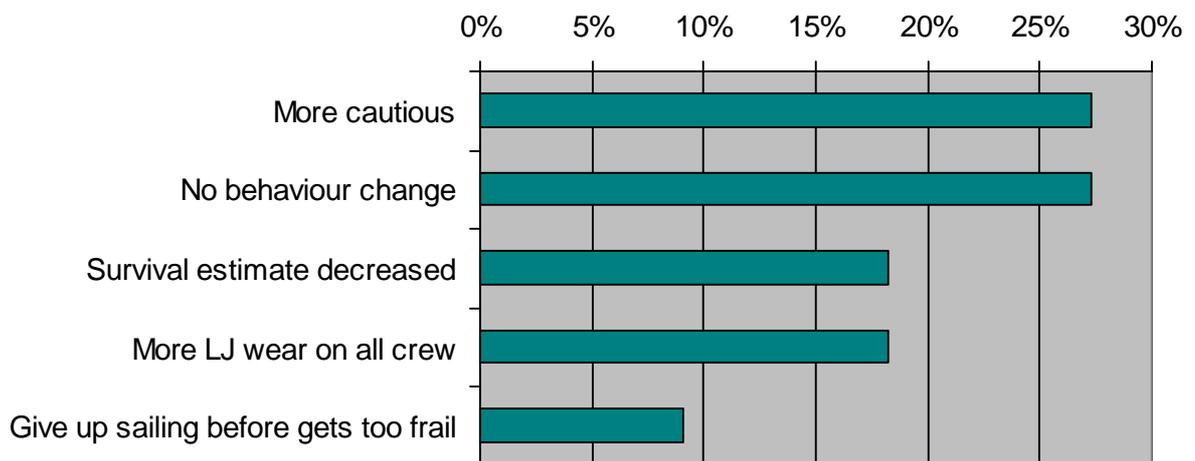


Figure 50: *Behavioural and cognitive reactions to knowledge of cold water shock (n = 11)*

	General behavioural intentions				Specific behavioural intentions			
	None	Probably not	Probably	No but maybe others	LJ wear more often	Check LJs more often	Possibly buy automatic LJ	More careful fitting
Percentage	70.3%	2.7%	2.7%	6.8%	12.2%	2.7%	1.4%	1.4%
Number	52	2	2	5	9	2	1	1

Table 19: General and specific behavioural intentions for the future, in response to seeing the poster (n = 74)

Table 19 indicates 70% of participants were not planning to change their use of lifejackets in the future. Qualitative research indicates that many participants do not plan to change their behaviour because they consider themselves safe already. In fact 17 (33%) of the people who would not change their behaviour as a reaction to the poster claimed to wear lifejackets all the time already. 7% of participants claimed that the poster would not change their safety behaviour but it should encourage those who do wear lifejackets to change their behaviour.

Some behavioural change in reaction to the poster was evident however (20%). 12% of participants definitely planned to wear their lifejackets more often and 3% would probably increase their wear. 3% of participants planned to check their lifejackets more often, one participant planned to fit his lifejacket more carefully and one planned to buy an automatically activated lifejacket.

However 35 (67%) of those who were not planning to change their use of safety equipment in the future did not wear their lifejackets most of the time. Many believed they were safe enough by undertaking other safety behaviour. Nevertheless qualitative data reveals a risk-taking attitude towards sailing in a substantial portion of participants. For example:

- *'I accept risk, I would rather die quickly'*
- *'It's a risk you take'*
- A 70 year old male from Brighton Marina had no plans to change his habit of drinking and sailing despite falling in numerous times and acknowledging the increased risk caused by alcohol.

In some cases where lifejackets were never or rarely worn, very serious overboard incidents had made no difference to lifejacket wear, or to other safety behaviours. However there was a degree of bravado in the responses of this particular group of participants which may have been due to experimenter effects. In other words, some participants who appeared particularly risky and sensation-seeking may have responded in this way due to the presence of the researchers.

## Conclusions

### **a) Targeting interventions**

Lifjacket wear should not be targeted according to age or location. In the pre-intervention contextual reviews, people who wore their lifjackets most of the time (wearers) were ten years younger on average than occasional or non-wearers (non-wearers). However in the post-intervention contextual reviews, lifjacket wearers were an average of five years older than non-wearers. This is despite the fact that the average age of the total samples were very similar for both pre and post contextual reviews. Additionally great variation was found in the percentage of wearers versus non-wearers who were interviewed where the same sites were visited twice. While a large range was found between sites (e.g.: 0% of participants in Port Hamble and 78% in Port Solent were classified as wearers), the variation within the same site was extensive in some cases. This may imply that using one-off observational data to direct lifjacket wear campaigns to areas with particularly low wear rates is misleading. For a substantial portion of participants, lifjacket wear varies from day to day according to the weather, whether children are aboard and their distance from the shore. Observational data therefore may be reflecting such factors as sea state, wind speed and air temperature, rather than showing what areas tend to have a social norm of low lifjacket wear. Simply put, safety interventions should be directed towards everyone.

### **b) Response efficacy/ confidence in lifjackets**

This research found some low estimations of the degree to which a lifjacket aids survival in the water. The average factor by which a lifjacket was perceived to increase survival times was 7.6, which is very accurate according to research reviewed on page 14. However each site differed considerably with this aspect of lifjacket efficacy: four sites had an average factor of 3.6 or less. This indicates that there is plenty to do in terms of educating some people about just how much lifjackets can do to improve chances of survival in the water.

84% of responders felt that a lifjacket would save their lives. Some respondents gave multiple reasons for why they thought a lifjacket would do this, although for some a lifjacket would simply 'keep them afloat'. This suggests that there is some need for educating people about what exactly a lifjacket can do to ameliorate various risks in the water. This becomes particularly important when encouraging people to wear lifjackets to protect themselves from a particular risk. Preliminary evidence was found that lifjacket wear is far more frequent in those who not only perceive a significant threat, but also view a lifjacket as capable of significantly reducing the threat. The results have been in complete support of the theoretical model drawn from protection motivation theory, as this is exactly what the model would predict.

### **c) Risk perception/ threat appraisal**

This research has illustrated that expected survival time and overboard experience has a close relationship to the overall evaluation of threat posed

by cold water shock. In turn, the perceived threat has a close relationship to lifejacket wear. When interpreted in light of the theoretical model, various aspects of information feed into threat appraisal, which then influences lifejacket wear. This implies that in order to increase lifejacket wear, the specific aspects of the threat must be communicated. By way of example, survival estimates were particularly high in a large proportion of participants. Giving people facts about the threat should influence how severe they believe it is – for example the risk of cardiac irregularities, the inspiration of lethal quantities of water and the potential for this to happen in relatively warm UK waters. Many participants accounted for water temperature when making survival estimates, which may indicate their primary concern was hypothermia rather than cold water shock.

The qualitative data indicated that enhancing people's perceptions of their personal susceptibility to cold water shock is also important to enhance threat appraisal. Some participants took swimming ability into account when estimating their survival times in the water, and some felt they could train themselves to react more favourably to cold water shock. Any misperceptions about how personal skills or abilities might minimise the threat should be addressed because they are likely to translate into low lifejacket wear.

### **Responses to the poster**

The safety poster engaged the attention of participants extremely well according to the proportion of participants who had noticed it in these complex environments. The majority of feedback was positive, with most people feeling that the image needed to be shocking to get the message across. Using a 'fear campaign' to communicate the message therefore appeared to be extremely effective in this situation. Some participants felt that alterations were necessary to increase the degree to which the image was representative of a gasping man or falling overboard.

The majority of participants understood the concept of cold water shock, although most knew about it before seeing the poster. The key source for prior knowledge about cold water shock is from personal experience – either through training or day to day experience with sailing.

### **Behavioural change – intentions to change safety behaviour**

The results so far have provided support for the theoretical model although the number of participants who planned to change their behaviour was lower than might have been predicted. Protection motivation theory predicts that high threat and coping appraisal will result in motivation to protect oneself from the threat. However the link between this motivation and actual behaviour can be easily broken by various factors. As Figure 23 (see page 48) indicates, protection motivation can be affected by various other factors including habit and what people believe others like themselves tend to do (perceived behavioural norm). Habit was found to be a key theme in why some people did not wear lifejackets despite acknowledgements like: '*I know I should*' (see page 48). Additionally found in the pre-intervention contextual

reviews, perceived behavioural norm was found to have a very high association with lifejacket wear (see Figure 24). Both a habit of not wearing a lifejacket and a perception that 'not many people wear lifejackets around here' will have a deleterious impact on the motivation to wear a lifejacket. It is therefore recommended in the next section that a more experiential method is used to encourage lifejacket wear rather than visual communications.

## Final conclusion

The results from both the pre and post intervention reviews have identified that the majority of participants who fail to wear lifejackets are in the Decision Making and Hazard Appraisal stages of change (see Table 8). Few problems were found in terms of barriers to obtaining lifejackets, and information on fitting, etc. These participants are therefore not generally in the Initiation stage of behavioural change. The primary concern for participants appeared to be whether they perceived the threat to be severe and likely enough to warrant lifejacket wear. It is not surprising that they hold this view because the assumption in the boating community is that the risk of falling overboard in open waters is quite low. This quote from Phil Kendall, in his article published on the RYA website illustrates this:

*'In the highly unlikely event of finding yourself in the water with your boat sailing away, it would be nice to think your crew could rescue you.'*  
(<http://www.rya.org.uk/newsevents/enewsletters/Cruising%20news/april2009/Pages/asktheexpertsmanoverboard.aspx>, retrieved 12/11/2009)

This research found that the majority of participants had some form of overboard experience. Considering the sample sizes, serious overboard experiences in open waters were not uncommon. Many cases of MOB events are not likely to be reported at all. This underreporting issue of near miss events is made even more severe when data about the incident is unlikely to be recorded unless the RNLI are involved, as this is the only SAR agency that records 'lives saved'. In essence, the perception that falling overboard is a 'highly unlikely event' could be misconceived.

The real challenge for encouraging lifejacket wear is to advance people into the Adherence stage of behavioural change. This is the stage in which changed behaviour becomes long-term. This phase can be self-reinforcing if several opportunities have emerged to try out the 'safe behaviour'. However this could be particularly problematic when applied to encouraging lifejacket use. In reality few people will need to inflate their lifejackets when they are in danger and therefore they are unlikely to see the personal benefit of them. This stage presents several problems for lifejacket campaigns. If the benefit of wearing a lifejacket is not experienced, these lifejackets may be stowed away permanently and never checked or worn. This is another argument in support of using training to give people a real experience of falling overboard, so that the benefits of a lifejacket can be proven first hand.

## **Objective 5: Produce research-based recommendations to prioritise effort and direct resource**

### **1. Collect evidence**

The key recommendation following this research is that robust evidence must be collected on the cause of death and causal factors of accidents in maritime fatalities.

#### **1a. Collect evidence about cold water shock & swimming failure**

Not much is known about the first two stages of immersion. These are the very aspects that could enhance lifejacket wear because of the salience of the threat (e.g. lack of time) and the efficacy of lifejackets in protecting people from them. Research clearly indicates that cold water shock and swimming failure happens, in which death occurs within a window of 30 minutes. However there is very little dependable research to show what proportion of people die in Stages 1 & 2 of cold water immersion. Survival curves are designed for predicting the time hypothermia will take to claim life, they do not appear to incorporate cold shock and swimming failure. In short, there is a lack of statistical evidence to show the proportion of people who die in these initial phases.

However interviews with experts in this area indicate that the risk of mortality from cold water shock is high. By way of example, the focus group undertaken with Worthing Beach office revealed that expected survival time in local waters during summer without a lifejacket was approximately six minutes. Sources of dependable data to investigate the likelihood of cold water shock are at present lacking, for example early deaths in the water are often attributed to hypothermia or drowning even when physiological evidence goes against these conclusions (Tipton, 2003). There is therefore some debate within the academic community about what survival chances are in the initial stages of immersion. It is very difficult to communicate maritime hazards, the benefit of a lifejacket and counter arguments against lifejacket efficacy unless the facts are established.

#### **1b. Collect evidence of cause, not phenomenon**

Estimating the amount of lives that could be saved as a result of an educational campaign to increase lifejacket use is impossible without knowing how many accidental deaths occur at sea with and without a lifejacket. This data is currently not reliably recorded. The lifejacket panel review goes some way to clarifying the benefit of lifejackets, and reliable research suggests that lifejackets increase survival time by a factor of seven (McCormack et al, 2008). Regardless, this does not address the cause of the incident. Behaviours such as wearing a safety line, not going out in rough weather, carrying a spare engine, and being fully trained in sea survival could avoid these incidents entirely. The avoidance of overboard incidents would reduce

demand for SAR resources, thereby being the most cost-effective set of interventions.

The WAID database, currently in development is an excellent step forward for the investigation of maritime accidents because it seeks to compile information from all relevant sources who might be involved such as the police, ambulance service and Coast Guard. This new database will eventually need to take the direction of specifying the combination of causes that has resulted in each accident if the most effective accident interventions are to be identified. In addition, the collection of near-miss or minor accident data is highly recommended when the processes for maritime fatality investigation are established. Recreational maritime fatalities in the UK are actually very low and patterns of accident causation will be clearer and more reliable if a larger sample can be attained. SAR agencies appear to be working very effectively to prevent maritime fatalities in the UK. Therefore the sole use of fatal incident data could mask various safety issues in the recreational maritime sector.

RNLI survey research suggests that lifejackets are rated 6<sup>th</sup> in a list of the most important safety equipment. Lifejackets are for many sailors a last resort because they want to avoid immersion in the water at all costs. Nevertheless, an accident is a rare, random event and can not always be avoided. Even if other safety behaviours reduce the chance of an overboard incident they should not be viewed as a substitute for a lifejacket. A lapse of attention in combination with a change in sea state and a slippery deck might be all it takes to fall overboard, even for the most careful sailor. As long as there is a chance of falling overboard, there is a strong probability that a lifejacket will save the life of the casualty. A lifejacket increases the probability of survival by a factor of at least seven according to research.

## **2. How to get the message across: real experience**

The poster was seen by the vast majority of people who had been ashore and were therefore able to see it. Considering the amount of warning communications and general information present in many of the sites reviewed, the location and design of the poster invited an unusually high degree of attention. The concepts communicated by the poster were understood by the majority of participants in addition. This indicates that this form of intervention is able to get through the first two barriers of communicating warning information. However as mentioned previously, this message is complex and designing a simple piece of communication to counter existing knowledge that leads to an underestimation of the threat is difficult. If the threat is not fully acknowledged as severe and personally applicable, people will not be motivated to protect themselves from it. For example, 32% of people who understood the concept of cold water shock still made survival estimates of 45 minutes or more. This does not necessarily

mean that they did not understand that cold water shock can claim life within five minutes, but they have other presumptions about the likelihood of cold water shock happening to them. Some people even felt they had trained themselves to be invulnerable to the initial effects of cold water immersion. This message may be too complex to get across with warning communications alone.

The post-intervention contextual reviews revealed that prior knowledge about cold water shock is most prominently from personal experience – through sailing experiences such as reactions to cold water and training courses. This may indicate that a training program will be the best way to convey cold water shock. Participants who claimed they had actually experienced cold water shock (one had to be hospitalised) wore their lifejackets constantly when aboard, irrespective of weather conditions. The psychology of learning indicates that some things are best learned by experience (Kolb, 1984). The learner actually needs to undergo the experience, preferably personally but learning the experiences of others can also be effective to achieve this aim. This is termed experiential learning. If budgets would allow, every sailor would undergo training in controlled conditions, such as the wave pool in the RNLI Lifeboat College (see Figure 51). This wave pool is solely reserved for the essential education of RNLI volunteers, although training organisations such as the RYA may want to consider the benefits that this kind of facility would afford leisure sailors. It would not fully simulate an overboard experience because immersion would be expected and assistance would be to hand. However it would be a particularly effective way of ensuring people understand what lifejackets do if it were ethically possible to immerse people with and without lifejackets.



Figure 51: *The wave pool at the RNLI Lifeboat College*

Evidence from this research to further support this recommendation is that people who have had more overboard experiences perceive cold water shock to be of more threat. Additionally this research has uncovered preliminary

evidence that 92% of people who were categorised as perceiving cold water shock of little threat to them did not tend to wear lifejackets (8% were wearers). In contrast 66% who perceived cold water shock to pose a high threat to them wore their lifejackets most of the time. This indicates that increasing threat perception of cold water shock and simultaneously enhancing confidence that lifejackets can deal with this threat, will result in substantial gains in lifejacket wear. It is however concluded that giving recreational maritime users first hand experience of cold water shock is the best way to do this.

This type of training course may need to be made mandatory for the results to be effective. This is because people who tend to take up training have the tendency to be safe already and take few risks. This aspect of the project is analogous to our work on BikeSafe (a Police-run motorcycle safety training program). If training is a permissible solution to increasing lifejacket wear, ensuring the attendance of the people who need the training most is essential. In our previous experience, this is best achieved through enforcement, i.e. introducing a license scheme. It seems that training take-up is becoming more common (according to the Scarborough Harbour Master), therefore this type of intervention may not be as unpopular as might be expected.

Failing this, the provision of affordable training, or perhaps providing incentive by reducing insurance costs upon training completion, could help to motivate recreational maritime users to undergo a training program. A word of warning must be mentioned here. If the right degree of challenge is not supplied, i.e. if it is made too easy for trainees to get out of the water, threat perception may actually be reduced. This was the case for several participants in this research who had been helped out of the water very quickly, or who had climbed onto their boats or the pontoon without assistance. These overboard experiences seemed to have reduced their perceptions of threat about falling into the water. This appears to be because the majority of overboard experiences take place while being moored.

### **3. General recommendations following this research**

- Demographic factors such as age and sailing locality are too unreliable to be able to ensure those who are most in need of safety information receive it. Our advice here is therefore to target everyone.
- If people can not be persuaded to wear lifejackets as soon as they set off, ensure they realise that sea state, rather than general poor weather conditions are what increase their risk of an overboard incident.
- The results of the contextual reviews suggest a campaign advising people to wear lifejackets not only on their boats but around mooring areas could be viewed as over-bearing. However the vast majority of overboard experiences were reported as occurring while stepping on or off the boat, or slipping from a pontoon. This indicates that the riskiest point for an overboard experience is while moored, the point at which

most people do not wear a lifejacket. While the risk of fatality may be reduced by greater ease of getting out of the water, for certain marinas this is difficult (e.g. Southsea Marina). The risk will also be increased at quieter times where assistance is less plentiful.

- Communicate the severity of the threat of falling into the water. This should be in terms of the length of time people typically survive without a lifejacket in open waters.
- This research has confirmed that an in-depth methodological approach, such as the contextual review is needed to investigate the issues rather than using self-report questionnaires. The former is able to probe for further information, get more honest responses, and capture the complexity of decision-making underpinning lifejacket wear. It is recommended that further research in this domain adopts similar ethnographic techniques.
- People may need to experience the difficulty of getting back aboard without assistance, how quickly an overboard casualty can be out of sight without a lifejacket, and the difficulty of putting a lifejacket on in these situations. Video or verbal case studies may be useful here.
- Emphasise how lifejackets improve chances of survival in the water. Specific effects such as they raise the wearer's position, thereby preventing a lethal inspiration of water are likely to be persuasive for this audience. Ensuring that the threat of cold water shock is emphasised to the same degree as a lifejacket's efficacy in preventing it is essential to encouraging behavioural change.
- In relation to the above point there is a need to develop a central repository of information about lifejackets. A website would be used by the majority of participants if they needed information about PFDs. It is therefore recommended that a website is developed, detailing: how lifejackets protect the wearer, the suitability of different lifejacket types for particular activities and how to fit and maintain a lifejacket properly.
- The theoretical stance selected as a foundation for this research has been very useful. It is extremely unusual that so many results confirm the predictions of a model, however this is exactly what was found in both sets of contextual reviews. Protection motivation theory identifies the subtle ways in which the different elements of decision-making need to be altered to encourage lifejacket wear. A Stages of Change approach enables the identification of different groups who essentially have different barriers to lifejacket wear. These different barriers in turn identify different sorts of interventions. It is suggested that further efforts to increase lifejacket wear use this theoretical model. It enables the provision of targeted interventions, but the factors delineating different groups have greater validity because they are psychological rather than demographic.
- People tend to report that they wear lifejackets most of the time when they perceive similar others to be wearing lifejackets. However attempting to target areas with particularly low levels of lifejacket wear could be difficult according to this research. Where comparisons could

be made, the samples of pre and post intervention reviews differed considerably in terms of lifejacket wear. The only site that had reliably low levels of lifejacket wear was Port Hamble Marina. However the implication of the relationship between social processes and lifejacket wear, is that the more lifejacket wear is encouraged by a particular intervention, the greater the additive effect of the intervention. There seems to be some divide between relatively new sailors who have undergone training (and wear lifejackets without question), and very experienced sailors. Any intervention that attempts to use perceptions of lifejacket wear norms to shift behaviour should try to minimise any differences non-wearers perceive between themselves and who they perceive as 'lifejacket wearers'

- Finally, as our review of MCA incident reports indicates, targeting sailors to wear lifejackets only deals with an aspect of improving recreational maritime safety. In 2008, there were twelve fatalities involving swimming, several of which also involved alcohol. Worthing Beach Office tends to direct most of its resources to drunken or antisocial behaviour on the pier, rather than to incidents in the water. This appears to be another area within the recreational maritime sector that requires investigation, which is likely to have very different issues at its core.

## 4. Recommendations Summary

1. Collect robust evidence on the cause of death and causal factors of accidents in maritime fatalities (see page 86).
2. Once processes for accident investigation and structures for accident data storage are established, collect data on incident causation for minor accidents and near misses (see page 87).
3. Communicate the risk of cold water shock and simultaneously the benefits a lifejacket can provide. The safety poster achieved these aims effectively, although such a complex message may need to be supported with training to fully educate leisure sailors (see page 87).
4. Organisations involved in the delivery of training to leisure sailors should be made aware of the benefits of providing a simulated personal experience of falling overboard for encouraging lifejacket wear (see page 87).
5. There is a clear need for the development of a website detailing important lifejacket information to support campaigns (see page 90).
6. When communicating risk, ensure clear, trusted information is imparted, i.e. sea state rather than general weather conditions increase incident risk; typical survival times in open waters (see page 89 & 90).
7. Providing a 'virtual' experience of maritime risks such as cold water shock through video and case studies is also advisable in future efforts to encourage lifejacket wear through education (see page 90).
8. Recreational sailors who need training most, i.e. those who engage in few safety behaviours on the water (including lifejacket wear) are likely to be those without a great deal of motivation to undertake a training course. Attention needs to be directed at the most appropriate way of tackling this issue, whether through incentives (e.g. reductions in insurance costs), or enforcement (see page 89).
9. Lifejacket interventions should be directed at everyone rather than on the basis of demographic information (see page 89).
10. Future campaigns may want to consider advising lifejacket wear around mooring areas to reflect the high incidence of overboard experiences reported in these locations, although this may be unpopular (see page 89).
11. The use of in-depth ethnographic techniques is advisable when undertaking future research in this area for various reasons (see page 90). Additionally future research may want to consider adopting the theoretical stance used to guide this project because results confirmed its efficacy in explaining the decision-making underlying lifejacket wear (see 90).
12. Future lifejacket campaigns should consider utilising social processes: a lever for encouraging wide-spread behavioural change is whether sailors perceive similar others to wear lifejackets (see page 90).

## Limitations

Any research has limitations to how it can be applied and how caution should be used when interpreting some of its findings. The following bullets refer to such qualifications:

- The use of the contextual review has many benefits over a questionnaire although its core disadvantage lies in the area of experimenter effects. Part of the researcher's role was to establish a bond with the participants and therefore encourage them to relay their thoughts around the topic. At times this was essentially a monologue with very little intervention from the researchers. However the establishment of this bond may have also encouraged some participants (in particular males) to respond with a degree of bravado. This might suggest that a proportion of participants were not in actuality as risk-averse and sensation-seeking as their responses would suggest.
- Small samples in various cases indicate areas where further research should be undertaken if interventions are planned on the specific results. By way of example, the analysis of lifejacket wear in participants with 'moderate' confidence in lifejackets illustrates a pattern rather than proving a relationship (see page 79).
- This research was based on a paucity of incident data. It was therefore impossible to know if increasing lifejacket wear would have an efficacious effect on increasing maritime safety because the causes for maritime incidents in the UK is largely unknown. By way of example much of the RNLI data analyses were not reported because there were too many missing cases to enable conclusions to be drawn. This is due to critical data not being collected at the scene of the incident.
- Recreational maritime activities often cross national boundaries. This research was undertaken in the UK primarily with British people, however several Dutch people also participated. Beliefs about the necessity of wearing lifejackets are likely to vary across countries, certainly a contrast between the contextual reviews undertaken in the South and North of the UK were observed. These findings should not be extracted past the boundaries of the UK because this research was conducted on a primarily British sample
- All contextual reviews were undertaken in summer or early autumn, predominantly in fine weather. There are likely to be seasonal variations in what kinds of people undertake recreational maritime activities and how people tend to behave. This will manifest itself in observed lifejacket wear, and the decision-making behind engaging in safety behaviours to protect oneself from a threat. Caution should therefore be employed when interpreting these results to attempt to alter lifejacket wear throughout the year rather than during the peak sailing season.

## References

- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. Berlin, Heidelberg, New York: Springer-Verlag.
- Baullinger, J., Quan, L., Bennett, E., Cummings, P., & Williams, K. (2001). Use of Washington State newspapers for submersion injury surveillance, *Injury Prevention*, 7, 339-342.
- Bell (1969), cited in Rockwell, T.H., Weir, F. W. (1974). Effects of Carbon Monoxide Intoxication on Driving Tasks. *Transportation Research Record*, 520, Transportation Research Board.
- Bennett, E., Cummings, P., Quan, L., Lewis, F.M. (1999). Evaluation of a drowning prevention campaign in King County, Washington. *Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention*, 5 (2), 109-13.
- Bye, R. & Lamvik, G.M (2007). Professional culture and risk perception: Coping with danger on board small fishing boats and offshore service vessels. *Reliability Engineering and System Safety*, 92, 1756–1763.
- Canadian Red Cross Society (1994). Drownings among 1 to 4 year old children in Canada. A high risk group for water related fatalities. Ottawa: Canadian Red Cross Society of Canada.
- DeJoy, D.M. (1996). Theoretical models of health behaviour and workplace self protective behaviour. *Journal of Safety Research*, 27 (2), 61-72.
- De Vries, H., Lechner, L. (2000). Motives for protective behavior against carcinogenic substances in the workplace: a pilot study among Dutch workers. *Journal of Occupational and Environmental Medicine*, 42(1), 88-95.
- Floyd, D.L., Prentice-Dunn, S. and Rogers, R.W. (2000) 'A Meta-analysis of Research on Protection Motivation Theory ', *Journal of Applied Social Psychology*. 30 (2), 407 – 429.
- Golden, F. (1986). Survival at Sea: the Nature of the Medical Threat. In conference proceeding RINA Escape, Evacuation and Rescue Conference. London.
- Hole, G., & Langham, M. (1997). Reaction Time. Paper presented at the Biannual Conference of the Institute of Traffic Accident Investigators, Telford, November 1997.
- Janz, T. (1989), "The patterned behaviour description interview: the best prophet of the future is the past", in Eder, R.W., Ferris, G.R. (Eds), *The Employment Interview: Theory, Research and Practice*, Sage Publications: Thousand Oaks, CA.
- Keatinge, W.R. (1969). *Survival in Cold Water*. Blackwell Press.
- Kolb, D.A. (1984) *Experiential Learning: experience as the source of learning and development*. New Jersey: Prentice-Hall.
- Lajunen, T. and Rasanen, M. (2003). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the Health Belief Model, Theory of Planned Behaviour and the Locus of Control. *Journal of Safety Research*, 35, 115-123.
- Marico Marine Group (2007). MCA research project 586: Research to Determine the Regulatory Approaches to Recreational Vessels within the EU, Canada, Australia, New Zealand and the USA. Maritime Coastguard Agency.
- Maylor, E. A. & Rabbitt, P.M.A. (1993). Alcohol, reaction time and memory: a meta-analysis. *British Journal of Psychology*, 84, 301-317.
- McCormack, E., Elliott, G., Tikuisis, P., & Tipton, M.J. (2008) Search and Rescue (SAR) Victim Empirical Survival Model. Report for the USCG.
- McKnight, A. J. (1972), "The application of system/Task analysis the identification of driver perception and decision making processes," paper presented to the

- OECD Symposium on road user, perception and decision making, 13-15 November, Rome.
- Melamed S, Rabinowitz S, Feiner M, Weisberg E, Ribak J. (1996). Usefulness of the protection motivation theory in explaining hearing protection device use among male industrial workers. *Health Psychology*, 15 (3), 209-215.
- Morrongiello, B.A., Lasenby, J., Walpole, B. (2007). Risk compensation in children: Why do children show it in reaction to wearing safety gear? *Journal of Applied Developmental Psychology*, 28, 56–63.
- Neuwirth K., Dunwoody, S. and Griffin, R.J. (2000) 'Protection Motivation and Risk Communication', *Risk Analysis*, 20 (5), 721–34
- O'Callaghan, F.V. and Nausbaum, S. (2006). Predicting bicycle helmet wearing intentions and behavior among adolescents. *Journal of Safety Research*, 37, 425-431.
- O'Connor, P.J. & O'Conner, N. (2005). Causes and prevention of boating fatalities. *Accident Analysis and Prevention*, 37, 689–698
- O'Connor, P.J., (2002). Assessment of Fatal and Non-fatal Injury due to Boating in Australia. National Marine Safety Committee, Sydney.
- Quan, L., Cummings, P. (2003). Characteristics of drowning by different age groups, *Injury Prevention*, 9, 163-168.
- Quan, L., Bennett, E., Cummings, P., Trusty, M.N. & Treser, C.D. (1998). Are life vests worn? A multiregional observational study of personal flotation device use in small boats, *Injury Prevention*, 4, 203–205.
- Quick, B. L., Stephenson, M. T., Witte, K., Vaught, C., Booth-Butterfield, S. and Patel, D. (2008). An examination of antecedents to coal miners' hearing protection behaviors: A test of the theory of planned behavior. *Journal of Safety Research*, 39, 328-338.
- Rabinowitz, S., Melamed, S., Feiner, M., Weisberg, E., & Ribak, J. (1996). Hostility and hearing protection behavior: The mediating role of personal beliefs and low frustration tolerance. *Journal of Occupational Health Psychology*, 1(4), 375–381.
- Rogers, R.W. (1983). Cognitive and physiological processes in fear-based attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp.153-176). New York, NY: Guildford.
- Shults, R.A. , Nichols, J.L., Dinh-Zarr, T.B., Sleet, D.A. and Elder, R.W. (2004). Effectiveness of primary enforcement safety belt laws and enhanced enforcement of safety belt laws: A summary of the Guide to Community Preventive Services systemic reviews. *Journal of Safety Research*, 35, 189-196.
- Tipton, M.J. (2003). Cold water immersion: sudden death and prolonged survival. *The Lancet: Extreme medicine*, 362, S12-S13
- Tipton, M.J. (1989). The Initial Responses to Cold-Water Immersion in Man. *Clinical Sciences*, 77, 581-588.
- Treser, C.D., Trusty, M.N., Yang, P.P. (1997). Personal Flotation Device Usage: Do Educational Efforts Have an Impact? *Journal of Public Health Policy*, 18 (3), 346-356.
- Verplanken, B., Aarts, H., van Knippenberg, A., & Moonen, A. (1998). Habit versus planned behavior: A field experiment. *British Journal of Social Psychology*, 37, 111-128.
- Williams, A. F. & Wells, J. K. (2004). The role of enforcement programs in increasing seat belt use. *Journal of Safety Research*, 35, 175-180
- Witte, K. & Allen, M. (2000). A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns. *Health Education & Behavior*, 27 (5), 591-615.

## Acknowledgements

This project was only possible due to the generosity of the Marina Managers and Harbour Masters who let us carry out research on their grounds. Grateful thanks are therefore given to the following people:

James Moody (Chichester Marina); Jonathan Hind, Graeme Barnsley & Dan Hughes (Port Solent Marina); Neill Winter & Dan Heckford (Brighton Marina); Colin Hitchcock & William Barker (Littlehampton Harbour); Neil Clark (Penzance Harbour); Mark Evans & John Osmond (Falmouth Marina); Rupert Bremmer (Southsea Marina); Richard Lawton & Captain Martin Willis (Scarborough & Whitby Harbour); Trevor Barnes (Woolverstone Marina); Colin Jefferies (Port Hamble Marina).

Grateful acknowledgements are also given to the following people who were so generous with their time when undertaking the stakeholder interviews:

Michael Vlasto (Head of Operations, RNLI), Rod Johnson (Chief Coastguard, MCA), Guy Addington (Lifeboat Coxon, Margate Lifeboat station, RNLI), Janet Kelly & her team (Tower Lifeboat Station Manger, RNLI), Captain Martin Willis (Scarborough Harbour Master), the team at Worthing Beach Office, James Stevens (RYA Head of Training), Sergeant Andy Simpson and PC Nick Mackinnon (Hampshire Marine Police Unit).

Special thanks to Roger Aldham (Data Quality Supervisor, RNLI), who undertook an extensive analysis of the RNLI database in order to answer our research questions in the reviews stage.

Thanks also to Chris Turner & Mike Tipton for providing a copy of their research for the U.S. Coastguard.

## Appendix I: Research Questions for Pre-Intervention Contextual Reviews

*\*\* Only numbered questions in black font are actual questions rather than research questions; LJ = lifejacket*

### **(Preamble)**

What kind of safety equipment do you have on the boat?  
(If they say LJs) In what situation would you wear your lifejacket?  
Do you understand what these symbols mean (buoyancy symbols)?

### **(Threat appraisal)**

*How aware are they of the threat (perceived severity of hazard)?*

1. What would you say is the biggest threat to you out on the water?
2. How long would you survive in this water without a lifejacket (metric)?

*How susceptible do they believe they are (perceived vulnerability)?*

4. Do you think there is much risk of you falling into the water and struggling to get out?
5. Are other people (passengers on your boat/other boats owners) more at risk than you?

### **(Decision making)**

- *What are the costs/barriers of LJ use?*
- *What are the rewards of not wearing a LJ (extrinsic & intrinsic rewards)?*
- *Perceived adequacy of behaviour (response efficacy).*
- *Perceived ability to perform adaptive behaviour (self efficacy)*

6. Do you believe a lifejacket could save your life?, i.e.: How confident are you of relying on a LJ?
7. How easy do you/ would you find it to choose a lifejacket, or to fit it properly?
8. Do you check your LJ to make sure its still usable?
9. What stops you from wearing a lifejacket (at all times on the water)?
10. Is there any benefit you haven't mentioned already of not wearing a LJ?

### **(Initiation & perceived behavioural norm)**

11. What percentage of people wear lifejackets in this area?
12. Are lifejackets quite easy to get hold of?
13. When did you buy yours/ did you think about buying one?

### **(Adherence)**

14. Are there any situations in which you would never wear a lifejacket?

### **(Risk compensation)**

15. Do you think some people are less careful on their boats when they have the protection of a lifejacket?

## Appendix II: Findings for Pre-Intervention Contextual Reviews

Lifejacket worn when:	Number of comments
Bad weather	19
Rough conditions (sea state, etc)	14
Lots of spray	3
At night	3
Children aboard	2
Far offshore	2
Offshore	2
Set sail - not at helm	2
At night in estuary	2
Trouble impending	2
Wearing heavy clothes	2

Table 20: *Categories of conditions when lifejackets were worn for occasional wearers, in order of the frequency with which they were mentioned*

Bad weather criteria:	Number of comments
Windy	3
Not hot	3
Force 5	2
Force 4/5	2
Force 12	2
Bad weather	2
Temperature changes	1
Not sunny	1
Force 5/6	1
Fog	1
Changeable weather	1

Table 21: *Weather conditions in which lifejackets were worn, making up the 'bad weather' category*

Rank of threat	Largest threat	Number of comments
1st	Weather (failing to prepare, fog, wind)	21
2nd	Other boats (ignorance, reckless skippers, not being seen)	20
3rd	Fishing pots	9
4th	MOB (drowning, hypothermia)	7
5th	Mechanical failure	5
Joint 6th	Equipment failure	4
	Fire	4
Joint 7th	Navigational hazards (grounding, sandbanks, etc)	3
	Manoeuvring	3
	Sinking	3
Joint 8th	Boom	2
	Debris	2
	Trapped under capsized boat	2
9th	Water conditions	1

Table 22: *The largest perceived threats in rank order of the frequency with which they were mentioned*

Rank of cost	Costs	Number of comments
Joint 1st	Uncomfortable	7
	Restrictive (bulky, including 275N)	7
2nd	Crotch straps restrictive	4
3rd	Dangerous when fishing with other equip	3
Joint 4th	Prevents even suntan	2
	Expensive	2
Joint 5th	Unobtrusive	1
	Not durable enough	1
	Not cool	1
	Hassle when changing clothing	1
	Hassle to maintain	1
	<b>Non costs</b>	
1st	Not uncomfortable	19
2nd	Not restrictive	4

Table 23: *Costs & Non costs in rank order of the frequency with which they were mentioned*

Notice those participants who claimed lifejackets were uncomfortable are outnumbered by those who said they were **not** uncomfortable.

Appendix III: Final safety poster designed for Objective 3 & assessed in Objective 4



# FIRST GASP OR LAST BREATH

## COLD WATER SHOCK KILLS

**FACTS:**

- Falling into water will result in a **gasp reflex: uncontrolled breathing and panic.**
- One gasp of water could **kill you in seconds.**
- **UK waters are cold** enough to cause cold shock and being a **strong swimmer will not save you.**
- A **lifejacket keeps your head safely above water** – ensuring you gasp **air.**
- Wear your lifejacket **correctly** – **make sure your first gasp is not your last.**



**Useless unless worn**

[uselessunlessworn.org.uk](http://uselessunlessworn.org.uk)

This is part of a research project by:  
User Perspective Ltd

## Appendix IV: Measures for the post-intervention contextual reviews

Is this your boat?  
What size is it?

### **CURRENT LJ WEAR**

1. Are there any situations in which you tend to wear a LJ?

#### **PROBES IF AWKWARD:**

- Rough conditions
- At night
- In the tender
- Sailing solo
- Equipment failure
- Set an example

### **SEE/UNDERSTAND**

2. Have you seen this poster?

*If yes - where? (If not let them read it)*

3. What do you understand about the message it is trying to convey?

*(Explain cold water shock & what LJs do)*

3a. What do you think of the image?

3b. What do you think this icon means? *(LJ man icon)*

3c. Have you ever fallen overboard?

### **DECIDE - Threat appraisal**

4. Were you aware of cold water shock before seeing this?

4a. *If yes* – How did you find out about cold water shock?

4b. Do you see cold water shock as a threat to you?

5. How long would you survive if you fell overboard without a LJ at this time of year?

5a. Has this assessment changed since seeing the message/since finding out about CW shock?

6. How long would you survive if you fell overboard with a LJ?

### **Coping appraisal**

7. Do you believe a LJ could save your life?

7a. Why?

### **Initiation**

8. Do you feel you need more info on lifejackets (fitting, etc)?

8a. Did you notice the website address on the poster?

8b. Would you use this as a source of information for LJs?

### **Behavioural intention**

9. Do you plan to change how you use safety equipment in the future after seeing this?

**PROBES IF AWKWARD: Conditions** of wear (weather, etc)

**Buying** a new lifejacket/ crotch straps

**Maintaining** your LJ more often

**Fitting** a lifejacket properly