

PRIMARY INDUSTRIES HEALTH AND SAFETY PARTNERSHIP



Reducing rates of death and injury in the Australian fishing industry

by Annie Jarrett and Adrienne Laird
NPF Industry Pty Ltd

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Foreword

Safe Work Practices Australian has reported that agriculture, forestry and fishing are the most dangerous professions in Australia with over fifty fatalities reported annually¹. The nature of the commercial fishing work environment is inherently dangerous, and the regular introduction of crew with no prior fishing experience into the increasingly transient workforce compounds this risk. Also relevant is the fact that traditional workplace health and safety training measures employed by the seafood industry, which are based largely upon memorisation of procedures, are largely ineffective in stimulating the necessary behavioural change required to effectively reduce injury/fatality levels. Effective modification of behaviour cannot be achieved without an individuals' strong internal motivation to change, the right knowledge and tools to facilitate change, and a sustained focus on the change.

Northern Prawn Fishing (NPF) Industry recognised that a new approach was required for the Northern Prawn industry, based upon an understanding of cognitive processes, value belief systems and behaviour, and how to influence those processes, systems and behaviours to improve safe practices. Such approaches have been successfully employed in other industries (e.g. the mining and energy generation sectors) but had not previously been trialled in the fishing sector. This project sought to develop and trial a training program which utilised effective methods employed in other industries to instil a level of commitment to safety which goes beyond compliance, cultivating a true work safety community.

This research found that cognitive-based training focusing on individual participants, their internal processes regarding risk awareness and self-empowerment regarding safety, could be an effective tool to increase workplace safety in the fishing industry. The training sought to provide participants with practical insights into how their brain works, empower them to make better decisions, and allow them the option of changing the way they respond to their world, particularly in regard to safety on a fishing vessel. The level of effectiveness of this type of training can be improved with strong support from higher levels such as vessel skippers, company fleet managers and CEOs.

The program was specifically designed using experientially-based activities and highly interactive methods which were informative and engaging to participants.

This project was funded from RIRDC Core Funds which are provided by the Australian Government.

This report is an addition to RIRDC's diverse range of over 2000 research publications and it forms part of our Primary Industries Health and Safety Partnership R&D program, which aims to improve the safety of the work environment and practices in farming and fishing industries.

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Mr John Harvey

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¹ <https://www.safeworkaustralia.gov.au/statistics-and-research/statistics/fatalities/fatality-statistics-industry>

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Executive Summary

What the report is about

This report details the experience of the cognitive-based safety training provided to crews and skippers of the Northern Prawn Fishery in 2015 and 2016 as a way to increase safety on board fishing vessels through enhancing safety attitudes and behaviours.

Who is the report targeted at?

The Australian fishing industry and safety training providers.

Where are the relevant industries located in Australia?

This research was undertaken in the Commonwealth's Northern Prawn Fishery (NPF) which operates across northern Australia from Cape York in Queensland to Cape Londonderry in Western Australia. The NPF is Australian's largest and most valuable prawn fishery and the Commonwealth's most valuable commercial fishery with GVP of approx. \$120 million in 2016. 52 trawlers operate in the Northern Prawn Fishery - approximately 300 people (skippers, engineers and crew) from across Australia and overseas are contracted to work on NPF trawlers.

The results of this research is relevant to all the State and Commonwealth fisheries located around Australia and also land-based primary industries.

Background

In November 2013 a fisher named Ryan Donaghue died tragically aboard an NPF trawler. The death occurred as a result of unsafe behaviour whilst undertaking vessel maintenance at sea, despite Ryan and his crew members having received all necessary training in safe work practices.

Safe Work Practices reports Agriculture, Forestry and Fishing as the most dangerous professions in Australia with over fifty fatalities reported annually². The nature of the fishing work environment is inherently dangerous, and the regular introduction of crew with no prior fishing experience into the increasingly transient workforce compounds this risk. Also relevant is the fact that traditional workplace health and safety training measures employed by the seafood industry, which are based largely upon memorisation of procedures, are largely ineffective in stimulating the necessary behavioural change required to effectively reduce injury/fatality levels. Effective modification of behaviour cannot be achieved without an individuals' strong internal motivation to change, the right knowledge and tools of how to change, and a sustained focus on the change.

Aims/objectives

The objective of this research was to undertake a trial in the NPF of the application of customised OH&S training & embedding methods which are based on an understanding of human behaviour and psychology of change to enhance penetration of knowledge and overall improvement of internal safety motivations among participating fishers.

Methods used

A one day fully customised and targeted safety training program was developed with Sentis and delivered to personnel in the NPF over a one week period during the pre-season preparation for the tiger

² <https://www.safeworkaustralia.gov.au/statistics-and-research/statistics/fatalities/fatality-statistics-industry>

prawn season at the end of July 2015. The one day workshops were conducted in the three main ports of Cairns, Darwin and Karumba.

A BACI (before, after, control, impact) design analysis approach was employed to achieve a thorough evaluation of program success.

Results/key findings

Sufficient data was collected to gain an understanding of the positive impact such training can have in the fishing industry, which is inherently dangerous. In particular:

- An increase in the motivation of individuals to behave safely, be more certain about their tasks and be effective safety role models for crew to follow;
- Increasing safety compliance behaviour and ability to exhibit safe behaviour;
- An increase in the confidence and ability of individuals to report safety incidents;
- Improved safety leadership, culture, communication, and performance.

However, the success of the project was to some extent impeded by difficulties in obtaining post workshop survey data during the fishing seasons.

In addition to the above results, it was found that the effectiveness of the training program varied between participants and depended on several factors:

- Initial interest in participation (individual willingness to be attend the workshop or feeling like they were being made to do it by the company);
- Level of support for the program from company hierarchy i.e. skippers, fleet managers, CEOs – this influenced the attitude of participants towards the program and their level of openness to the new concepts;
- Upcoming fishing season – distracted by preparations for the season, highly productive/busy season;
- Remoteness of the fishery and ability to maintain contact with participants for follow up surveying; *and*
- Limited windows of opportunity to engage face-to-face with participants – skippers and crew live throughout Australia and return to port to prepare for the fishing season a week prior to the vessel leaving for the start.

It is anticipated that the adoption of this style of cognitive-based safety training by the fishing industry should result in a decrease in the level of injuries and/or fatalities and near-misses on fishing vessels. The training was interactive and engaging and gave participants the knowledge and tools to make behavioural changes to improve the safety of the workplace. It also gave the participants the confidence to identify unsafe practices and communicate these to their workmates and skipper. Adoption of this type of training should result in safer work place practises. Regular (annual or biennial) ‘refresher’ training would assist with long-term embedding of learnings.

Recommendations

The following recommendations are targeted at those in the fishing and other primary industries sectors looking to implement cognitive-based safety training in the workplaces, research funding agencies, and agencies involved in developing work place safety policies.

The challenges faced by the Sentis project team highlight the need for an overall change in safety culture in the commercial fishing industry. This will require a collaborative approach between policy makers, regulators, trainers and industry to improve safety awareness and safety outcomes.

These types of research projects need to be rolled out across a variety of fisheries and fishery locations to determine the effectiveness of cognitive-based safety training in various situations. Data should be collected on the challenges relating to the geographic location of the fishery, logistics of fishing time and crew availability, constraints on both face to face and e-communications and attitudinal issues which can impede the potential for success of this type of training in differing situations.

Further research into the long-term effectiveness of this type of training should also be undertaken. While some positive results were gained from this program in the NPF, safety knowledge exhibited a decline back to baseline levels 3 months post the workshop which suggests that retention of knowledge after the program may have decreased over time. Continued refreshing of the concepts and tools learnt could possibly reduce or eliminate this decline however this needs to be tested.

Whilst the workshop approach was effective, consideration should be given to holding separate workshops for senior personnel and separate workshops for crew members (ie one workshop for skippers and management, another for crew).

Awareness programs should include (but not be limited to) provision of new and innovative technologies and programs such as cognitive training techniques available for adaption/adoption in the fishing industry.

Similar research projects should be undertaken in other primary industry sectors to determine the appropriateness of cognitive-based training in those sectors.

Implications

The implications of the successful implementation of this type of training are generally positive as follows:

Industry

Cognitive training is likely to result in safer work places and less accidents resulting in injury or deaths on fishing vessels. Improvements in work place safety in the fishing industry will have both reputational and practical benefits for the industry, including recognition by the overall community of fishing as a safer activity and increased potential to attract and retain crew to a recognised safe working environment.

Communities

Communities will benefit from improvements in fishing vessel safety due to less accidents resulting in injury or death, and crew being returned safely home from sea to their families and friends. Family stress will be reduced knowing that innovative training methods are being provided to their fishing family members with a view to making them safe whilst on board fishing vessels.

Policy makers

Policy makers should support further investigation of this type of training for primary industries, including through support for research projects and funding to ascertain the pros and cons of this type of training across a range of industries and situations. Government policy should be aimed at improving work place safety without regulatory burden where possible. Safety prevention should be front of mind in developing workplace safety policies. Focusing on safety prevention, rather than with dealing with the consequences of work place accidents, will have positive social and economic benefits for families, communities and governments. However this will require willingness to invest in exploring new and innovative ways of workplace training methods and the exploration and/or adoption of non-traditional approaches such as the Sentis-type training where appropriate and applicable.

Introduction

In November 2013 a fisher named Ryan Donaghue died tragically aboard an NPF trawler. The death occurred as a result of unsafe behaviour whilst undertaking vessel maintenance at sea, despite Ryan and his crew members having received all necessary training in safe work practices.

The nature of the fishing work environment is inherently dangerous, and the regular introduction of crew with no prior fishing experience into the increasingly transient workforce compounds this risk. Also relevant, is the fact that traditional workplace health and safety training measures employed by the seafood industry, which are based largely upon memorisation of procedures, are largely ineffective in stimulating the necessary behavioural change required to effectively reduce injury/fatality levels. Effective modification of behaviour cannot be achieved without the following three preconditions:

1. strong internal motivation to change
2. knowledge and tools of how to change
3. a sustained focus on the change

NPFI recognised that a new approach was required for the seafood industry, based upon an understanding of cognitive processes, value belief systems and behaviour, and how to influence them to improve safe practices. Such approaches have been successfully employed in other industries (e.g. the mining and energy generation sectors), however to date have not been trialled in the fishing sector. This project seeks to develop and trial a training program which utilises effective methods employed in other industries, to instil a level of commitment to safety which goes beyond compliance, cultivating a true safety community.

Objectives

1. Trial the application of customised OH&S training & embedding methods, in the Northern Prawn Fishery, which are based on an understanding of human behaviour and psychology of change to enhance penetration of knowledge and overall improvement of internal safety motivations among participating fishers.
2. Undertake a BACI-style analysis approach to confirm effectiveness, and extend findings to other fisheries.

Methodology

In designing the training program for the NPF, Sentis trainers incorporated elements of stage-learning theory and social learning theory (Bandura, 1977). According to the stage-learning approach, interventions typically consist of three phases: acquiring declarative knowledge, knowledge consolidation/compilation, and knowledge proceduralisation (developing skills). Social learning theory is founded in observational, rehearsal, and feedback activities designed to increase the learner's self-efficacy. Applied to safety training, the stage- and social-learning theories have been shown to result in increased safety knowledge, motivation, and behaviors (Burke, Holman & Birdi, 2006). Specific to the program, a combination of expert lecture, combined with demonstrations of key skills, interactive media to illustrate key concepts (such as animations), and an extensive role-play/practice session focusing on application of a safety feedback/recognition conversation process was used.

The training program also trialled a ‘safety training transfer toolkit’ that was derived from current theory around training transfer. These tools included:

- A ‘relapse prevention tool’ conducted at the conclusion of workshops that helped participants identify opportunities to apply learned concepts, identify specific goals, and address anticipated barriers to transfer (Burke & Baldwin, 1999; Rahyuda et al., 2014).
- A skipper safety training transfer module also delivered at the workshop conclusion that identified critical behaviors skippers can use to support their crews’ training transfer (e.g., Bhatti & Kaur, 2010; Dermol & Cater, 2013).
- Communications templates designed for senior fleet management highlighting the priority of the safety intervention (Yelon et al., 2014) throughout the intervention and follow-up.

Together, these tools should address both the individual (transfer motivation) and contextual (safety training transfer climate) factors that are implicated in application of learning on return to the job.

Cognitive based workshops

A one day fully customised and targeted safety training program (High Performing and Safe Teams program) was developed with Sentis and delivered to personnel in the Northern Prawn Fishery over a one week period during the pre-season preparation for the tiger prawn season at the end of July 2015. The one day workshops were conducted in the three main ports of Cairns, Darwin and Karumba. Two workshops were run in each port, one for the vessel skippers and another for the crew.

The workshop was designed around core psychological and behavioural concepts that have been shown to improve safety performance. Specifically, both crews and skippers received a consistent four-hour ‘block’ of content that focused on building intrinsic motivation for safety, communicating key safety knowledge (with focus on brain science such as inattention and social pain/threat responses), and a key safety communication process (with skill-based training).

In addition to this core module, skippers also received an additional four-hours of content that focused on safety leadership competencies. Specific concepts and skills covered in the additional skipper module included a model of individual change (Prochaska & Velicer, 1997), tools to improve collaboration with crews, and a focus on reward/recognition of high safety performance.

The workshops were delivered using a facilitated instructional style the emphasised adult learning principles such as group discussion, acknowledging learners’ own experiences and skills, and including opportunities to practice skills and receive feedback (Knowles, 1970). This approach also reflects meta-analytic findings that suggest more engaging and interactive training formats result in greater learning

The program was specifically designed using experientially-based activities and highly interactive methods which were informative to participants. Program objectives and the agenda are provided below.

Program Objectives:

- Identify WHY we choose to make safe choices in the workplace.
- Discuss how the brain works and how this knowledge can be used to keep safe.
- Explore how belief systems and attitudes are formed & how they affect personal safety.
- Identify thinking patterns shown through psychological research to increase personal safety.
- Identification of immediate workplace application of skills, models and tools.
- Ensure strong links between program content and NPF’s Management System and Plan, and overall expectations.

Crew Workshop:

- Personal Big 5 and Cost vs. Currency Models.
- Attitudes-Behaviour-Results Model.
- Safety Culture Model, with emphasis on how our attitudes toward each component can drive behaviour and results.
- Safety Locus of Control (Sphere of control and influence)
- The core competency of ‘Communicate’.
 - Focus will be on behaviours including passing on all safety messages and raising safety concerns or issues with others.
 - Core tool is the ‘SAFE Conversations’ model – Safety Acknowledgement
- The core competency of ‘Support’.
 - Focus will be on behaviours including challenging unsafe acts to establish a positive team safety climate and helping the team to complete behaviours safely, thereby setting a positive example and working collectively to achieve high safety performance.
 - The main tool is SAFE Conversations model – Safety Concern

Leader (Skipper) Workshop

- Personal Big 5 and Cost vs. Currency Models.
- Attitudes-Behaviour-Results Model.
- Safety Culture Model, with emphasis on how our attitudes toward each component can drive behaviour and results.
- Safety Locus of Control (Sphere of control and influence)
- The Stages of Change model.
- The Social Brain – focus on threat and reward responses.
- The core competency of ‘Recognising’
 - Tokens
 - The SAFE Conversations model.
- The core competency of ‘Actively Caring’.
 - Trust and authenticity – Social Brain
- The core competency of ‘Collaborating’.
 - Leader Frames

BACI analysis

Program analysis was vital to determine effectiveness, and derive lessons able to be shared with other fisheries. A BACI (before, after, control, impact) design analysis approach was employed to achieve a thorough evaluation of program success. For this the following was done:

- delivery of pre training (before) surveys (T1) to collect baseline data from participants (treatment) and non-participants (control) groups;
- delivery of post-training (after) impact and transfer surveys (T2) immediately post-program and again after 3 months (T3) to facilitate pre-post comparison of knowledge, attitudes, and behaviours, and comparison between treatment and control groups. Surveys were used to assess evidence of change across the following factors:
 - Safety knowledge, such as the amount of learning that occurs across key topics targeted by the training.

- Safety attitudes and beliefs, which are the keystones of sustained behaviour change.
 - Specific safety behaviours.
 - Team-level factors such as the quality of safety communication and the general safety climate aboard each fishing vessel.
- completion of a summary of program outcomes based on trainer observations of participants (informing ongoing program modifications and qualitative evaluation);
 - Focus group workshop with skippers

Chapters

Cognitive based workshops

The tailored cognitive-based workshops were delivered to crews and skippers in July 2015 just prior to the tiger prawn season. The primary objective of these workshops was to increase vessel safety through enhancing employees' safety attitudes and behaviours, in anticipation of the upcoming season.

With assistance from NPF Industry Pty Ltd (NPF), Sentic delivered these workshops in three locations: Cairns, Darwin, and Karumba. A total of 127 employees representing 9 fishing companies and 29 (of 52) separate vessels participated in the safety workshops. Selected Fleet Managers and industry leaders also participated in the programs across the three locations.

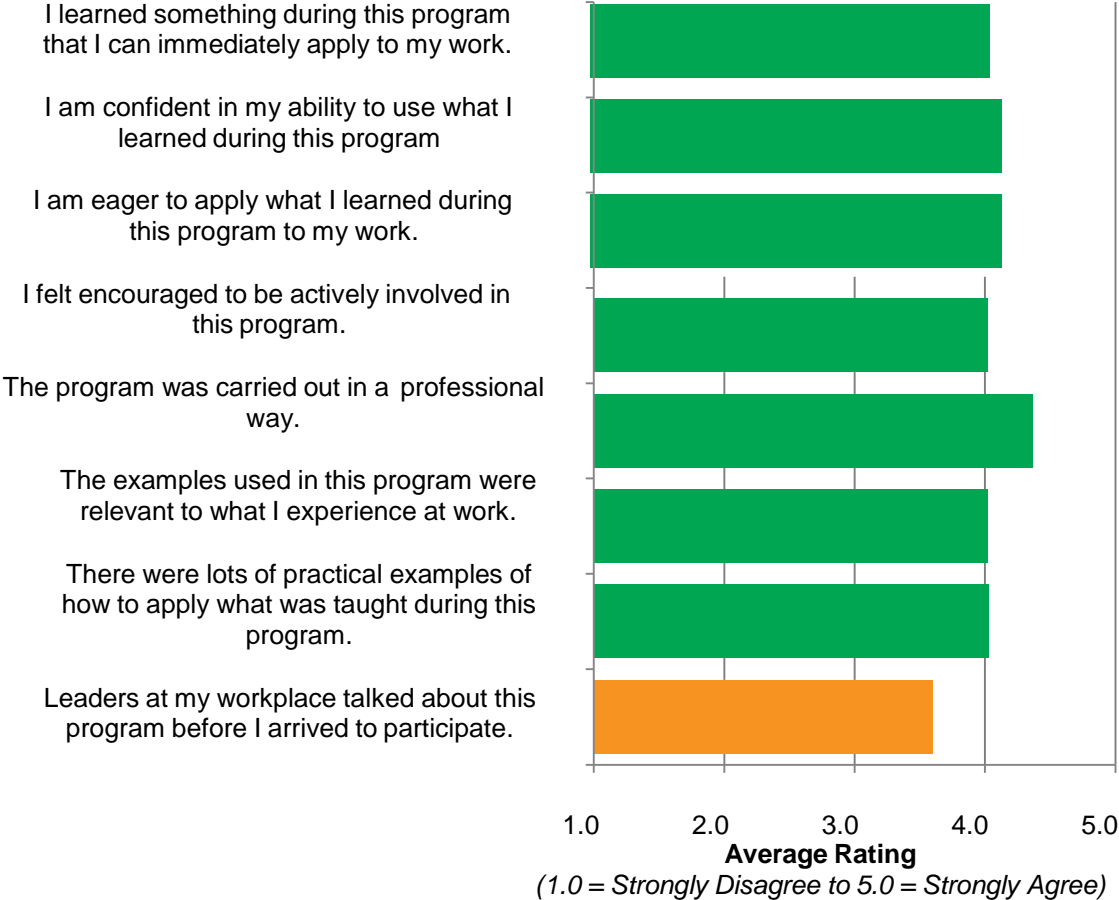
In conjunction with the workshop delivery, Sentic worked with NPF to conduct an applied research program. This research hoped to achieve two objectives: 1) evaluate the impact of the workshops on personal, team, and vessel safety outcomes, and 2) evaluate the effectiveness of a suite of tools designed to 'boost' training transfer (the application of what was learned during training). Sentic reported on the outcomes of this applied research program throughout the duration of the project (see Appendix 1 and 2)

An overarching summary of the research results obtained from the pre and post workshop surveys is presented below (see Appendix 1 for full results) and showed most positive results and attitude towards applying the safety training concepts learned (Figure 1):

Key Results

1. Overall ratings of program quality (e.g., workshop delivery, effectiveness of learning strategies) were positive (mean responses to survey questions ranged between 4.0-4.2 out of 5.0).
2. In general, the amount of new knowledge about safety significantly increased pre- (Mean = 3.5/5.0) to post-workshop (Mean = 4.0/5.0).
3. Post-workshop, crews and skippers reported feeling confident to display the trained safety behaviours such as conducting safety conversations (Mean = 5.2/6.0).
4. Post-workshop, crews and skippers reported feeling ready and eager to apply at least one concept that they learned from the workshop when they returned to work (Mean = 4.1/5.0).
5. Results from the Site 2 participants were significantly less positive than the results from either Site 1 or Site 3 (mean differences ranged between 0.3-0.4).

Figure 1. Mean responses to each post-workshop feedback question (all training groups combined).



Follow up surveying

Between August and December 2015, Sentis and NPMI implemented follow-up data collection in support of the NPF High Performing and Safe Teams program rollout. This activity continued on the applied research study to track the effectiveness of the cognitive-based safety workshop delivered to crews and skippers during July 2015. The main objective of the 3 month post workshop survey (T3) was to establish whether the positive changes obtained at the initial post workshop survey (T2) carried over, as well as conducting a holistic assessment of change over the course of the project.

The main challenge experienced was a low participation rate among the control group (pre workshop = 18% and post workshop = 38%). As these percentages were below what Sentis recommended as a minimum (60%), it is unlikely that the control group responses represented the general control group population across the fleet. A further challenge was a significantly lower participation rate from the follow up survey training group after 3 months (43%) as compared to the pre (93%) and post (88%) workshop surveys. Further, most follow up survey participants were drawn from two large companies. This meant that the ability to directly track individuals’ changes over time was limited, and there was a possibility that the follow up data were biased (as they over-represent two companies).

Specific findings following the analysis of pre (T1) and post (T2) workshop survey and the follow up (T3) survey data are summarised below (see Appendix 2 for full results):

Key Results

1. The frequency of safety compliance behaviour among training participants increased between pre workshop (Mean = 4.9/6.0) and 3 months later (Mean = 5.2/6.0), although the difference was not statistically-significant.
2. The average number of safety incidents (e.g., near-misses, injuries) experienced and not reported significantly decreased between pre workshop (Mean = 1.5) and 3 months later (Mean = 0.1).
3. Trainees' confidence to show safety behaviours on the vessel remained at a high level at 3 months post workshop (Mean = 5.3/6.0).
4. Compared to the control group at 3 months later, the training group had significantly higher safety motivation (more motivated to behave safely) and less task uncertainty (less likely to report that the job was unpredictable during last season), but the difference for task uncertainty was not statistically-significant.
5. Perceived levels of change in safety leadership, culture, communication, and performance were positive at 3 months post workshop, with over 80% of training participants reporting that improvements had occurred following the Sentis workshop.
6. Although the amount of safety knowledge learned among participants improved between pre workshop (M = 3.7) and post workshop (M = 3.9), 3 months post workshop safety knowledge exhibited a decline back to baseline levels (M = 3.7). This suggests that retention of knowledge after the program may be decreasing over time.
7. Of all the concepts learned during the workshop, training participants were most likely to report that they applied 'Being an effective safety role model for the crew to follow' 3 months post workshop.

Table 1 below shows the changes in group averages over time, in terms of raw changes between all measurement occasions. Of all the evaluated study variables, the frequency of safety compliance behaviour and the number of safety incidents experienced and reported improved. Some other results listed below also improved over time, but were not statistically significant so the change may be due to chance fluctuations and not meaningful.

Although some of these results lend support to the success of the High Performing and Safe Teams program, the challenges encountered throughout data collection mean that the findings should be interpreted with caution.

Table 1. Selected comparisons across all measures

Safety Factor	Average Result			General Trend
	T1	T2	T3	
Safety knowledge	3.7 /5.0	3.9 /5.0	3.7 /5.0	No change
Confidence to show safety behaviours	5.3 /6.0	5.2 /6.0	5.3 /6.0	No change
Safety motivation	5.5 /6.0	5.4 /6.0	5.5 /6.0	No change
Safety control	5.2 /6.0	-	5.1 /6.0	No change
Frequency of safety compliance behaviours	4.9 /6.0	-	5.2 /6.0	Positive change*
Frequency of safety citizenship behaviours	4.5 /6.0	-	4.7 /6.0	Positive change
Safety incidents experienced and reported	1.9	-	1.4	Positive change (reduction)
Safety incidents experienced and <u>not</u> reported	1.5	-	0.1	Positive change (reduction)*

Note: Asterisk trend results denote where the changes were statistically-significant at a $p < .05$ level.

Workshop Embedding Analyses

To support the NPF in sustaining the positive changes made via the Sentis workshop, the follow up survey (T3) data was analysed using the series of ‘training transfer’ questions included as a diagnostic measure. Overall, these results suggested the following challenges to training transfer and embedding:

- Although the post workshop ‘readiness to apply learning’ result was high, the follow up data indicated that employees varied greatly in their actual application of the learned concepts 3 months later. The most commonly applied concept was ‘Role-modelling safety for other crew to follow’.
- Support to apply learned concepts from co-workers, skippers, the job, and management also varied markedly 3 months later. A specific ‘safety training transfer toolkit’ was included in the Site 2 and Site 3 groups, which may have contributed to these varied results. Unfortunately, the small sample of follow up surveys received means it was difficult to reliably explore whether the training transfer module had a booster effect compared to the non-module group.
- Participants’ ratings of the safety training transfer toolkit tools were moderate (positive, but typically fair in their evaluations), which could mean that these were not effectively implemented after the workshop and may not have been consistently encouraged by skippers.

Table 2 below summarises the participants’ average perceptions of support to transfer safety training at the time of the follow-up survey. Notably, the deviation around the group mean was sizable, which means that perceived support for safety training transfer differed markedly across the fleet. Also, the average or mean for each perception was fair, which suggests that all aspects of support for safety training transfer could be improved. Finally, perceptions of ‘opportunity to use what was learned’ were the least positive and may have been influenced by the extremely busy fishing season preceding the workshop.

Table 2. Average perceptions of support from workshop participants to apply learned skills/concepts in the workplace following participation in the NPF cognitive-based safety program.

Perception	Mean	SD
Skipper's support for safety training transfer	3.8 /5.0	1.3
Crewmates' support for safety training transfer	3.7 /5.0	1.3
Opportunity to use that was learned on the job	3.5 /5.0	1.2
Fleet managers' support for safety training transfer	3.8 /5.0	1.1

Note: SD refers to 'standard deviation' or the standardised average difference between each individual's raw score and the group mean.

Following the analyses of the data and the low level of training transfer and embedding, Sentis made the following recommendations to make further improvements to safety across the NPF fleet:

1. Consider refreshing all training participants' knowledge of the trained skills and concepts, which could be achieved through a variety of methods, including videos, eLearning, and brief face-to-face sessions (possibly as part of the T4 follow-up component of the research project). This recommendation is supported by the finding that T3 safety knowledge declined to baseline (T1) levels.
 - a. As part of this process, remind participants about the concept of 'training transfer' and discuss any practical challenges to applying the program concepts over the past fishing seasons.
2. Re-engage with training group Fleet Managers and skippers to highlight the importance of supporting safety training transfer, reminding them of the key concepts/skills and their role in encouraging these to be applied among their crews.
3. Provide skippers and first mates with coaching to improve their ability to explain and implement cognitive-safety concepts with their crews (e.g., roleplaying SAFE Conversations, demonstrating how to conduct an effective pre-start safety meeting).
 - a. As part of this ongoing development, skippers could benefit from a workshop and supporting coaching that targets their safety and general leadership abilities, particularly around their skills to positively influence the thinking and behaviour of crew using psychological tools.
 - b. Focussing on skippers is recommended as this is likely to be the most economically viable option (given it is a smaller group) and the weight that the skipper's presence carries on-board each vessel (establishing the social context for safety across the crew).
4. Through interviews and workplace observations with vessel crews, explore further ways that the cognitive-based safety concepts and skills can be contextualised to increase their uptake among vessel crews.
 - a. This improvement process could be supplemented by interviews with crews and skippers based on their hands-on experiences with trying out what they learned from their Sentis workshop.

5. Consider sharing the research results with Fleet Managers, emphasising the areas where positive change was not achieved and link this to the ‘support for safety training transfer results’. Discuss reasons why the program may not have been as successful as expected, and formulate an action plan that includes specific commitments from Fleet Managers to help revitalise and re-embed the trained concepts and skills.

Focus Groups

Recommendations 2 and 3 were implemented as the final stage of the High Performing and Safe Teams program to re-engage with training group Fleet Managers and skippers to highlight the importance of supporting safety training transfer, reminding them of the key concepts/skills and their role in encouraging these to be applied among their crews.

The focus groups also provided skippers with coaching to improve their ability to explain and implement cognitive-safety concepts with their crews (e.g., roleplaying SAFE Conversations, demonstrating how to conduct an effective pre-start safety meeting).

In February 2016 Sentis consultants attended the NPMI stakeholder meeting to outline the training tools applied in the skipper and crew workshops in 2015 and present the results of the program so far. They also emphasised the need for upper level support for the concepts learned in the workshops and encouraging their skippers and crew to apply them. The meeting was attended by NPMI Directors, company fleet managers, CEOs and NPMI license holders.

In July 2016 skipper focus groups were run at Site 1 and Site 3 prior to the start of the fishing season. Skippers in the NPMI are highly regarded by their crew and further coaching of skippers in positive attitudes and safety behaviour could influence crew to support and take on the same positive attitude and safety behaviour. Fourteen skippers and two fleet managers participated in the focus groups which aimed to review and build on concepts learned in the 2015 workshop.

Activities were run at both sites to recall and apply concepts previously learned. The recall of workshop concepts varied between the two sites with Site 3 much lower than Site 1 so more time was spent reiterating the main concepts with those skippers (see Appendix 3).

To communicate outcomes of this research a video was developed and distributed by Cox Inall Communications as part of the *Communications for the Primary Industries Health and Safety Program 2015-17 project* (<https://www.youtube.com/watch?v=GnHTr6D2BTM&feature=youtu.be>).



Figure 2 Sentis consultant Christiaan Knapp working with skippers of the Northern Prawn Fishery on improving safety attitudes and behaviour of their crew.

Results

Objective 1. Trial the application of customised OH&S training & embedding methods, in the Northern Prawn Fishery, which are based on an understanding of human behaviour and psychology of change to enhance penetration of knowledge and overall improvement of internal safety motivations among participating fishers.

In 2015 the High Performing and Safe Teams program, a customised cognitive based safety training program, was rolled out in the NPF in the fishery's ports of Cairns, Darwin and Karumba. The safety training workshops were implemented successfully with a total of 127 skippers and crew representing 9 fishing companies and 29 (of 52) separate vessels participating. Selected Fleet Managers and industry leaders also participated in the program across the three locations.

While 127 fishers participated in the training, only 28 individuals completed all three of the surveys over the duration of the program. The nature and remoteness of the Northern Prawn Fishery proved to be a challenge for running this sort of research and collecting the longer term information required to determine the effectiveness of the training. Skippers and crew live Australia wide and overseas when the fishery is closed and arrive in port approximately one week prior to the vessel departing for the opening of the (two) fishing seasons. This time is extremely busy and stressful and is spent preparing the vessel as well undertaking other training such as first aid, safety at sea, OH&S and other company briefings. While NPMI was successful in maximising the number of participants at the workshops and for the control group, subsequent surveying of both groups proved difficult for the 3 month survey as once they were at sea they were hard to contact and distracted by the fishing activity.

The effectiveness of the training program varied between participants and appeared to depend on several factors:

- Initial interest in participation (individual willingness to be attend the workshop or feeling like they were being made to do it by the company);
- Level of support for the program from company hierarchy i.e. skippers, fleet managers, CEOs – this influenced the attitude of participants towards the program and their level of openness to the new concepts;
- Upcoming fishing season – distracted by preparations for the season, highly productive/busy season;
- Remoteness of the fishery and ability to maintain contact with participants for follow up surveying; and
- Limited window of opportunity to engage face-to-face with participants – skippers and crew live throughout Australia and return to port to prepare for the fishing season a week prior to the vessel leaving for the start.

Objective 2. Undertake a BACI-style analysis approach to confirm effectiveness, and extend findings to other fisheries.

The BACI analysis using pre-workshop (before) surveys of non-participants (control) and participants (impact) and 3 months later (after) showed that this style of customised OH&S training and embedding methods could have significant and positive influence on members of the fishing industry.

Statistical analysis of those 28 who could be matched over the three surveys showed there was a tendency for most of the measured safety factors to remain constant over time. Notable positive exceptions were the frequency of safety compliance behaviour and the proportion of incidents experienced and not reported (significantly fewer of these incidents on average after 3 months). Also, comparison of the

follow up data for the control and training groups revealed some positive results for safety motivation and task uncertainty.

This type of cognitive based training demonstrated an effective way to motivate people to think differently about keeping safe at work on a fishing vessel and in a difficult working environment. It can give them the confidence to put the new ideas into practice and open up communication with their co-workers and leaders. While the program experienced difficulties in obtaining post workshop data, sufficient data was collected to gain an understanding of the positive impact such training can have in the fishing industry, which is inherently dangerous. In particular:

- Motivation to behave safely, be more certain about their tasks and be an effective safety role model for crew to follow;
- Increasing safety compliance behaviour and ability to exhibit safe behaviour;
- Having the confidence and ability to report safety incidents;
- Improved safety leadership, culture, communication, and performance.

Implications

The implications of the successful implementation of this type of training are generally positive as follows:

Industry

Cognitive training is likely to result in safer work places and less accidents resulting in injury or deaths on fishing vessels. Improvements in work place safety in the fishing industry will have both reputational and practical benefits for the industry, including recognition by the overall community of fishing as a safer activity (than it currently is), and increased potential to attract and retain crew to a recognised safe working environment.

Communities

Communities will benefit from improvements in fishing vessel safety due to less accidents resulting in injury or death, and crew being returned safely home from sea to their families and friends. Family stress will be reduced knowing that innovative training methods are being provided to their fishing family members with a view to making them safe whilst on board fishing vessels.

Policy makers

Policy makers should support further investigation of this type of training for primary industries, including through support for research projects and funding to ascertain the pros and cons of this type of training across a range of industries and situations. Government policy should be aimed at improving work place safety without regulatory burden where possible. Safety prevention should be front of mind in developing workplace safety policies. Focusing on safety prevention, rather than with dealing with the consequences of work place accidents, will have positive social and economic benefits for families, communities and governments. However this will require willingness to invest in exploring new and innovative ways of workplace training methods and the exploration and/or adoption of non-traditional approaches such as the Sentis-type training where appropriate and applicable.

Further research

Further research into the long-term effectiveness of this type of cognitive-based safety training for the fishing industry is required. While some positive results were gained from this program in the NPF and although the amount of safety knowledge learned among participants improved post workshop, there were significant challenges relating to the geographic location of the fishery, logistics of fishing time and crew availability, constraints on both face to face and e-communications and attitudinal issues which impeded the potential for success of this type of learning. In addition, safety knowledge exhibited a decline back to baseline levels 3 months post the workshop which suggests that retention of knowledge after the program may have decreased over time. Continued refreshing of the concepts and tools learnt could possibly reduce or eliminate this decline. However it may be difficult to run repeat programs and/or refresher courses given the cost of the program, and the diversity of geographic locations and fishing seasons across the industry.

The challenges faced by the project team further highlight the need for an overall change in safety culture in the fishing industry. Further research into the long-term effectiveness of this type of cognitive-based safety training for the fishing industry is required across a range of fisheries to benchmark its effectiveness. This may need to consider how cognitive factors such as attention, risk perception and risk tolerance, as well as individual factors such as experience level, affects a crew member's ability to identify and respond to risks.

Recommendations

The following recommendations are targeted at those in the fishing and other primary industries sectors looking to implement cognitive-based safety training in the workplaces, research funding agencies, and agencies involved in developing work place safety policies.

The challenges faced by the Sentis project team highlight the need for an overall change in safety culture in the commercial fishing industry. This will require a collaborative approach between policy makers, regulators, trainers and industry to improve safety awareness and safety outcomes.

These types of research projects need to be rolled out across a variety of fisheries and fishery locations to determine the effectiveness of cognitive-based safety training in various situations. Data should be collected on the challenges relating to the geographic location of the fishery, logistics of fishing time and crew availability, constraints on both face to face and e-communications and attitudinal issues which can impede the potential for success of this type of training in differing situations.

Further research into the long-term effectiveness of this type of training should also be undertaken. While some positive results were gained from this program in the NPF, safety knowledge exhibited a decline back to baseline levels 3 months post the workshop which suggests that retention of knowledge after the program may have decreased over time. Continued refreshing of the concepts and tools learnt could possibly reduce or eliminate this decline however this needs to be tested.

Whilst the workshop approach was effective, consideration should be given to holding separate workshops for senior personnel and separate workshops for crew members (ie one workshop for skippers and management, another for crew).

Awareness programs should include (but not be limited to) provision of new and innovative technologies and programs such as cognitive training techniques available for adaption/adoption in the fishing industry.

Similar research projects should be undertaken in other primary industry sectors to determine the appropriateness of cognitive-based training in those sectors.

Appendices

1 Workshop feedback Report (T1 – T2)

2 Workshop feedback Report (T3)

3 Focus Group Feedback Report

References

Footnote 1 and 2: <https://www.safeworkaustralia.gov.au/statistics-and-research/statistics/fatalities/fatality-statistics-industry>

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