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Mental health in the commercial fishing industry: Modern uncertainties and traditional risks

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Abstract

Commercial fishers face a range of stressors that impact physical and mental health. However, there is limited research on the level of mental ill-health among fishers and on the nature of stressors that contribute to their psychological distress. This paper focuses on the experiences of commercial wild-catch fishers and analyses the results of an Australian national survey conducted in 2017 (n = 872) (Appendix S1). We first assess underlying themes in perceived stressors, identifying three distinct categories termed 'traditional risks', 'modern uncertainties' and 'future concerns'. Second, we assess the level of self-reported psychological distress, demonstrating higher occurrence of high to very high psychological distress among commercial fishers in comparison with the national population. Third, we examine the relationship between different groups of stressors and psychological distress, finding that stronger perceptions of both 'traditional risks' and 'modern uncertainties' are associated with greater levels of psychological distress among fishers. Third, recognizing diversity within the industry, we examine differences in these relationships among skippers and crew (work role), and inshore versus offshore fishers (fishing location). Our analysis demonstrates that 'traditional risks' and 'modern uncertainties' differentially impact on fisher mental health and depend on the individual's role in the industry and their fishing location. The findings suggest that changes to factors associated with modern uncertainty stressors—including government management techniques, red tape, media representation and political support—could significantly improve mental health in the commercial fishing sector.

KEYWORDS

fishing location, K10, psychological distress, stressors, work role

1 | INTRODUCTION

Commercial fishing poses a range of physical and mental challenges. Levels of physical injury and fatality exceed those of most other peacetime occupations, and labouring in dangerous or demanding environments can put pressure on the mental health of workers (Brooks, 2011; Pollnac et al., 1998; Woodhead et al., 2018). However, research also suggests that overcoming physical challenges and managing calculated risks can contribute to fisher job satisfaction (Pollnac et al., 1998; Seara, Pollnac, & Poggie, 2017; Seara, Pollnac, Poggie, et al., 2017). Many remain in the job long after it would be economically rational to leave because of an emotional attachment to the occupation and lifestyle (Dwyer et al., 2008; Pollnac et al., 2019 p. 174). Understanding poor mental health that occurs

within the fishing industry requires careful attunement to the culturally specific negotiation of risk and harm.

For over twenty years, researchers have suggested that the state of mental health among commercial fishers is cause for concern. In 1998, Johnson et al. (1998) reported that 35% of 567 Gulf of Maine shrimp captains interviewed had a diagnosable mental health disorder, roughly double that of the general American male population. Since this alarming discovery, there has been little attention paid to understanding the state of mental health among commercial fishers (Woodhead et al., 2018). While qualitative social science has explored the nature of the problem and considered underlying drivers (King et al., 2015; Pollnac et al., 2011), few have quantitatively measured the state of fishers' mental health until very recently (Laraqui et al., 2018; Scyphers et al., 2019; Turner et al., 2018).

What drives poor mental health in any individual is complex and multifaceted, and incorporates environmental, biological, cultural and circumstantial factors. Some research links the physically risky nature of working at sea and the accompanying isolation with poor mental health (ITF Seafarers' Trust, 2017); however, these assumptions remain largely untested. Seafarers also report that long periods of time spent in nature, or among a small group of like-minded colleagues, are an appealing, emotionally uplifting aspect of the occupation (Pickett & Hofmans, 2019; Seara, Pollnac, Poggie, et al., 2017; Swift, 2019).

Fishers often fall into social cohorts that tend to present with poorer-than-average mental health. While relationships between health metrics and particular cohorts are not necessarily causal, such observations are relevant to the formulation of effective, targeted health interventions. It is frequently proposed that men tend to suffer poorer mental health than women (Alston, 2012; James et al., 2020; Klingelschmidt et al., 2018; Milner & King, 2019). Other groups identified as being of particular risk to poor mental health include primary producers, such as farmers and fishers, who run businesses in complex and variable ecological and economic environments (King et al., 2015; Lunner Kolstrup et al., 2013); those living in rural and regional locations that are remote from health services (Bowers et al., 2018; Perceval et al., 2019); those in isolated, confined and extreme (ICE) jobs (Palinkas et al., 2004); and those in insecure employment (Lübke, 2019; Urbanaviciute et al., 2019; de Witte et al., 2016). As predominantly male primary producers, subject to financial peaks and troughs, who often work in socially or physically isolated contexts (or both), according to work schedules that limit access to health services, it is unsurprising that commercial fishers have been found to be disposed to poorer-than-average mental health. However, given that fishing communities have long been considered by social scientists as a cultural cohort in their own right (Acheson, 1981), it is necessary to explore factors specific to the industry and particularly those elements fishers themselves see as contributing to poor mental health.

Research with Australian fishers has previously identified stressors that researchers have delineated into two categories: 'traditional risks' and 'modern uncertainties' (King et al., 2014, 2015). The 'traditional risks' of fishing include the physically dangerous nature of the job, the variable weather, long and unsocial hours of work, being self-employed, managing crew dynamics, responding to fluctuating market conditions and variable catches. While it is impossible to eliminate these risks, fishers do have some day-to-day control over traditional risks through their skills, knowledge and experience. It is argued that fishers have traditionally faced these stressors with virtuosity, through some combination of a heightened tolerance for risk, a capacity to navigate and mitigate such risks through either learned or inherent characteristics and abilities, and through a willing trade-off between the perceived risks and rewards of the lifestyle (Jentoft & Davis, 1993; Pickett & Hofmans, 2019; Pollnac et al., 2011; Pollnac & Poggie, 2008). Australian fishers often refer to certain, particularly physical challenges and those associated with working in sometimes harsh marine environments, as being 'what we signed up for'.

In contrast, 'modern uncertainties' are defined as stressors that fishers are limited in their capacity to anticipate or manage, including those which undermine the reputation and identity of the group as a whole. Typically, modern uncertainties are related to increasing regulatory surveillance, oversight and compliance requirements, a reduction, removal or restructuring of access rights (including intergenerational access), negative representation in the media and conflict with other stakeholders (e.g. anglers, energy developments, other commercial fishers). Modern uncertainties tend to emanate from policy decisions that have arisen in recent decades as the regulatory environment has tightened in response to actual and perceived environmental decline. While regulatory agencies purportedly make policy decisions about fisheries access and practices in a manner consistent with scientific evidence, the powerful role of public opinion, political negotiation and competing stakeholder advocacy has recently been emphasized (Brown, 2016; Cullen-Knox et al., 2017; King & O'Meara, 2018; Voyer et al., 2017). The unpredictability of governance decisions, including a sense of public disregard or even demonization, which potentially undermines political support for commercial fisheries, is both types of modern uncertainties that have added to the stressors already posed by traditional risks.

The focus of this paper is on the relationship between Australian commercial wild-catch fishers' level of psychological distress and their perceived stressors. We address the following research questions: (1) What is the current status of psychological distress among commercial wild-catch fishers in Australia? (2) What are the stressors perceived by Australian fishers, and are 'traditional risks' and 'modern uncertainties' distinguishable themes within these perceptions? (3) How do 'traditional risks' and 'modern uncertainties' relate to fishers' psychological distress? and (4) Do psychological distress and perception of stressors differ according to work role or fishing location?

2 | METHODS

This research used a 2017 national survey of Australian commercial wild-catch fishers (Appendix S1) to understand the state of health and well-being of the industry (Figure 1). The survey included questions to determine the level of reported psychological distress among fishers and the stressors related to 'traditional risks' and 'modern uncertainties'. These data were used to examine the relationship between the perception of stressors and reported psychological distress and whether psychological distress and perception of stressors differ according to work role or fishing location. The research received approval from the Deakin University Human Research Ethics Committee (2016–367).

2.1 | Survey design

Survey development was informed by a project Advisory Committee, and draft surveys were piloted with commercial fishers across the state of Victoria. The survey was divided into five sections: (1) personal health and well-being status; (2) personal health and well-being behaviours; (3) health, well-being and safety practices and perceptions in the respondent's fishery; (4) the role of the respondent in the industry; and (5) demographic information covering the respondent and their business. Most were closed questions, including Likert-type scale questions, with some opportunities for open-ended responses. A copy of the survey can be found in King et al. (2019).

2.1.1 | Measuring stressors

Respondents were asked to assess the extent to which they perceived a range of stressors/risks on a 5-point scale (from 'not at all' to

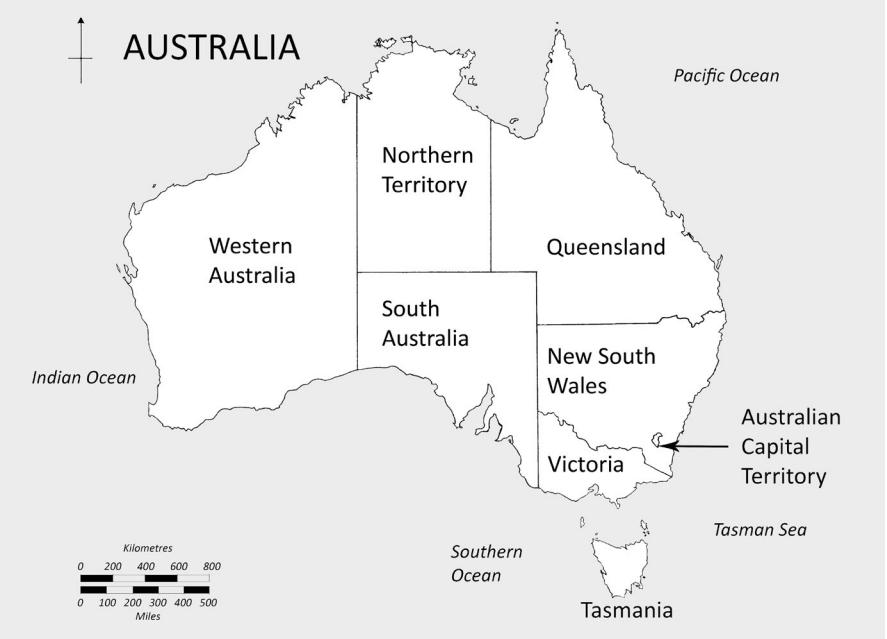

FIGURE 1 Australia, showing States and Northern Territory, canvassed in national survey

'very much'). The list of 16 stressors presented was developed using existing literature, qualitative data and feedback from pilot testing (Table 1). The stressors included those considered to be traditional risks (such as physical danger, severe weather, fluctuating market prices) and modern uncertainties (such as changing regulations, poor media representation and red tape).

2.1.2 | Measuring mental health

Self-reported mental health was assessed using the Kessler Psychological Distress Scale (K10 test; Andrews & Slade, 2001; Kessler et al., 2002; Table 2). The K10 test is a standard set of ten questions used widely as a measure of unspecified psychological distress in the anxiety–depression spectrum in Australia as well as internationally. Responses to each question are based on a 5-point scale based on frequency of symptoms (from 'none of the time' to 'all of the time'). To enhance data comparability, other questions were drawn from existing health and well-being surveys, including the Australian National Survey of Mental Health and Wellbeing, annual Victorian (State) population health surveys and complimentary research projects (Turner et al., 2018). Alignment of questions with the K10 test and other surveys allows comparison to the findings of the Australian national survey of fishers, and direct comparison with other segments of the community.

The survey asked respondents an open-ended question about the factors that affect health and well-being of fishers in their fishery. It required participants to list the five most important factors. Factors relating to mental health stressors were coded using a grounded theory approach (Strauss & Corbin, 1997), in which data are iteratively sorted into nested categories.

TABLE 1 Range of stressors included in the survey. Responses were scored on a 5-point scale from 'not at all' to 'very much' according to the extent to which each stressor was perceived

Stressor
Severe weather
Fluctuating market prices
Changes to government regulations on access (e.g. area closures)
Government red tape
Uncertainty about *future* unknown changes to government regulations
Negative media representation, poor public image
Uncertainty about seafood stocks
Physical danger of fishing
General demands of running a business
Financial concerns
Recreational fishing sector
Climate change
Skills required to do your job (e.g. drive a boat, gutting skills)
Isolation
Relationship/s with co-worker/s
Succession planning

2.2 | Recruitment, distribution and response

In 2017, the survey was mailed to 4,584 fishers and aquaculture workers by fifteen industry bodies from all Australian jurisdictions (except the ACT) on behalf of the researchers. The industry bodies mailed a reminder letter 3–4 weeks later, including details of where to obtain replacement or extra surveys. The survey was also made available online for those not captured by these industry bodies. Returns included 703 paper surveys (response rate = 15.3%) and 169 online surveys, giving a total of 872 responses. The response represents 15.1% of the Australian wild-catch employment of 5,777 at the 2016 Australian Bureau of Statistics (ABS) Census (Australian Bureau of Agricultural & Resource Economics & Sciences, 2018). Through comparison with data on the Australian fishing industry from the ABS 2014–2015 Census data (Australian Bureau of Statistics, 2015) and the ABS Labour Force Survey (Mobsby & Koduah, 2017), the survey sample was found to be representative in terms of age, gender and full/part-time work status. Responses were not representative in terms of geographic distribution (see King et al., 2019, 26 for a breakdown of responses by region). As this paper addresses aggregated national data, this irregularity is not unpacked here.

2.3 | Data analysis

Of the 810 surveys with a response, 80% (n = 645) were from skippers, while 15% (n = 124) were from crew in a fishing operation. Those involved in aquaculture were excluded from the analysis, as these fishers tend to be members of dedicated aquaculture industry representative groups, which were not targeted in the recruitment stage. Of the remaining 734 who answered the question, 48% (n = 355) identified their usual fishing grounds as inshore (<3 nm from the high-water mark, including bays and beaches), while 52% (n = 379) indicated that they fished offshore (>3 nm).

2.3.1 | Perceived stressors

Principal component analysis (PCA) was used to explore whether traditional risks and modern uncertainties represented distinct underlying themes in the stressors perceived by fishers. Analysis was conducted in R using the 'psych' package (Revelle, 2019). The PCA was based on a correlation matrix and was followed by varimax rotation of the principal components (PCs) to help interpret indicator loadings. Only principal components (PCs) corresponding to eigenvalues ≥1 were retained (Legendre & Legendre, 2012). Each PC represented a subcomponent of the stressors perceived. To interpret each PC, only indicators with relatively high loadings (≥0.5) on that PC were considered. For each PC, individual scores were extracted for each respondent for further analysis.

2.3.2 | Psychological distress

Scores for the ten questions about psychological distress were summed to calculate a K10 score for each respondent. Individual scores were classified as low, medium, high or very high following the classification used by the ABS: 10–15 = Low; 16–21 = Moderate; 22–19 = High and 30–50 = Very High (Australian Bureau of Statistics, 2012). Chi-squared tests were used to compare the frequency of responses in each category in the fisher survey to those reported by the ABS National Health Survey (Australian Bureau of Statistics, 2015), which represents the national population in terms of age and gender. Like the fisher survey in this project, the National Health Survey uses self-reporting of health conditions and diagnoses.

2.3.3 | Relationship between perceived stressors and psychological distress

To understand how perceived stressors and psychological distress vary across diverse Australian fisheries and the people who work in them, we make a distinction between inshore and offshore fishing, which we anticipate face different stressors related to their fishing location and the different management regimes governing them. 'Inshore' fishing takes place in coastal waters, bays, estuaries, from the high-water mark to three nautical miles from shore, as well as inland waterways, and is managed by state governments. 'Offshore' fishing occurs in deeper water between three nautical miles and the 200 nautical mile Exclusive Economic Zone, typically using different fishing methods, and operating under Commonwealth jurisdiction. Individual fishers may be licensed to fish in both locations.

We anticipate that inshore fishers are more likely than offshore fishers to experience modern uncertainties, due to their heightened probability of coming into conflict with other users of the environment, particularly recreational fishers, and any subsequent management alterations that are enacted in order to balance the demands of all stakeholders. Inshore fishing is also typically regarded by fishers as less dangerous than working in the open ocean (Chauvin et al., 2017; King, 2011; Poggie et al., 1976), and so we anticipate a lower perception of traditional risks among inshore fishers.

We also make a distinction between skippers, who may or may not own boats, licences and quotas but all engage the management of the fishing enterprise, on the one hand, and 'crew', which includes deckhands, on the other hand. We anticipated these two groups would face different stressors and/or levels of psychological distress, because of their differing levels of responsibility and involvement in decision-making.

First, *t*-tests were used to assess whether perceived stressors (PC scores) differed between the groups of (1) skippers versus crew and (2) inshore versus offshore fishers. Second, chi-square tests were used to assess whether K10 categories differed among these same groups. Third, a one-way analysis of variance (ANOVA) was used to assess whether perception of stressors (PC scores) differed in relation to K10 scores. Post hoc testing was carried out where $p < .05$. The latter analysis was carried out for all respondents combined, and subsequently for skippers versus crew and inshore versus offshore fishers separately. K10 classifications of High and Very High were combined to accommodate low frequencies.

TABLE 2 Items included in the K10. Respondents answered on a 5-point scale from 'none of the time' to 'all of the time'

Question	Item
In the last **four** weeks, how often have you felt:	Tired out for no good reason
	Nervous
	So nervous nothing could calm you down
	Hopeless
	Restless or fidgety
	So restless you could not sit still
	Depressed
	That everything was an effort
	So sad that nothing could cheer you up
	Worthless

3 | RESULTS

This section reports the results of quantitative analysis of survey data, illustrated by data from open-ended question responses where appropriate.

3.1 | Psychological distress

3.1.1 | Overall

High or Very High levels of psychological distress were experienced by 22.9% of fisher respondents, and a Low level by 53.1%. This compares with 11.7% of Australians aged 18 years and over experiencing High or Very High levels and 68.0% a Low level of psychological distress in the 2014–15 national survey (ABS, 2015). Respondent scores for the K10 are compared in Table 3 to the most recent Australian available national K10 data from the ABS National Health Survey 2014–15 (ABS, 2015, Table 7: Psychological Distress). There was a significant difference between the percentages in each of the K10 categories when comparing the national fisher survey to the National Health Survey ($\chi^2_{(3,N=17,599)} = 94.60$, $p < .001$), with comparatively more fishers experiencing High and Very High levels of psychological distress.

3.1.2 | Differences among fishers

There was no statistically significant difference in the proportion of skippers and crew reporting Low, Moderate and High/Very High levels of psychological distress ($\chi^2_{(2)} = 0.261$, $p = .878$) (Table 4). Nor

TABLE 3 Fisher respondent K10 score categories compared to Australian population

K10 category: level of psychological distress	Respondents Fisher health survey ($N = 659$)	Australians 18 years and over, National Health Survey 2014–15 (Australian Bureau of Statistics, 2015) ($n = 17\,598$)
Low	53.1% (350)	68.0% (12,066)
Medium	24.0% (158)	19.5% (3,457)
High	16.5% (109)	8.0% (1,415)
Very high	6.4% (42)	3.7% (660)

Note: $\chi^2_{(3,N=17,599)} = 94.60$, $p < .001$.

TABLE 4 Fisher respondent K10 score categories by work role and location

K10 level of psychological distress	Responses							
	Work Role ($\chi^2_{(2)} = 0.261$, $p = .878$)				Fishing Location ($\chi^2_{(2)} = 2.542$, $p = .281$)			
	Skippers	%	Crew	%	Inshore	%	Offshore	%
Low	294	53	56	55	162	51	188	55
Moderate	135	24	23	23	73	23	85	25
High	90	16	19	19	62	20	47	14
Very high	39	7	3	3	19	6	23	7

was there a significant difference in the proportion of inshore and offshore fishers reporting Low, Moderate and High/Very High levels of psychological distress ($\chi^2_{(2)} = 2.542$, $p = .281$; Table 4).

3.2 | Perceived stressors

3.2.1 | Overall

The most commonly perceived stressors were those relating to changes in government regulation, red tape and uncertainty about future regulatory changes (Table 5). Financial concerns along with fluctuating prices and the demands of running a business were also widely perceived as stressors, as were issues of poor public image and conflict with the recreational sector. Climate change, co-worker relationships, isolation and skills were among the least commonly perceived stressors.

Principal components analysis (PCA) identified three underlying dimensions that together explained 57% of the variation in responses (Table 5). All stressors loaded strongly (>0.5) onto one component with the exception of succession planning. The first dimension, accounting for 22% of the variance, we interpreted as representing respondents' perceptions of modern uncertainties, including stressors relating to future uncertainty, red tape, changing regulations and access, negative media representation and opposition from the recreational fishing lobby. The second component, accounting for 22% of the variance, reflected what could primarily be interpreted as traditional risks, including the general demands of running a business and associated financial concerns, changes to weather and market prices, relationships with co-workers, and physical danger and isolation. In addition to the first two components, which reflected the categories of stressors we had anticipated, there was also a third component, accounting for 13% of the variance. Climate change and uncertainty about seafood stocks were the primary stressors loading on to this component, along with skills to do your job into the future, and therefore, we interpreted it as broadly reflecting 'future concerns'.

The open-ended survey responses regarding traditional risks tended to be brief. They included financial burdens (pay and entitlements, running costs), harvesting-related stressors (catches, stocks, environment of fishing), competition and conflict (with imports, commercial fishers, recreational fishers), access to health services (distance to health services, cost, scheduling around fishing) and the masculinity of the fishing culture.

The modern uncertainties described by respondents captured two key contributors. The first was the regulatory environment, including regulation change (anticipated or experienced), quota and licence requirements, and the perceived lack of fairness and procedural justice. The second comes from fishers' perceptions of public and stakeholder attitudes to the industry, including negative media, and perceived 'anti-commercial fishing' lobby groups' perceptions and activities.

Illustrative responses associated with traditional risks, modern uncertainties and future concerns are shown in Table 6.

3.2.2 | Differences among fishers

Principal component scores for modern uncertainties were significantly different between skippers and crew, with skippers showing

TABLE 5 Results of principal components analysis on stressors perceived by fishers showing factor loadings for the individual survey items. Only items strongly loading onto each component (loadings >0.5) are shown. The column headings indicate the percentage of variance explained by each principal component. The percentage of respondents perceiving the stressor as high or very high indicates the proportion scoring 4 or 5 on a 5-point scale

Stressor	% respondents perceiving stressor as high or very high	PC1 modern uncertainties (22%)	PC2 traditional risks (22%)	PC3 future concerns (13%)
Uncertainty about *future* unknown changes to government regulations	75	0.89		
Government red tape	75	0.88		
Changes to government regulations on access	75	0.86		
Negative media representation, poor public image	50	0.72		
Recreational fishing sector	41	0.64		
General demands of running a business	39		0.73	
Financial concerns	50		0.70	
Severe weather	35		0.66	
Fluctuating market prices	49		0.62	
Relationship/s with co-worker/s	14		0.60	
Physical danger of fishing	20		0.60	
Isolation	14		0.60	
Climate change	14			0.74
Uncertainty about seafood stocks	26			0.62
Skills required to do your job	12			0.57
Succession planning	18			

greater perception of these stressors ($t_{(138.46)} = 8.484$, $p < .001$) (Table 7). In contrast, crew members showed higher perceptions of future concerns ($t_{(146.08)} = -2.896$, $p = .004$; Table 7). There was no statistically significant difference between skipper and crew scores in the principal component for traditional risks ($t_{(168.01)} = -1.517$, $p = .131$; Table 7).

Offshore fishers showed higher perceptions of traditional risks than inshore fishers ($t_{(721.87)} = 3.999$, $p < .001$). In contrast, inshore fishers had higher values relating to modern uncertainties ($t_{(724.52)} = -4.190$, $p < .001$) and future concerns, though the latter was not statistically significant ($t_{(731.73)} = -1.795$, $p = .073$; Table 5).

3.3 | Relationship between perceived stressors and reported psychological distress

3.3.1 | Traditional risks

Across all fishers, there was a statistically significant difference in perceptions of traditional risks across the categories of psychological distress reported ($F_{(2)} = 26.200$, $p = < .001$). Figure 2 shows that greater perception of traditional risks was associated with greater psychological distress. This was consistent when comparing the data for skippers ($F_{(2)} = 20.460$, $p = <.001$) and crew ($F_{(2)} = 6.521$, $p = .002$) separately, indicating that concerns around traditional risks were associated with greater psychological distress in both groups (Figure 2a). The same trend was evident among both inshore ($F_{(2)} = 8.400$, $p = <.001$) and offshore fishers ($F_{(2)} = 22.430$, $p = <.001$; Figure 2b).

3.3.2 | Modern uncertainties

Across all fishers collectively, higher perceptions of modern uncertainties were associated with higher psychological distress ($F_{(2)} = 17.390$, $p < .001$). The same pattern was found for both inshore ($F_{(2)} = 13.040$, $p = <.001$) and offshore ($F_{(2)} = 5.383$, $p = .005$) fishers (Figure d), and for skippers as a distinct group ($F_{(2)} = 20.940$, $p = <.001$), but was not evident among crew ($F_{(2)} = 1.248$, $p = .292$; Figure 2c).

3.3.3 | Future concerns

There was no evidence of difference in perceived future concerns in relation to psychological distress in the sample as a whole ($F_{(2)} = 0.063$, $p = .939$), nor among inshore fishers ($F_{(2)} = 1.486$, $p = .228$), offshore fishers ($F_{(2)} = 1.452$, $p = .236$) or skippers ($F_{(2)} = 0.365$, $p = .694$). However, stronger perceptions of future concerns were associated with greater psychological distress among crew ($F_{(2)} = 3.984$, $p = .022$; Figure 2e–f).

TABLE 6 Qualitative responses that are associated with traditional risks, modern uncertainties and future concerns

Category of stressor	Illustrative quotes
Traditional risks	'In the last two years I have not made enough to live because of weather effects on fishing and so I have used all our savings' Inshore skipper, 68, New South Wales 'The stress on relationships is caused by time away at sea. [This] Is probably more common in fisheries with longer trips' Inshore skipper, 65, Tasmania 'Stress over where the next load of fish are' Offshore skipper, 58, Tasmania
Modern uncertainties	'Stress from management is the major contributing factor in fisher health. Constant changes, new rules, new closures, new restrictions, forcing more investment (loans/money) to buy more shares to work less time in less areas. Utter contempt [for] fishers and imposing comparatively astronomical charges for the mismanagement that has been going on for 30 years plus.' Inshore skipper, 58, New South Wales 'I cannot emphasise [enough] the stress related to [the] uncertainty [that] governments impose on the commercial sector, from access to stocks [to] continued pressure from [the] recreational sector' Inshore skipper, 65, New South Wales 'There is no certainty in the fishing industry, no security' Inshore skipper, 53, Victoria
Future concerns	'I have recently retired after 38 years of commercial fishing. I still own quota which allows my son to fish, but I feel sorry for the younger generation as the requirements to enter industry are too time consuming and expensive and [there is] far too much red tape. You will have to be a university graduate to enter industry and if you're that smart you will seek something with a lot less hours and a better future' Offshore ex-skipper, 70, New South Wales

TABLE 7 Summary statistics of Principal Component scores comparing skipper ($n = 645$) and crew ($n = 124$), and inshore (<3 nM) ($n = 273$) and offshore (≥3 nM) ($n = 408$) fishers. Offshore fishers include those who fish both inshore and offshore

Perceived stressors	Mean PC score (*SD*)		*T* test *p* value	Mean PC score (*SD*)		*T* test *p* value
	Skipper	Crew		Inshore	Offshore	
Traditional risks	−0.022 (1.010)	0.122 (0.915)	.131	−0.151 (1.020)	0.141 (0.963)	<.001
Modern uncertainties	0.150 (0.888)	−0.818 (1.160)	<.001	0.157 (0.899)	−0.147 (1.060)	<.001
Future concerns	−0.050 (0.970)	0.273 (1.120)	.004	0.068 (0.954)	−0.064 (1.040)	.073

4 | DISCUSSION

This study sets out to explore the relationship between Australian commercial wild-catch fishers' level of psychological distress and their perceived stressors. Our findings reveal the extent to which the stressors perceived by Australian fishers can be characterized as 'traditional risks' and 'modern uncertainties', their relationship to fishers' psychological distress, and the heterogeneity within Australia's commercial fisheries.

Socioeconomic circumstances, ecological conditions and management approaches differ greatly among the world's fisheries, and stressors are therefore likely to be context-dependent. The stressors faced by those fishing commercially are different to those for whom seafood is harvested for subsistence. This research reflects the experiences of those who work within a highly interventionist management approach, characterized by neoliberal principles (Pinkerton & Davis, 2015). The focus on hierarchical fisheries governance and bio-economic management tools is far more common in the Global North than in the Global South, though the distinction between management approaches—as between the geopolitical categories—is not precise. Given the relevance of management interventions as a perceived driver of poor mental health in this Australian study, it stands to reason that the stressors characterized as modern uncertainties will have broad and direct relevance in contexts where similar economic imperatives and management interventions are present. Our findings are consistent with research in other commercial fisheries that has found mental health and job satisfaction (in particular self-actualization) to be influenced by unpredictable management interventions, privatization policies and accompanying community conflicts and value shifts (Pollnac et al., 2019; Smith et al., 2003).

Whether or not the category of modern uncertainties has wider relevance in less commercial fisheries or those with more localized or participatory management systems warrants further investigation. This

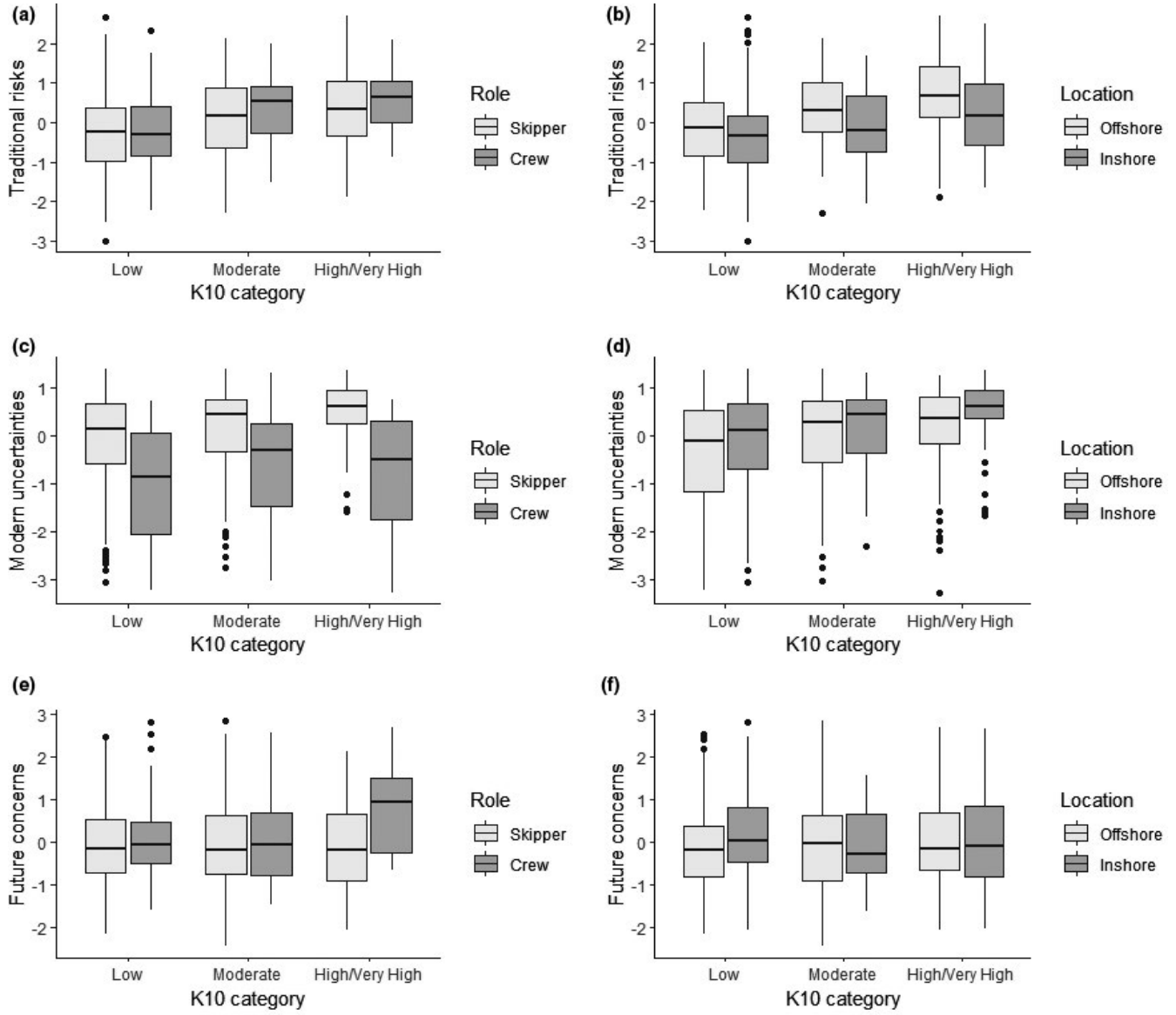

FIGURE 2 Distribution of respondents' principal component scores for traditional risks, modern uncertainties and future concerns, by job role (plots a, c, e) and fishing location (plots b, d, f) in relation to K10 scores for psychological distress. Relationships between principal component scores and K10 scores were tested using ANOVA (section 3.3). Differences between skippers and crew and between inshore and offshore fishers were assessed using chi-squared tests (section 3.1.2)

study has relevance to global fisheries as a case study for comparison between contrasting management contexts. Such a comparison was made by Seara, Pollnac, Poggie, et al. (2017, 19), who found that while fishers both in the USA and in the Caribbean were similarly attached to certain aspects of fishing, the former's 'highly restrictive management environment' had 'significant impacts on levels of job satisfaction' and associated well-being. With research suggesting that overexploitation of fisheries persists in smaller fisheries that are unassessed or unmanaged (Hilborn & Ovando, 2014) continued momentum for more extensive management intervention means that some of these stressors may increasingly affect fishers around the world.

Furthermore, the finding of this study that traditional risks perceived by fishers are also linked to psychological distress has broader global relevance. Though these categories of stressors are difficult to disentangle (we discuss this further in the sections below), the anticipated risks facing fishers such as weather, market prices and physical risk are common across fisheries globally and, linked to the category of future concerns, may be exacerbated in the context of environmental change. Research on the impact of such stressors on fishers' mental health has to date been confined primarily to a developed country context (Woodhead et al., 2018), yet mental health is now an emerging area of focus in the developing world (Minas et al., 2015). Understanding how these stressors are experienced, and how they intersect with other stressors such as poverty and food insecurity, is an important area for further research.

In the following sections, we discuss the key findings and their wider relevance.

4.1 | Psychological distress

In Australia, nearly 23% of commercial fishers surveyed experienced High or Very High levels of psychological distress, compared to less than 12% in the general population. This research is the first of its kind to quantitatively demonstrate the state of mental health among Australian fishers, and that psychological distress is experienced at significantly higher levels than the comparable Australian population. This is striking particularly as our survey sample includes a disproportionately high number of men, and fewer younger people (under 30) and older people (over 64). The majority of respondents were between 30 and 64 years of age (80.4%), compared to only 70% of employed Australians in this age range at the 2016 Census. Physical health conditions are more prevalent among older adults, and it is well established that women are more commonly diagnosed with mood disorders than men, though this difference attenuates with age (Kiely et al., 2019); it could be expected that survey results would show better physical and mental health results than the general national survey.

In presenting these findings, we acknowledge that distinguishing between physical and mental health fails to reflect the interlinked nature of these health indicators. We take as established the notion that physical and mental health are related, and that stressors routinely associated with one kind of health issue can impact on others. However, these results highlight an important component of fishers' health that has to date received limited attention.

4.2 | Perceived stressors

A focus of this research was not only to quantify the state of psychological distress among fishers, but to better understand the perceived stressors identified by fishers and reflected in the qualitative research to date (Minnegal & Dwyer, 2008; Shaw et al., 2011). The analysis of stressors in this study supports a distinction between 'traditional risks' and 'modern uncertainties' (King et al., 2015) and also revealed a third, albeit weaker, category of stressors, which reflect 'future concerns'. Both traditional risks and modern uncertainties were associated with higher levels of psychological distress.

Traditional risks are described by fishers as 'what we signed up for', or what they anticipated when they began their career. Fishers generally have—or anticipate acquiring—some ability to mitigate the stress of these pressures using their accumulated knowledge and skill. Modern uncertainties are more nebulous and mitigating them requires skillsets including political lobbying, public relations and a command of social media. While members and advocates of the fishing industry are increasingly recognizing and acquiring such skills, they still fall outside the traditional requirements of the profession, and for many represent a category of stress that is set apart from those anticipated. The capacity to distinguish between kinds of stressors identified by fishers has the potential to inform the development of bespoke solutions. The distinction between modern uncertainties, traditional risks and the third category of future concerns would benefit from further testing in order to explore the applicability of these categories in other contexts. In particular, though the third category of future concerns emerged as a distinct theme in the statistical analysis, it was linked to a small number of stressors. Given that future concerns may be interlinked with both traditional risks and modern uncertainties, this interpretation warrants further exploration.

Like Jentoft and Davis's so-called 'rugged' and 'utilitarian' individualisms, that they employ to explore expressions of identity relevant to small boat fishers labouring within capitalist industrial fisheries, the concepts of 'traditional risks' and 'modern uncertainties' are not advanced as 'discrete entities' (Jentoft & Davis, 1993, 359) but as tools for use within a particular context. These terms emphasize 'points of contrast' that resonate within discussions of stressors facing Australian fishers as part of their involvement with neoliberal fisheries management at a point in time—when our data were collected. Another useful contrast has been made by Coulthard and Britton (2015), who consider the similarities and distinctions between Northern Irish fishers who are undergoing 'adaptation' and those who are in the process of floundering (or to use their term, 'drowning') in response to particular demands on their flexibility. As in these studies, we offer the terms 'traditional risk' and 'modern uncertainty' with an awareness that the experiences of fishers are fluid across time and context, in telling and in memory and retrospect. These terms offer us a shorthand term that characterizes overlapping—if not perfectly matched—ways of encountering a shared environment. Though these categories are certainly intertwined, difficult to disentangle and potentially shifting, our findings confirm that there is a distinction in the underpinning themes of stressors perceived by fishers. In addition, these terms have had anecdotal resonance in our discussions with Australian fishers, managers and researchers. Though not a rigorous test in themselves, these conversations with the broader industry were germinal for this research and suggest that the concepts we introduce pass 'the pub test'.

4.3 | Relationship between perceived stressors and reported psychological distress

Our analysis suggests that across respondents overall, stronger perceptions of both traditional risks and modern uncertainties were associated with greater levels of psychological distress. The association between traditional risks and psychological distress may appear surprising given previous research suggesting fishers' capacity to respond, adapt and even thrive in the context of these challenges (Pollnac & Poggie, 2008). However, an examination of the factors contributing to traditional risks reveals that there may be connections between some of these stressors and those included under modern uncertainties. For example, 'traditional' stressors relating to the demands of running a business, financial concerns and market prices may all be heightened in an environment of rapidly changing regulations and uncertainty about the future regulatory environment. The expansive work of Poggie, Pollnac, Seara and colleagues

(e.g. Pollnac et al., 2015; Seara, Pollnac, & Poggie, 2017) demonstrates the complexity of relationships between various measures of well-being (named in terms of 'job satisfaction') and external factors (including governance changes). Pollnac et al. (2019 p.175) propose a Human Impact Assessment (HIA) heuristic model that acknowledges and incorporates the complex interaction of factors (causal and otherwise), including 'management' and fisher 'well-being', which are linked via the intervening factor, 'job satisfaction'. Future research in the Australian context could benefit from drawing on lessons from this model. While our analysis does not demonstrate causal links between perceived stressors and psychological distress, and it is possible that fishers with poor mental health may have heightened sensitivity to stressors, it is nevertheless likely that reducing stressors will have a positive impact on levels of psychological distress.

4.4 | Differences among fishers

Importantly, this study has begun to illuminate the relationship between what fishers do and where, and the kinds of stressors they are likely to face. This is the first study that we know of to quantitatively reflect the different kinds of stressors felt by skippers and crew, and to distinguish between inshore and offshore fisher experiences. While there was no significant difference in the overall level of psychological distress when analysed by role and location, there were significant differences in how stressors were perceived and how they related to levels of psychological distress. In other words, while fishers are unusually stressed as a cohort, the kinds of things that cause them stress differ depending on their role and where they fish.

Consistent with the findings of Pollnac et al. (1998 p. 56), who found that '*All* fishers manifested great concern with falling overboard, explosions in the engine room, and collisions at sea' (original emphasis), there was no difference between skippers and crew, or inshore and offshore fishers, in the association between perceived traditional risks and psychological distress. However, Pollnac et al. (1998) did find differences in how particular cohorts responded to other, less serious or more manageable risks. Similarly, in this study there were differences in how stressors were perceived. Offshore fishers, for example, were more likely than inshore fishers to perceive traditional risks as stressors, consistent with earlier research that links heightened concerns about safety to fishing that occurs in offshore locations (Chauvin et al., 2017; Malinowski, 1918). Among skippers, stronger perceptions of modern uncertainties and an association between these perceptions and higher levels of psychological distress may reflect skippers' greater responsibility for decision-making, meeting regulatory and reporting obligations, and their greater financial investment compared to crew. This finding reflects the growing body of literature exploring the relationship between fisheries management and well-being (Breslow et al., 2016; Pollnac et al., 2019; Seara, Pollnac, & Poggie, 2017; Seara, Pollnac, Poggie, et al., 2017). Management decisions that are perceived to create or exacerbate, for example social inequity in the community, may compromise the well-being of fishers: 'It is changes in management that influence satisfaction with fishing which has a direct effect on wellbeing' (Pollnac et al., 2019, p.179). The current research supports these findings and extends them to show that skippers, who are exposed more directly to management changes, may be disproportionately impacted by these stressors.

Heightened psychological distress among skippers who perceive greater stressors from modern uncertainties, and crew who more strongly perceive future concerns, may reflect that some fishers perceive their livelihoods to be under threat. These findings are consistent with wider research demonstrating that job insecurity is linked to declining mental health (Lübke, 2019). The reasons for greater perceptions of future concerns being associated with higher levels of psychological distress among crew are unclear. It may be that these are new uncertainties that crew are starting to worry about in terms of how they may affect their livelihoods in the future, while skippers are more focussed on modern uncertainties impacting them in the present. It may also be related to the younger average age of crew, among whom there tends to be a greater concern about environmental issues (Lee, 2008), though this requires further investigation.

Inshore fishers were more likely than offshore fishers to name modern uncertainties as stressors. This is not surprising, given that inshore fishers in Australia in recent years have experienced increasing resource conflict with other sectors including oil and gas, and renewable energy, coastal tourism and recreation, aquaculture and particularly recreational fishing, and that this conflict has often resulted in management interventions that reduce commercial fisher access. The coast is the site of social, political, cultural and legal conflicts, and Jentoft (2017) argues that, as the most politically marginalized, small-scale inshore fisheries are perhaps the most vulnerable to external pressures from other stakeholders. In the Australian context, the impact of resource conflict, particularly across the eastern states, has been linked to widespread accounts of poor mental health and low job satisfaction (Alexander & Abernethy, 2019).

Understanding the matrix of stressors and risk factors contributing to the higher incidence of psychological distress among Australian fishers overall could be used to inform targeted intervention strategies for skippers (as well as owners and those in charge of operations) during future periods of management change.

4.5 | Recommendations

Quantification of the relative mental health status of fishers provides a robust rationale for action on this issue where in the past there has been little more than hand-wringing. In a positive step, since the preliminary release of these findings several industry-led mental health programmes have been initiated, and the Australian Commonwealth government has committed funding in excess of A$600,000 towards these and other mental health programmes for the commercial fishing industry (Seafood Industry Australia, 2020; Tasmanian Seafood Industry Council, 2020; Women in Seafood Australasia, 2019). The recommendations from this research, as

outlined in the final report to the funding agency (King et al., 2019), have been partially taken up within this suite of initiatives. For example, mental health first aid training has been delivered to three industry members who have been designated 'trusted industry members' within their region, as part of a Seafood Industry Australia pilot of this approach (Seafood Industry Australia, 2020). In addition, thirty-five A$2,000 grants have been made available for grassroots groups to raise awareness, combat stigma and explore approaches to locally tailored mental health support (Seafood Industry Australia, 2021). However, there has yet to be a commitment to implement 'Social impact assessments on all those affected, including fishers and their businesses … before all major policy reforms, with a particular focus on the physical and mental health of those impacted' (King et al., 2019, 7). Given this research argues there is a significant role played by actual, understood or anticipated government reforms on fisher mental health, such a commitment would demonstrate government willingness to address the problems in the industry closer to their perceived source. While it is a significant step for the Commonwealth government to acknowledge the mental health problems facing the industry, rendering the issues visible and funding acute care is just the first step in addressing the structural factors that this research highlights.

5 | CONCLUSION

This study provides robust quantitative evidence supporting the call for greater attention to fishers' mental health. There has already been significant work done by researchers and practitioners to identify ways to improve mental health in cohorts with which fishers overlap (e.g. 'men', 'primary producers'), and opportunities exist for tailored remedial measures to be modelled on proven techniques (Cole & Bondy, 2019; Pirkis et al., 2019). The novelty of this study is that it delineates stressors in a way that allows a clearer understanding of the threats that are specific to fishers—and therefore possible avenues for even more bespoke solutions—to improve mental health in the fishing industry.

This study differentiates between the categories of stressor that are expected to affect the mental well-being of fishers, namely 'modern uncertainties', which are largely beyond fishers' individual control, and 'traditional risks', where some individual mitigation actions are possible, and adds the category of 'future concerns'. The finding that modern uncertainties had a significantly greater impact on skippers than crew supports the idea that these stressors are likely to be more detrimental to their mental health than those traditional risks they 'signed up for'. In contrast, the younger crew cohort was more likely than skippers to experience future concerns about climate change and changing skill requirements.

These findings provide strong evidence that changes to factors associated with modern uncertainty stressors—government management techniques, media representation, political support—could significantly improve mental health and well-being in the commercial fishing sector. Possible avenues of change may be streamlined administrative requirements, more explicit support from political representatives and positive media representation.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

Acheson, J. M. (1981). Anthropology of fishing. *Annual Review of Anthropology*, *10*, 275–316. https://doi.org/10.1146/annurev.an.10.100181.001423

Alexander, K. A., & Abernethy, K. E. (2019). *Determinates of socially-supported wild-catch and aquaculture fisheries in Australia*. Retrieved from https://www.frdc.com.au/project/2017-158

Alston, M. (2012). Rural male suicide in Australia. *Social Science and Medicine*, *74*, 515–522. https://doi.org/10.1016/j.socscimed.2010.04.036

Andrews, G., & Slade, T. (2001). Interpreting scores on the Kessler Psychological Distress Scale (K10). *Australian and New Zealand Journal of Public Health*, *25*, 494–497. https://doi.org/10.1111/j.1467-842X.2001.tb00310.x

Australian Bureau of Agricultural and Resource Economics and Sciences. (2018). *Employment*. Retrieved from https://www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-and-aquaculture-statistics/employment-2018 June 26, 2020.

Australian Bureau of Statistics (2015). *National Health Survey: First Results, 2014–15*. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4364.0.55.0012014-15?OpenDocument June 18, 2018

Bowers, J., Lo, J., Miller, P., Mawren, D., & Jones, B. (2018). Psychological distress in remote mining and construction workers in Australia. *Medical Journal of Australia*, *208*, 391–397. https://doi.org/10.5694/mja17.00950

Breslow, S. J., Sojka, B., Barnea, R., Basurto, X., Carothers, C., Charnley, S., & Levin, P. S. (2016). Conceptualizing and operationalizing human wellbeing for ecosystem assessment and management. *Environmental Science and Policy*, *66*, 250–259. https://doi.org/10.1016/j.envsci.2016.06.023

Brooks, K. (2011). *Health and Safety in the Australian Fishing Industry*. (RIRDC Project No. PRJ-005591; RIRDC Publication No. 11/021). Rural Industries Research and Development Corporation. http://www.agrifutures.com.au/wp-content/uploads/publications/11-021.pdf

Brown, C. J. (2016). Social, economic and environmental effects of closing commercial fisheries to enhance recreational fishing. *Marine Policy*, *73*, 204–209. https://doi.org/10.1016/j.marpol.2016.08.010

Chauvin, C., Le Bouar, G., & Lardjane, S. (2017). Analysis of occupational injuries in the sea fishing industry according to the type of fishery

and the fishing activity. *International Maritime Health*, *68*, 31–38. https://doi.org/10.5603/IMH.2017.0006

Cole, D. C., & Bondy, M. C. (2019). Meeting farmers where they are: Rural clinicians' views on farmers' mental health. *Journal of Agromedicine*, *25*, 126–134. https://doi.org/10.1080/1059924X.2019.1659201

Coulthard, S., & Britton, E. (2015). Waving or drowning: An exploration of adaptive strategies amongst fishing households and implications for wellbeing outcomes. *Sociologia Ruralis*, *55*(3), 275–290. https://doi.org/10.1111/soru.12093

Cullen-Knox, C., Haward, M., Jabour, J., Ogier, E., & Tracey, S. R. (2017). The social licence to operate and its role in marine governance: Insights from Australia. *Marine Policy*, *79*, 70–77. https://doi.org/10.1016/J.MARPOL.2017.02.013

de Witte, H., Pienaar, J., & de Cuyper, N. (2016). Review of 30 years of longitudinal studies on the association between job insecurity and health and well-being: Is there causal evidence? *Australian Psychologist*, *51*, 18–31. https://doi.org/10.1111/ap.12176

Dwyer, P. D., King, T. J., & Minnegal, M. (2008). Managing shark fishermen in southern Australia: A critique. *Marine Policy*, *32*, 263–273. https://doi.org/10.1016/j.marpol.2007.06.003

Hilborn, R., & Ovando, D. (2014). Reflections on the success of traditional fisheries management. *ICES Journal of Marine Science*, *71*, 1040–1046. https://doi.org/10.1093/icesjms/fsu034

ITF Seafarers' Trust. (2017). *Social isolation, depression and suicide among seafarers*. (Report date: June 2017). http://www.seafarerstrust.org/wp-content/uploads/2015/05/Seafarers_Tust_SIDS_Booklet.pdf

James, C. L., Rich, J. L., & Kelly, B. (2020). Mental health and mining: Research challenges and influences. In A. Campbell, M. Duffy, & B. Edmondson (Eds.), *Located research: Regional places, transitions and challenges* (pp. 135–152). Palgrave Macmillan. https://doi.org/10.1007/978-981-32-9694-7_9

Jentoft, S. (2017). Small-scale fisheries within maritime spatial planning: Knowledge integration and power. *Journal of Environmental Policy and Planning*, *19*, 266–278. https://doi.org/10.1080/1523908X.2017.1304210

Jentoft, S., & Davis, A. (1993). Self and sacrifice: An investigation of small boat fisher individualism and its implication for producer cooperatives. *Human Organization*, *52*, 356–367. https://doi.org/10.17730/humo.52.4.4650487532761447

Johnson, D. G., Formichella, C., Thomas, S. J., & Bhaumik, D. (1998). Stress and distress among Gulf of Mexico shrimp fishermen. *Human Organization*, *57*, 404–413. https://doi.org/10.17730/humo.57.4.y64r3g1w7g1u365k

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S.-L.-T., & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*, 959–976. https://doi.org/10.1017/S0033291702006074

Kiely, K. M., Brady, B., & Byles, J. (2019). Gender, mental health and ageing. *Maturitas*, *129*, 76–84. https://doi.org/10.1016/j.maturitas.2019.09.004

King, T. J. (2011). The 'skipper effect': Riddles of luck and rhetorics of individualism. *Human Organization*, *70*, 387–396. https://doi.org/10.17730/humo.70.4.7671729107n37t02

King, T. J., Abernethy, K., Brumby, S., Hatherell, T., Kilpatrick, S., Munksgaard, K., & Turner, R. (2019). *Sustainable Fishing Families: Developing industry human capital through health, wellbeing, safety and resilience. (FRDC Project No 2016/400)*. Fisheries Research and Development Corporation. https://www.frdc.com.au/Archived-Reports/FRDC%20Projects/2016-400-DLD.pdf

King, T. J., Kilpatrick, S., & Willis, K. (2014). *Staying healthy : Industry organisations' influence on behaviours and services used by fishers. (FRDC Project No 2012/402)*. Fisheries Research and Development Corporation. http://frdc.com.au/Archived-Reports/FRDC%20Projects/2012-402-DLD.pdf

King, T. J., Kilpatrick, S., Willis, K., & Speldewinde, C. (2015). 'A different kettle of fish': Mental health strategies for Australian fishers, and farmers. *Marine Policy*, *60*, 134–140. https://doi.org/10.1016/J.MARPOL.2015.06.013

King, T. J., & O'Meara, D. (2018). 'The people have spoken': How cultural narratives politically trumped the best available science (BAS) in managing the Port Phillip Bay fishery in Australia. *Maritime Studies*, *18*, 17–29. https://doi.org/10.1007/s40152-018-0097-5

Klingelschmidt, J., Milner, A., Khireddine-Medouni, I., Witt, K., Alexopoulos, E. C., Toivanen, S., & Niedhammer, I. (2018). Suicide among agricultural, forestry, and fishery workers: A systematic literature review and meta-analysis. *Scandinavian Journal of Work, Environment and Health*, *44*, 3–15. https://doi.org/10.5271/sjweh.3682

Laraqui, O., Manar, N., Laraqui, S., Ghailan, T., Deschamps, F., & Laraqui, C. E. H. (2018). Occupational risk perception, stressors and stress of fishermen. *International Maritime Health*, *69*, 233–242. https://doi.org/10.5603/IMH.2018.0038

Lee, K. (2008). Opportunities for green marketing: Young consumers. *Marketing Intelligence and Planning*, *26*, 573–586. https://doi.org/10.1108/02634500810902839

Legendre, P., & Legendre, L. (2012). *Numerical ecology (3rd Edition)*. Elsevier. www.elsevier.com/books/numerical-ecology/legendre/978-0-444-53868-0

Lübke, C. (2019). How self-perceived job insecurity affects health: Evidence from an age-differentiated mediation analysis. *Economic and Industrial Democracy*, 1–18, https://doi.org/10.1177/0143831x19846333

Lunner Kolstrup, C., Kallioniemi, M., Lundqvist, P., Kymäläinen, H. R., Stallones, L., & Brumby, S. (2013). International perspectives on psychosocial working conditions, mental health, and stress of dairy farm operators. *Journal of Agromedicine*, *18*, 244–255. https://doi.org/10.1080/1059924X.2013.796903

Malinowski, B. (1918). Fishing in the Trobriand Islands. *Man*, *18*, 87–92. https://doi.org/10.2307/2788612

Milner, A., & King, T. (2019). Men's work, women's work and suicide: A retrospective mortality study in Australia. *Australian and New Zealand Journal of Public Health*, *43*, 27–32. https://doi.org/10.1111/1753-6405.12859

Minas, H., Tsutsumi, A., Izutsu, T., Goetzke, K., & Thornicroft, G. (2015). Comprehensive SDG goal and targets for non-communicable diseases and mental health. *International Journal of Mental Health Systems*, *9*, 1–4. https://doi.org/10.1186/s13033-015-0003-0

Minnegal, M., & Dwyer, P. D. (2008). Mixed messages: Buying back Australia's fishing industry. *Marine Policy*, *32*, 1063–1071. https://doi.org/10.1016/j.marpol.2008.03.005

Mobsby, D., & Koduah, A. (2017). *Australian fisheries and aquaculture statistics 2016*. Australian Bureau of Agricultural and Resource Economics and Sciences, https://data.gov.au/dataset/ds-dga-c12a0597-b535-48b3-a602-1f8382d8dae6/details

Palinkas, L. A., Johnson, J. C., & Boster, J. S. (2004). Social support and depressed mood in isolated and confined environments. *Acta Astronautica*, *54*, 639–647. https://doi.org/10.1016/S0094-5765(03)00236-4

Perceval, M., Kõlves, K., Ross, V., Reddy, P., & De Leo, D. (2019). Environmental factors and suicide in Australian farmers: A qualitative study. *Archives of Environmental and Occupational Health*, *74*, 279–286. https://doi.org/10.1080/19338244.2018.1453774

Pickett, J., & Hofmans, J. (2019). Stressors, coping mechanisms, and uplifts of commercial fishing in Alaska: A qualitative approach to factors affecting human performance in extreme environments. *Journal*

of Human Performance in Extreme Environments, *15*, https://doi.org/10.7771/2327-2937.1121

Pinkerton, E., & Davis, R. (2015). Neoliberalism and the politics of enclosure in North American small-scale fisheries. *Marine Policy*, *61*, 303–312. https://doi.org/10.1016/j.marpol.2015.03.025

Pirkis, J., Schlichthorst, M., King, K., Lockley, A., Keogh, L., Reifels, L., Spittal, M. J., & Phelps, A. (2019). Looking for the 'active ingredients' in a men's mental health promotion intervention. *Advances in Mental Health*, *17*, 135–145. https://doi.org/10.1080/18387357.2018.1526095

Poggie, J. J., Pollnac, R. B., & Gersuny, C. (1976). Risk as a basis for taboos among fishermen in southern New England. *Journal for the Scientific Study of Religion*, *15*, 257–262. https://doi.org/10.2307/1386089

Pollnac, R. B., Carothers, C., Seara, T., & Poggie, J. J. (2019). Evaluating impacts of marine governance on human communities: Testing aspects of a human impact assessment model. *Environmental Impact Assessment Review*, *77*, 174–181. https://doi.org/10.1016/j.eiar.2019.02.001

Pollnac, R. B., Monnereau, I., Poggie, J. J., Ruiz, V., & Westwood, A. D. (2011). Stress and the occupation of fishing. In J. Langan-Fox, & C. L. Cooper (Eds.), *Handbook of stress in the occupations* (pp. 309–321). Edward Elgar Publishing. https://doi.org/10.4337/9780857931153.00041

Pollnac, R. B., & Poggie, J. J. (2008). Happiness, well-being and psychocultural adaptation to the stresses associated with marine fishing. *Human Ecology Review*, 194–200.

Pollnac, R. B., Poggie, J. J., & Cabral, S. L. (1998). Thresholds of danger: Perceived risk in a New England fishery. *Human Organization*, *57*, 53–59. https://doi.org/10.17730/humo.57.1.6102370471p43530

Pollnac, R. B., Seara, T., & Colburn, L. L. (2015). Aspects of fishery management, job satisfaction, and well-being among commercial fishermen in the northeast region of the United States. *Society & Natural Resources*, *28*, 75–92. https://doi.org/10.1080/08941920.2014.933924

Revelle, W. (2019). *psych: Procedures for Psychological, Psychometric, and Personality Research*. Retrieved from https://cran.r-project.org/package=psych

Scyphers, S. B., Steven Picou, J., & Grabowski, J. H. (2019). Chronic social disruption following a systemic fishery failure. *Proceedings of the National Academy of Sciences of the United States of America*, *116*, 22912–22914. https://doi.org/10.1073/pnas.1913914116

Seafood Industry Australia (2020). *Mental health*. Retrieved from https://seafoodindustryaustralia.com.au/our-priorities/mental-health/. June 26, 2020

Seafood Industry Australia (2021). *Community resilience grants to help commercial fishers Stay Afloat*. Retrieved from https://seafoodindustryaustralia.com.au/community-resilience-grants-to-help-commercial-fishers-stay-afloat/ January 8, 2021

Seara, T., Pollnac, R. B., & Poggie, J. J. (2017). Changes in job satisfaction through time in two major New England fishing ports. *Journal of Happiness Studies*, *18*, 1625–1640. https://doi.org/10.1007/s10902-016-9790-5

Seara, T., Pollnac, R. B., Poggie, J. J., Garcia-Quijano, C., Monnereau, I., & Ruiz, V. (2017). Fishing as therapy: Impacts on job satisfaction and implications for fishery management. *Ocean and Coastal Management*, *141*, 1–9. https://doi.org/10.1016/j.ocecoaman.2017.02.016

Shaw, S., Johnson, H., & Dressler, W. (2011). *Identifying, communicating and integrating social considerations into future management concerns in inshore commercial fisheries in Coastal Queensland*. (FRDC Project No 2008/073). Fisheries Research and Development Corporation & Queensland Seafood Industry Association. https://qsia.com.au/content/uploads/2018/01/Attachment-38_Final-Report_Project-No-2008_073.pdf

Smith, S., Jacob, S., Jepson, M., & Israel, G. (2003). After the Florida net ban: The impacts on commercial fishing families. *Society & Natural Resources*, *16*, 39–59. https://doi.org/10.1080/08941920309174

Strauss, A., & J. M. Corbin (Eds.) (1997). *Grounded theory in practice*. SAGE Publications Inc.

Swift, O. (2019). Home-making on land and sea in the Archipelagic Philippines. In T. J. King, & G. Robinson (Eds.), *At home on the waves: Human habitation of the sea from the Mesolithic to today* (pp. 268–285). Berghahn Books. https://doi.org/10.2307/j.ctv12pns49.19

Tasmanian Seafood Industry Council (2020). *Stay Afloat*. Retrieved from https://www.tsic.org.au/ June 26, 2020

Turner, R. A., Szaboova, L., & Williams, G. (2018). Constraints to healthcare access among commercial fishers. *Social Science and Medicine*, *216*, 10–19. https://doi.org/10.1016/j.socscimed.2018.09.026

Urbanaviciute, I., De Witte, H., & Rossier, J. (2019). Perceived job insecurity and self-rated health: Testing reciprocal relationships in a five-wave study. *Social Science and Medicine*, *233*, 201–207. https://doi.org/10.1016/j.socscimed.2019.05.039

Voyer, M., Barclay, K., McIlgorm, A., & Mazur, N. (2017). Connections or conflict? A social and economic analysis of the interconnections between the professional fishing industry, recreational fishing and marine tourism in coastal communities in NSW, Australia. *Marine Policy*, *76*, 114–121. https://doi.org/10.1016/j.marpol.2016.11.029

Women in Seafood Australasia (2019). *Project Regard Launch*. Retrieved from https://womeninseafood.org.au/project-regard-launch/ June 26, 2020

Woodhead, A. J., Abernethy, K. E., Szaboova, L., & Turner, R. A. (2018). Health in fishing communities: A global perspective. *Fish and Fisheries*, *19*, 839–852. https://doi.org/10.1111/faf.12295

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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