Supplementary 3

Table 1: Summary of quantitative studies

Author	Study design	Aim/objective	Study population/study country and industry	Health outcome	Measurements	Summary of findings
Aiken & McCance, 1982[55]	Cross-sectional survey	To examine the drinking habits of offshore workers	213 male workers; Industry; age NR; country/country: UK; industry: Offshore oil/gas	Alcohol intake	Self-reported alcohol intake prior to offshore tour. Analysis plan: Chi-square test and Log t-test	30% consume alcohol above safe limit and more heavy (30%) compared to the general population (10%). Alcohol intake was significantly high among manual workers (37%); manual worker consumed 49.3 units/week compared to an executive worker (29.5 units) ($p<0.004$) and onshore manual industrial workers (21.4 units) ($p<0.005$).
Albrecht & Anglim, 2018[29]	Longitudinal diary survey	To test a model of how day-to-day experiences of job demands and job resources predict day-to-day wellbeing across the FIFO work cycle	52 FIFO workers; 62.7% male. Country: Australia Industry: Construction	Emotional exhaustion and engagement	Emotional exhaustion, and engagement were measured with items adapted from previously published scales. Analysis plan: Bayesian hierarchical methods	Work engagement declined (-0.07, 95%CI -0.11, 0.03) and emotional demand increased (0.05, 95%CI -0.09, 0.00) over the course of the work cycle. Day-level autonomy (β =0.15; $p<0.05$) predicted day-level engagement; day-level workload (β=0.16;$p<0.05$) and emotional demands (β=0.45;$p<0.05$) predicted emotional exhaustion
Barclays *et al*., 2016[58]	Cross-sectional survey	To assess the factors associated with well-being of fly-in fly-out (FIFO) workers	60 FIFO geologists; 51.7% males; Mean age 32.2 years Country/country: Australia Industry: Mining	Mental and physical health; sleep problems; BMI	Mental health (Depression, anxiety & stress) measured using DASS-21 (Depression: scores 7-10=moderate, ≥11 severe; Anxiety: 6-7 moderate, ≥8 severe; stress: 10-12 moderate, ≥13 severe); Physical health assessed by self-reported health status. Analysis plan: Descriptive statistics	Depression (m=6.6±7.28), anxiety (m=3.69±4.20), stress (m=8.98±7.64) scores were similar to that of normal population; 10% had severe psychological problem. 45% reported loneliness and isolated. Physical health status was reported good (61.7%) or very good (11.7%); 66.7% reported exercise regularly; 3.3% reported smoking; 46.7% exercise daily or multiple times per week; 25% reported difficulty in sleeping often/most of the time, and 33.3% sometime experience trouble sleeping; 40% were overweight
Bergh *et al*., 2015[77]	Mixed method study	To present and discuss the auditing	303 offshore employees;	Feeling worn out;	Feeling worn out measured by GWBQ (scores ≥18 on 0-48	Offshore workers (m=13.8) were less worn-out compared to the normal population (m=15.87).

	(Quantitative data)	tool for psychosocial work environment	Country: Norway Industry: Offshore oil & gas	musculoskeletal complaints	scale= more worn out). Self-reported musculoskeletal pain in the past year. Analysis plan: Likelihood Ratio/Odds Ratio analysis	Less than 50% of the survey participants reported musculoskeletal pain; headache (36%), shoulder pain (36%), back pain (33%) and neck (27%)
Bergh *et al*., 2018[76]	Mixed method study (Quantitative data)	To explore specific and common psychosocial risks to the oil and gas industry	788 offshore and 1024 onshore workers; Country: Norway Industry: Offshore oil & gas	Worn-out	Work-related stress symptoms was assessed using the worn out scale of the GWBQ (scores ≥ 18 on 0-48=more worn out). Analysis plan: t-test and correlation analysis	Offshore workers (m=13.82) were less worn-out compared to onshore oil workers (m=15.11) (t=4.658; p<0.001). Increased job demands (r=-0.382; p<0.001) related to poor general well-being. High social support (r=-0.457; p<0.001), clear roles (r=-0.415; p<0.001), and job control (r=-0.472; p<0.001) related to low symptom scores (i.e. better well-being).
Berthelsen *et al*., 2015[64]	Cross-sectional survey	To examine the relationship between psychosocial work exposures and mental distress among onshore- and offshore workers	1471 onshore and offshore workers; 93.2% males; mean age 42.6±10.5yrs; Country: Norway; Industry: Offshore oil & gas	Mental distress (Depression and anxiety)	Anxiety and depression assessed using Hospital Anxiety and Depression Scale (HADS) (scores ≤7-normal, ≥8=borderline abnormal, ≥11-abnormal case). Analysis plan: Simple and multiple linear regression analyses with block design	Prevalence of anxiety (11.4%) and depression (16.7%) among the offshore workers were lower than the onshore workers (anxiety:13.9%, depression:22.8%); Job demands (β=0.18, 99%CI 0.10-0.26) was associated with more mental distress. Job control (β=-0.11, 99%CI -0.20, -0.03), role clarity (β=-0.15, 99%CI -0.24, -0.06), and fair leadership (β=-0.18, 99%CI -0.29, -0.08) were associated with lower mental distress.
Bjerkan *et al*., 2010[95]	Cross-sectional survey	To examine the relationship between health, safety and work environment	9945 personnel; 89.5% males; 67.1% aged 31 to 50yrs. Country: Norway Industry: Offshore oil & gas	Health complaints	Health complaints assessed by subjective health complaints in last 3 months and self-rated General health status. Analysis plan: MANOVA and Bonferrioni post-hoc test	Perceived general health status was good or very good; Workers in maintenance and modification work groups perceived their general health as poor than other work groups ($F_{7, 8870}$= 7.23, p<0.000); Accommodation personnel reported a significantly higher frequency of ill-health symptoms as compared to the other work groups ($F_{7, 8870}$=12.76, p>0.000).
Bjerkan *et al*., 2011[78]	Cross-sectional survey	To examine the effect of work-related variables on self-reported health complaints among	414 onshore and offshore workers in the maintenance and modification division;	Mental and physical health	Health assessed using the Subjective Health Complaints Inventory (higher mean score on 0-3 =more health complaints). Analysis plan:	Offshore workers reported few physical (mean scores 1.32-1.91) and psychological health (mean scores 1.09-1.40) complaints similar to onshore workers. Job type was related to perceived

		Norwegian onshore and offshore oil workers	87.4% male; mean age of 40± 11.19yrs; Country: Norway Industry: offshore oil and gas		MANOVA and Stepwise multiple regression analyses	psychological health [$F_{(7)} = 2.94$, $p = 0.011$] and physical health status ($F_{(14,100)}= 1.85$, p=0.041). Low control of decision ($\beta = -0.27$; p=0.011) and perceived family matters exert negative influence on health ($\beta = -0.24$; p=0.020) was negatively associated with psychological health; job demands of repetitive work ($\beta = -0.23$; p=0.042) was negatively associated with physical health
Bowers *et al*., 2018[59]	Cross-sectional survey	To assess the prevalence and correlates of psychological distress	1124 participants (99.6% FIFO) 93.5% males Mean age 37.3±10.7 years Country: Australia Industry: Mining and construction	Psychological distress	Psychological distress assessed by The Kessler Psychological Distress Scale (K10) (scores ≥22 on a scale of 10-50=high/very high distress); Analysis plan: Univariate multinomial regressions and multivariable regression	28% high or very high psychological distress than the general population (10.8%). Stress from fear of stigmatisation for mental health problems (OR=23.5; 95%CI=7.5-73.2), stress caused by immediate supervisory (OR=4.3; 95%CI 1.6-11.3), stress from remoteness of their living circumstances (OR=3.7; 95%CI=1.6-8.6), financial stress (OR=6.0; 95%CI=2.7-13.1), stress from job tasks (OR=6.2; 95%CI =1.8-21.2), and stress from shift length (OR=2.4; 95%CI=1.2-5.1); and on roster 1 week on/1 week off (OR=1.6; 95%CI=1.0-2.5) and 2 weeks on/2 weeks off (OR=2.4; 95%CI=1.7-3.4) were associated with high distress levels.
Carter *et al*., 2007[17]	Cross-sectional study	To examine the hydration knowledge, perceptions and behaviours; hydration status and needs	180 mining staff; 96% males. Country: Australia. Industry: Mining	Alcohol intake; physical activity	Self-reported alcohol intake (number of standard alcoholic drinks) and number of physical activity. Analysis plan: descriptive statistics	33% consume alcohol; median 3.0(IQR 2.0-6.0) standard drinks per session, and median 3.0(IQR 2.0-6.0) days per week. 50% engage in physical activity at camp; engaged in a median of 3 days per week
Chen, *et al*., 2003[88]	Cross-sectional survey	To examine determinants of perceived occupational stress	561 male workers; mean age was 32.43±8.65yrs; Country: China Industry: Offshore oil & gas	Perceived occupational stress	Occupational stress was measured by the Occupational Stress Scale (OSS). Analysis plan: Hierarchical regression	Lower perceived social support was associated with greater stress from managers ($\beta = 0.119$; $p<0.05$), organization structure ($\beta = -0.126$; $p<0.01$) and living environment ($\beta = 0.120$; $p<0.001$).

Chen *et al.,* 2005[15]	Cross-sectional study	To examine musculoskeletal pain and their occupational stress and other psychosocial factors	561 male workers; mean age 32.43±8.65yrs Country: China; Industry: offshore oil and gas	Musculoskeletal problems	Musculoskeletal complaints in the past 12 months using the standardised Nordic questionnaire. Analysis plan: multiple forward stepwise logistic regression	56.3% reported musculoskeletal pains in the last 12 months: low back (32.4%), neck (25%), knees (20.1%) and shoulder (20%). Low back pain associated with stress from interface between job and family/social life (OR=1.46; 95%CI=1.18–1.82), safety concerns (OR=1.29; 95%CI=1.05–1.59), physical environment of workplace (OR=1.37; 95%CI=1.11–1.69), and living in environment (OR=1.26; 95%CI=1.02–1.56). Pains in the neck associated with stress from interface between job and family/social life (OR=1.34; 95%CI=1.05–1.70), safety concern (OR=1.53; 95%CI=1.26–1.93), and physical environment of workplace (OR=1.43; 95%CI=1.14–1.79). Pain in the knees was associated with stress from safety concerns (OR=1.59; 95%CI=1.24–2.06), physical environment of workplace (OR=1.43; 95%CI=1.11–1.85) and managerial role (OR=0.76; 95%C=0.58–0.98). Pains in the shoulder was associated with stress from interface between job and family/social life (OR=1.35; 95%CI=1.02–1.71), safety concerns (OR=1.54; 95%CI=1.20–1.99), and physical environment of workplace (OR=1.32; 95%CI=1.03–1.68). Pain in the wrist/hands was associated with social support (OR=2.44, 95%CI=1.18–5.04).
Chen *et al.,* 2008[109]	Cross-sectional study	To explore the relationship of occupational stress and social support with health-related behaviours	561 male workers; mean age 32.43±8.65yrs; Country: China; Industry: offshore oil and gas	Physical exercise, alcohol intake, smoking.	Self-reported physical exercise (regular exercise after work), alcohol intake (regular intake of alcohol at least one time per week for at least one year), current smoking (regularly smoking of at least one cigarette per day for at least one year). Analysis plan: logistic regression	63.1% did not engage in leisure-time physical exercise. 38.9% current smokers; 22.1% current alcohol consumers. Current smoking was associated with perceived stress from safety concerns (OR=0.74; 95%CI=0.58-0.94) and supervisors' instrumental support (OR=0.34; 95%CI=0.18-0.65). Current drinking was related to perceived stress from "interface between job and family/social life" (OR=1.32; 95%CI=1.02-1.70) and "Organizational structure" (OR=1.35; 95%CI=1.06-1.74) and

						emotional support from friends (OR=0.54; 95%CI=0.32-0.96). Physical inactivity after work was associated with perceived stress from safety concerns (OR=1.44; 95%CI=1.16-1.79) and lack support from both supervisors (OR=1.74; 95%CI=1.13-2.65) and friends (OR=1.68; 95%CI=1.06-2.42)
Chen *et al.,* 2009[87]	Cross-sectional study	To explore the association of occupational stress with mental health	561 male offshore workers; mean age was 32.43±8.65yrs; Country: China; Industry: Offshore oil and gas	Mental health	Mental health measured using the General Health Questionnaire (GHQ-12) (higher score on 0-36=worse mental health). Analysis plan: Hierarchical linear regression analysis	Mental health relatively low (mean score=10.17±4.97); Perceived stress from 'management problems and relationships with others at work' (β =0.199; p<0.001), safety concerns (β=0.188; p<0.001), interface between job and family/social life (β=0.197; p<0.001), career and achievement (β=0.181; p<0.001), physical environment of workplace (β=0.130; p<0.001) and organizational structure (β=0.122; p<0.001) were associated with poor mental health
Chen *et al.,* 2009[79]	Cross-sectional survey	To explore the association of mental health with occupational stress, coping styles and their interaction	561 male workers; mean age 32.43±8.65 years; Country: China Industry: offshore oil & gas	Mental health	Mental health measured using General Health Questionnaire (GHQ)-12 (higher score on 0-36=worse mental health). Analysis plan: Pearson correlation analysis and hierarchical multiple regression	Mental health level was relatively low (mean score=10.2±5.0). Poor mental health was positively associated with increase perceived occupational stress (β=0.379; p<0.001).
Chen *et al*., 2009[10]	Cross-sectional study	To explore the association of occupational stress and coping styles with ulcer-like symptoms in Chinese male off-shore oil workers	561 male workers; mean age 32.43±8.65yrs Country: China; Industry: offshore oil and gas	Gastric wellbeing (Ulcer-like symptoms)	Self-reported ulcer-like symptoms; high scores indicating poor gastric well-being. Analysis plan: stepwise multiple regression	Gastric well-being was relatively good; but poor appetite (66.8%) and localized epigastric pain (52.3%) were reported. Increase in occupational stress associated with increased Ulcer-like symptoms (β=0.010; p<0.001).

Cooper & Sutherland, 1987[70]	Cross-sectional survey	To examine the relationships between psychosocial and occupational stressors, and mental health	218 male offshore workers; age range 20 to 59 yrs; Country: UK; Industry: Offshore oil/gas	Mental health; anxiety and depression	Mental health and psychological wellbeing assessed by The Crown-Crisp Experiential Index. Analysis plan: A stepwise multiple regression	Offshore workers mental health (mean score=22.6) was comparable to that normal population & onshore industrial workers (mean score=21.1); anxiety levels in offshore workers was significantly higher than normal population; stress from relationships at work and home associated with mental well-being (β=0.626; p<0.001), free floating anxiety (β =0.574; p<0.001), and depression (β=0.494; p<0.001); stress from living environment associated with anxiety (β=0.596; p<0.001) and poorer mental wellbeing (β=0.637; p<0.001).
Cooke *et al*., 2019[66]	Cross-sectional survey	To examine the association between pregnant women's report of stress and their partners working fly-in-fly-out	394 families (77 FIFO families); mean age of FIFO workers 32.8±5.83yrs; Country: Australia; Industry: General FIFO	Depression, anxiety and stress	Perceived stress was assessed with Perceived Stress Scale (scores 0-13=low stress, 14-26=moderate stress, 27-40=high stress); State and trait anxiety assessed using The Spielberger State-Trait Anxiety Inventory STAI (higher score on 20-80 indicate greater anxiety); Depression assessed by Beck Depression Inventory II BDI (scores <14=minimal, ≥14=mild/moderate, ≥29 severe depression). Analysis plan: One-way between subjects ANOVAs	No differences between depression (5.18±5.10 vs 5.28±6.81; p<0.955), anxiety (33.30±9.22 vs 32.37±8.77; p<0.296) and perceived stress (18.77±6.27 vs 19.95±7.17; p<0.607) level among FIFO and non-FIFO regular workers
Dittman *et al.,* 2016[67]	Cross-sectional study	To examine the impact of Fly-In/Fly-Out (FIFO), on children and families	46 FIFO workers and 36 community fathers; Country: Australia; Industry: General FIFO	Depression, Anxiety, Stress, Alcohol	Depression Anxiety Stress Scales-21 (Depression: scores 0-4 normal, 5-6 mild, 7-10 moderate, ≥11 severe; Anxiety: 0-3 normal, 4-5 mild, 6-7 moderate, ≥8 severe; stress: 0-7 normal, 8-9 mild 10-12 moderate, ≥13 severe). Alcohol Alcohol Use Disorders	Levels of depression (2.58±3.43 vs 3.31±4.39), anxiety (1.31±2.12 vs 1.65±3.04), and stress (3.33±3.27 vs 4.68±4.74) among FIFO fathers were similar to that of non-FIFO fathers (p>0.05). Alcohol use was higher in FIFO workers than non-FIFO workers (5.52±3.97 vs 3.50±2.86, t=-2.68; p<0.05).

					Identification Test (high score on 0-28 indicate severe alcohol use). Analysis plan: Independent t-test	
Ferguson *et al.,* 2010[98]	Longitudinal diary study	To examine the amount of sleep obtained during off- and work-days	29 participants; 89.7% males Mean age 37.4±6.8yrs; Country: Australia; Industry: mining	Sleep and fatigue	Daily sleep diary and actigraphy. Subjective fatigue was assessed using the Samne Perelli Fatigue Scale for pre- and post-sleep period (for 21 or 28 days). Analysis plan: mixed model ANOVA and pairwise post-hoc	Total sleep time longer on days off (7.3±1.2 hrs) than both day-shift (6.1±1.0 hrs) and night-shift (5.7±1.5 hrs) days ($p<0.0001$). Sleep duration short on night shifts than day-shifts ($p<0.01$). Fatigue higher at pre-sleep periods than post-sleep periods; pre-sleep fatigue higher on night shifts than both day shifts and days off; post-sleep fatigue lower on days off than both day and night shifts. Recovery of sleep on both night shift and days off higher than day shift ($p<0.01$).
Gann *et al*., 1990[50]	Cross-sectional survey	To quantify levels of anxiety and depression	796 employees (403 offshore & 393 onshore); 96.1% males Mean age 40.6 years Country: UK Industry: Offshore oil and gas	Depression and anxiety	Goldberg's Anxiety and depression Scale; Analysis plan: 2 x 2 contingency table and chi-squared test	15% reported symptoms of Anxiety; 28% reported symptoms of depression; No significant differences in levels of depressive and anxiety symptoms between onshore and offshore staff ($p=0.05$)
Gibson-Smith *et al*., 2018[80]	Cross-sectional survey	To determine the health status, quality of life and mental wellbeing, and self-care status of offshore workers	776 offshore workers; 66.3% male; mean age 42.9±10.1yrs. Country: UK; Industry: offshore oil & gas	Mental quality of life & mental wellbeing; physical health; alcohol intake; smoking; diet; physical activity; BMI; sleep	SF-8 assessed physical and mental function (scores >50 indicate greater quality of life); Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) (higher scores on 14-70 indicate greater mental wellbeing); Fast Alcohol Screening Test (FAST) assessed alcohol in last 1yr (score ≥3 indicate harmful alcohol intake); Global Adult Tobacco Survey (GATS); diet	Mental function (median=54.7, IQR 8.1), mental wellbeing (median score=52.0,IQR=9.0), and physical function (median score=56.1, IQR=4.8) were higher than normal population (median score 50); 53.4% reported harmful alcohol intake; 20.2% reported smoking, 25.1% were ex-smokers; 5.2% use recreational drugs; 45.1% reported intake of fruit and vegetable below the required guidelines; 70.7% reported physical activity; 67.0% reported poor sleep quality; BMI median 27.5(IQR=4.9); 51.1% were overweight and 23.3% were obese.

					in 24hrs (≥5 serves of fruit and vegetables per day); Pittsburgh Insomnia Rating Scale-2 (PIRS-2) assessed sleep in 7 days (socres>2 on 0-6 indicated poor sleep quality); Physical activity assessed by IPAQ (≥150/75 minutes moderate/vigorous physical activity); self-reported height and weight (BMI 25-29.9=overweight, ≥30 obese). Analysis plan: Whitney U test	
Hanoa *et al*., 2011[30]	Longitudinal study	To investigate possible changes in health after a voluntary implementation of a new shift schedule	274 in 2006, 307 in 2007 and 312 in 2008 coal company male employees; Mean age 39.1±9.6 yrs. Country: Norway. Industry: Mining	Perceived stress, sleep, pain	Self-reported sleep and stress assessed using questionnaire developed by authors. Analysis plan: Independent t-test	Stress symptoms were rare among 85.5% of workers. Prevalence of sleep problems and pain (1-5%) were low. Stress level at baseline was better for those on 14 days on/14 days off compared 7 days on /7 days off roster (p=0.006). No differences in stress (p=0.910) and sleep (p=0.992) between 14 days on/14 days off and 7 days on /7 days off roster over 2 year period
Harris *et al*., 2010[36]	Longitudinal study	To study if health, reaction time, and the cortisol rhythm were negatively affected by change in work schedule	19 employees working offshore; mean age was 44 years; 68.4% male. Country: Norway; Industry: offshore oil & gas	Subjective health complaints	Health complaints measured by the Subjective Health Complaints inventory (SHC) in the last 30 days; measured 2 times; 9 months apart). Analysis plan: Paired sample t-tests	73.7% reported very good or good health; 94.7% reported very good or good physical fitness; few subjective health complaints reported (mean score=6.82±6.40; range 0-87); few musculoskeletal (mean score=3.68±3.51; range 0-24) and few gastric complaints (mean score=1.00±1.60; range 0-24). No change in subjective health complaints between working fixed shift (mean score=6.82±6.40) and swing shift (mean score=5.97±4.36) over 9 months period (p=0.494)
Haward *et al.,* 2009[89]	Longitudinal diary study	To assess the effects of vessel motion on crew performance,	47 male crew on a floating vessel; mean 41.5±6.7yrs; Country: UK;	Sleep and fatigue, depression, anxiety	Daily diaries reporting sleep, and symptoms of fatigue, depression, anxiety (on 0 none to 4 severe scale) for 150 days	Fatigue: physical tiredness (*T*=0.147; p<0.01) and mental tiredness (*T*=0.143; p<0.01); Sleep problems: sleep quality (*T*=0.216; p<0.01), sleep duration (*T*=-0.210; p<0.01); depression (*T*=0.121;

		and sleep impairment.	Industry: offshore oil & gas		over 6 offshore tour (14 days each). Analysis plan: Kendall rank-order correlation and the Kendall partial rank correlation	p<0.01) and anxiety (*T*=0.133; p<0.01) were related to vessel motion.
Hope *et al.,* 2010[108]	Cross-sectional survey	To examine the relationship between risk perception and safety climate, and sleep quality	9601 employees on 52 offshore oil installations; 90% males; aged 31-50yrs; Country: Norway; Industry: offshore oil and gas	Sleep quality	Self-reported sleep quality (score 1-5: high score indicate high sleep quality). Analysis plan Independent t-tests and one-way ANOVAS and Pearson's correlation and hierarchical multiple regression	Subjective sleep quality was relatively good (mean score 3.87±0.74); sleep quality better in day shift (mean=4.00±0.72) workers than night (mean=3.72±0.71), fixed (mean=3.68±0.72) and swing (mean=3.81±0.25) shifts (p<0.001). Positive perceived safety climate (β =0.13-0.18; p<0.001) was related to good subjective sleep quality. Risk perception (β=-0.28; p<0.001) was negatively associated with sleep quality.
James *et al*., 2018[43]	Cross-sectional survey	To assess the prevalence of psychological distress and associated demographic, health, and workplace characteristics	1,799 mine workers (85.4% FIFO); 89% males 93.6% aged 25 years and over Country: Australia Industry: Mining	Psychological distress Alcohol intake	Psychological distress was measured by The Kessler Psychological Distress Scale (K10) (score 16-21=moderate, ≥22 indicate high/very high distress on 10-50 scale). AUDIT (scores >8 indicating risky/high Risk alcohol use); Analysis plan: Chi-square test and multivariate logistic regression	16.9% reported high or very high levels of psychological distress than general population (7.6%, p<0.001); 49.1% were risky/high risk alcohol users. 33.8% were illicit drug users in the last month. Increased concerns of losing job (OR=3.17; 95%CI=1.96-5.16), having shift length longer than 12 hrs (OR=1.61; 95%CI=1.17-2.30) and working for financial reasons (OR=1.34; 95%CI=1.12-1.61) were associated with high distress; increased satisfaction with work (OR=0.33; 95%CI=0.25-0.43) and increased perception of the mine's commitment to mental health (OR=0.69; 95%CI=0.55-0.85) were associated with low distress
Joyce *et al*., 2013[48]	Cross-sectional survey	To examine the association of health behaviours and outcomes with employment type in the West Australian adult population	11,906 adult respondents aged 16 years and above from 2008 to 2010; 524 (4.4%) FIFO workers; 88.5% males; 60.6% aged 25-44yrs; Country:	Mental health; Alcohol intake; Smoking; diet, physical activity, BMI	Mental health conditions ever been diagnosed by a doctor. Self-reported alcohol intake (number of drinks per day), smoking status, fruits and vegetable intake (insufficient serves: <5 serves of fruit and vegetables per day), physical activity (insufficient <150/75	FIFO workers had a lower self-reported prevalence of current mental health problems (7.7%; 95%CI=4.4–11.0), consume more alcoholic drinks per day [high risk for short-(29.8%; 95%CI=22.8–36.8) and long-term harm (64.7%; 95%CI= 57.5–71.9)], smoke higher (26.7%; 95%CI=20.5–33.0), and more classified as over-weight or obese (79.3%; 95%CI=73.2–85.5) than other work employment (p<0.01). FIFO consume insufficient

			Australia; Industry: General FIFO		minutes moderate/vigorous physical activity per week), and height and weight (BMI 25-29.9=overweight, ≥30 obese); Analysis plan: Chi-square test	fruits (48.9%; 95%CI=41.7–56.1) and vegetables (87.7%; 95%CI=82.9–92.5) intake and undertake insufficient physical activity (40.4%; 95%CI=33.5–47.4) similar to other work employment (p>0.05).
Kalteh *et al*., 2018[94]	Cross-sectional study	To assess the prevalence of musculoskeletal pain and their work-related factors	1,157 employees at 229 installations; mean age 40±10.5 yrs; 95.8% males; country: Iran; industry: offshore oil & gas	Musculoskeletal pain; physical activity, Sleep, BMI	Self-reported sleep duration, physical activity and musculoskeletal pain in last 12 months at workplace using Standardized Nordic Questionnaire (SNQ); analysis plan: chi-square test	BMI was 25.8±3.3 kg/m^2; musculoskeletal pain (MP) was high; common MP in the last 12 months were knees (47%), neck (38%), low back (37%), shoulder (29%); Workers on drilling, maintenance, operational and tour-scheduling and day-off jobs reported the highest level of musculoskeletal pain (p<0.05). 51.6% engage in exercise twice or more per week. 33.1% reported insufficient sleep duration of less than 5 hours.
Kecklund *et al*., 2001[44]	Longitudinal study	To investigated how double shifts (15.5hrs) affect sleep fatigue and self-rated health	48 male workers (80% LDC); mean age: 41 years; Country: Sweden; Industry: construction.	Health complaints; sleep problem	Self-reported health complaints for 3 times over 1 year period: complaint of pains (1 always to 5 never); insufficient sleep (1 always to 5 never); exhaustion (1 always to 5 never). Daily diary 8 times during roster cycle on sleep duration, sleep quality, sleepiness (KSS on 1 very alert to 9 very sleepy); mental fatigue (1inactive to 9 high energy). Analysis plan: ANOVA and t-tests	Complaints of pain in the neck and shoulders (3.8±0.2 vs 3.3±0.2; p<0.05), and back and knees (4.3±0.2 vs 3.9±0.2; p<0.05), insufficient sleep (3.8±0.2 vs 3.3±0.2; p<0.05; range 1-5) and exhaustion on awakening (4.0±0.1 vs 3.4±0.2; p<0.05) significantly increased across 1 year period. Sleepiness (F=2.2; p<0.05) and mental fatigue (F=4.6; p<0.001) increased and accumulated across days and were highest on the last work shift; Sleep duration varied across days (F=15; p<0.001) and was short (approx. 5.5 hrs) during double shifts; Sleep quality was good but varied across days, being poor on last shift (F=9.8; p<0.001); Sleep efficiency was high and show no changes across days (F=0.7; p>0.05)
Lester *et al*., 2015[60]	Mixed method study (Quantitative part)	To explore the parenting patterns of families exposed to the fly-in–fly-out (FIFO) work pattern in raising adolescent children	23 FIFO workers; aged 30 years and above; 87% males ; Country: Australia; Industry: Mining and offshore oil/gas	Psychological distress	Mental health was measured using K10 scale (score 16-21=moderate, ≥22 indicate high distress on 0-50 scale). Analysis plan: Kruskall–Wallis non-parametric tests	26% of FIFO reported very high levels of psychological distress than normal population (9.5%); no significant relationship between FIFO work roster and FIFO workers psychological distress (p=0.496)

Light & Gibson, 1986 & 1987[45,46]	Cross-sectional survey	To estimate prevalence of overweightness	419 caucasian males; mean age 32.5±8.2yrs (range 18-57). Country: UK; Industry: offshore oil & gas	Weightness (BMI)	Objectively measured weight and height; Weightness (BMI) calculated as W/H2 (Kg/m2) (BMI 25-29.9=overweight, ≥30 obese). Analysis plan: chi-square	BMI was 24.80±2.9kg/m^2(range 18.3-33.9); 40.1% were overweight and 5.5% obese; Overweightness greater in offshore workers than the general population (66.2% vs 50%; p<0.05).
Ljosa *et al*., 2011[16]	Cross-sectional survey	To investigate the association between individual and psychosocial work factors and mental distress among offshore shift workers	1336 employees; 83% males; mean age 45.1±9.6yrs (range 20-64); Country: Norway Industry: Offshore oil & gas	Mental distress; anxiety and depression	Mental distress assessed by shortened version of the Hopkins Symptom Checklist (HSCL-5) (score 1-5, higher score indicate high level of distress). Analysis plan: Block-wise linear regression	Mental distress symptoms were low (mean score=1.6±0.7); High quantitative demands (β=0.17; 95%CI=0.09-0.26), low social support (β=-0.11; 95%CI=-0.17- -0.16) and high shift work home-interference (β=0.28; 95%CI 0.22-0.34) were associated with high mental distress
Maniscalco *et al*., 1999[56]	Longitudinal interventional study	To examine the effect of a wellness program on the number of back injuries- and positively impact cholesterol, nutrition, and fitness.	147 workers; average age 42 yr; 90% males. Country: USA; Industry: offshore oil & gas	Nutrition/diet	Nutrition score was calculated from 23 items on dietary fat, salt, sugar, and fiber intake between 1992 and 1997 (high on salt, sugar, fat and low fibre= poor nutrition). Analysis plan: Descriptive statistics	From 1992 to 1994; 71% reported poor nutrition; and 63% reported poor fitness level; From 1995 to 1997; 63% reported poor nutrition; and 76% reported poor fitness levels
Mathisen *et al*., 2016[75]	Cross-sectional survey	To investigated psychosocial precursors of action errors and violations	653 oil production workers; Country: Norway; industry: offshore oil & gas	Emotional exhaustion; health complaints	Health complaints in the last 6 months (score 1-2, higher score indicate few complaints); emotional exhaustion measured by the GWB-Q (scores 1-4, higher score indicate high emotional exhaustion). Analysis plan: descriptive, correlation and regression analyses	Workers reported few health complaints (mean score=1.65±0.33) and low emotional exhaustion (mean score=1.39±0.33); emotional exhaustion predicted action errors (β=0.27; p<0.01) and violations (β=0.26; p<0.01)

Menezes *et al.,* 2004[57]	Cross-sectional survey	To assess the sleep parameters among offshore personnel	202 offshore personnel; 95.5% males; mean age 36.75±9.5yrs; country: Brazil; Industry: offshore oil and gas	BMI, Sleep problems	Self-rated weight and height (BMI 25-29.9=overweight, ≥30 obese); self-reported sleep duration and quality. Analysis plan: independent t-test and z-test	BMI was 26.2±1.2kg/m^2. Shift/night shift workers reported high BMI (26.7±3.7 kg/m2 vs 25.6±3.3 kg/m^2; p<0.05), poorer sleep quality (20.4% vs. 1.2%; p<0.01), habitual difficulty in falling asleep (15.1% vs. 4.7%; p<0.01) fragmented sleep (45.2% vs. 16.3%, p<0.01), long latency of sleep onset (28% vs. 7%, p<0.01), short sleep duration (6h or less) (44.1% vs. 16.3%; p<0.01), waking up tired (15.1% vs. 3.5%, p<0.01) and habitual napping (35.5% vs. 18.6%; p<0.01) than day-shift workers.
Merkus *et al*., 2015[90]	Longitudinal diary study	To compare the course of self-reported recovery from work-related fatigue after 2-week 12-hour schedules	61 male employees; mean age 41.5±7.4yrs. Country: Norway; Industry: offshore oil & gas	General health status, sleep and fatigue	Self-perceived general health status; Sleep and fatigue diary for 14 days, and Karolinska Sleep Questionnaire. Analysis plan: Chi-square tests and analysis of variance (ANOVA)	88.6% rated general health status as good or very good; no differences between day (92%), night (75%) and swing (100%) shift workers (p=0.902). Poorer sleep quality in night shift (β=1.41; 95%CI 1.05-1.89) and swing shift (β=1.42; 95%CI 1.03-1.94) workers compared to day shift workers over the leave period. Recovery of sleep quality was similar for night and swing shift workers but different from day workers. Fatigue; feeling rested: night shift (β=1.67; 95%CI 0.74-3.80) swing shift (β=1.56; 95%CI 0.67-3.62); Physical tiredness: night shift (β=1.42; 95%CI 0.91-2.22), swing shift (β=1.52; 95%CI 0.94-2.46); Mental tiredness: night shift (β=1.44; 95%CI 0.85-2.43), swing shift (β=1.01; 95%CI 0.52-1.93) compared to day shift workers.
Merkus *et al*., 2017[91]	Longitudinal diary study	To explore the pursuit of activities relevant to recovery after offshore tour	61 male employees; Mean age 41.5±7.4yrs. Country: Norway Industry: offshore oil & gas	General health status; physical activities	Self-perceived general health status. Self-reported daily physical activities and duration for 14 days during leave period. Analysis plan: Chi-square test and ANOVA	88.6% rated general health status as good or very good; 97% engaged in regular leisure time physical activities (PA); overall no change in physical activities from start to the end of a 14-day leave period (p=0.083). Leisure time physical activities did not differ between night-, swing-and day-shift workers on the first day of the free period, but PA decreased over course of the 14 days in day workers compared to night shift

						workers (OR 1.10; p=0.029 and swing workers (OR 1.10; p=0.009).
Miller *et al*., 2020[41]	Cross-sectional survey	To examine the association between bullying and psychological distress	580 FIFO personnel 76.3% males Mean age was 35.5±9.1 years Country: Australia Industry: Mining	Depression and hopelessness	Clinical depression assessed by Beck Depression Inventory-II (BDI-II) (scores 11-16 mild, 17-20 borderline, 21-30 moderate, >30 severe/extreme depression); Hopelessness assessed by Beck Hopelessness Scale (BHS) (score ≥9 on 0-20 indicate elevated suicide risk) Analysis plan: Backward Logistic regression	32.3% of FIFO workers reported moderate or severe depression and 26.7% were at elevated risk of suicide high than the general population; Workplace bullying associated with increase depression (OR = 2.38; 95% CI =1.40–4.05), and suicide risk (OR =2.70; 95% CI = 1.53–4.76)
Miller *et al*., 2019[42]	Cross-sectional survey	To establish whether clinical depression and increased suicide risk between fly-in, fly-out workers and residential worker	751 Participants (576 FIFO and 175 residential); 76.2% males; mean age 36.5±9.1yrs Country: Australia Industry: Mining	Depression Suicide risk	Depression assessed by Beck Depression Inventory–II (BDI-II) (scores 11-16 mild, 17-20 borderline, 21-30 moderate, >30 severe/extreme depression); Hopelessness (suicide intention and behaviour) assessed by Beck Hopelessness Scale (BHS) (score ≥9 on 0-20 indicate elevated suicide risk). Analysis plan: A General linear model	32.3% of FIFO workers reported moderate or severe depression and 26.7% were at elevated risk of suicide high than the general population. Depression (marginal mean scores 19.7 (17.0–22.4 vs 15.5; 95%CI=14.3–16.6, p=0.01) and hopelessness (27.4% vs 26.7%, p= 0.02) significantly higher in residential than FIFO workers. Bullying associated with higher levels of depression (partial η^2=0.11; p=0.001) and hopelessness (partial η^2 = 0.04; p=0.001). Increased social support associated with lower levels of depression (partial η^2 = 0.13; p=0.001) and hopelessness (partial η^2=0.14; p= 0.001).

Muller *et al*., 2008[47]	Longitudinal diary study	To examine the effects of FIFO operations on self-reported fatigue and performance over a whole FIFO production roster	55 male FIFO; mean age 37yrs; Country: Australia; Industry: Mining	Alcohol, smoking, physical activity, BMI, sleep and fatigue	The Pittsburgh Sleep Diary; Swedish Occupational Fatigue Inventory (SOFI) for 28 days; Diary of self- reported alcohol consumption for 28 days during work and leave periods. Self-reported height and weight, smoking and physical activity. Analysis plan: Bivariate testing	BMI was 28.9 kg/m^2, with 35.3% as obese. >30 min of vigorous exercise was reported on 5 days (3–7) per week at-camp and 4 (2–5) days per week off-site. Regular drinking habit: median of 4(2–6) standard drinks per session at-camp and 6(3–10) drinks off-site. Daily drinking was highest during off-shift days (1.0-3.5 units/day) than day shift average: 2(1.7-2.8 units/day) and night shifts: average 1(median 0.6-1.4 units/day). 27.5% were current smokers. Sleep duration was highest on off-shift days (average 8.2h) than day-shift (average 6.6h) and nigh-shifts (average 6.7h) days. Sleep duration was short before and on day-shift days (5.8h) than night-shift (7.0h) days. Fatigue increased at concerning levels at the finish of night shifts 1–3 and from day shift 8 onwards
Nielsen *et al*., 2013[96]	Cross-sectional survey	To psychometric properties from a brief self-report measure of safety climate adapted to the petro-maritime organizations	396 offshore workers; 95% males; 64.1% aged 51 years and over. Country: Norway; Industry: Offshore oil & gas	Health complaints	Subjective health complaints were assessed on with 14 item common physical and psychological health issues (mean score 1-4, higher score indicate more complaints). Analysis plan: Pearson product-moment correlations	Respondents reported low subjective health complaints (mean score 1.39±0.13); Management prioritization ($r = -0.21$; $p< 0.01$) and authentic leadership ($r=-0.21$; $p<0.01$) negatively and risk perception ($r=0.24$; $p<0.01$) positively correlated with health complaints
Nielsen *et al*., 2013[73]	Cross-sectional survey	To examine the relative impact of workplace bullying and risk perception on the mental health among employees in safety critical organisations.	1017 randomly selected offshore workers; 85.9% males; mean age 44.59±8.9 years; Country: Norway Industry: Offshore oil and gas	Mental health (symptoms of anxiety)	Symptoms of anxiety as indicators of mental health problems, assessed using six items from the Hopkins symptoms checklist (HSCL) (mean score 1-4, higher score indicate severe symptoms). Analysis plan: Hierarchical regression analysis	Workers reported low anxiety symptoms (mean score= 1.21±0.29); Workplace bullying ($\beta=0.33$; 95%CI=0.28-0.40; $p<0.001$), and risk perception ($\beta=0.21$; 95%CI=0.06-0.11; $p<0.001$) were predictors of anxiety.
Nielsen *et al*., 2013[62]	Longitudinal study	To examine the prevalence and occupational	1074 offshore employees;	Psychological distress	Mental health assessed by Hopkins Symptoms Checklist-25 (HSCL-25) at 2	Prevalence of psychological distress decrease from 9 % at baseline to 8 % after 6 months lower than rates in general population (13%). Psychological

		predictors of psychological distress among offshore workers	85% male; mean age 45±8.6 years (baseline) Country: Norway Industry: Offshore oil and gas		measurements point 6 months apart (mean score ≥1.75 indicate distress case). Analysis plan: logistic regression	distress at follow-up was associated with laissez-faire leadership (OR = 1.69; 95%CI=1.12–2.54) and workplace bullying (OR = 1.49; 95%CI=1.07–2.10).
Nielsen *et al*., 2016[92]	Cross-sectional survey	To examine direct and indirect associations between shift work schedules, health complaints, and psychological safety climate	8066 employees; 91% men, aged 31 to 50 years. Country: Norway Industry: Offshore oil and gas	Health complaints; sleep problems	Subjective health complaints measured on 5 item issues related to physical health (headache, neck-, back-, and knee pain, and problems with hearing) (mean score1-4, higher score indicate more complaints). Sleep problems assessed using Trends in risk-level-Norwegian Shelf (mean score 1-5, higher score indicate poor sleep quality). Analysis plan: ANOVA and correlation analysis	Health complaints (m=1.58±0.47) and sleep problems (m=2.07±0.73) were relatively low. Safety climate associated with health complaints (β=-0.16; p<0.001) and sleep problems (β =-0.31; p< 0.001). Night shift (β=-0.14; 95%BCaCI=-0.19- -0.09) and swing shift (β=-0.13; 95%BCaCI=-0.15- -0.11) schedules associated with more sleep problems compared to day shifts.
Oshaug *et al.,* 1992[53]	Cross-sectional survey	To describe the diet among oil workers on selected oil installations	203 workers from 4 installations; 95.6% males; age range 18 to 58 yrs. Country: Norway; Industry: offshore oil & gas	Diet	Food invoice review and self-reported food intake in the last 24h and compared to the Norwegian dietary recommendation	Average daily intake of energy was 12.2MJ of which 44 % from fat and 39 % from carbohydrate, including 8 % from sugar. Compared to the Norwegian dietary recommendation, offshore diet intake was prone to the development of coronary artery disease

Paech *et al*., 2010[97]	Longitudinal diary study	To assess the work-related factors that influence sleep duration and subjective sleep quality	51 participants; mean age 40.3±10yrs; 98% male; country: Australia; Industry: Mining	Smoking; sleep duration and quality; BMI	Self-reported weight/height, smoking by General Health Questionnaire (GHQ). Daily sleep diaries and Actigraphy for 15 to 22 days (poor sleep quality: higher score on 1-5 scale). Analysis plan: Linear mixed effects models	BMI was 28.7±4.2 Kg/m^2. 47.1% reported smoking; Total sleep time (TST) for days off (7.0±1.9hrs) was longer ($p<0.001$) than day (6.0±1.0hrs) and night (6.2±1.6hrs) shifts. TST did not differ across consecutive dayshifts, but TST on first day of nightshifts were longer ($p<0.001$) than TST on all other day and nightshifts; Sleep quality did not significantly differ for dayshifts (3.0±1.2), nightshifts (2.8±1.1) or days off (3.1±1.2) [$p>0.05$] and compared to non-FIFO roster pattern ($p>0.05$)
Parkes, 1992[69]	Cross-sectional survey	To examine the differences mental health between onshore and offshore employees	172 male workers (84 offshore works & 88 onshore workers); Mean age 40.9±6.8, range 28-57; Country: UK; Industry: Offshore oil & gas	General mental health; anxiety	General mental health and anxiety assessed using The General Health Questionnaire (GHQ) (score=0-26, higher score indicate high level of poor mental health; poor anxiety: higher score on 0-21 scale). Analysis plan: Univariate comparisons and multivariate (multiple regression) analysis	No different between offshore workers' mental health (8.75±3.76) and other work group (8.80±4.02); but significantly higher ($p<0.05$) than that of onshore petroleum workers (7.64±2.94); Anxiety levels among offshore higher than onshore workers (3.62±3.42 vs 2.43±2.18; $p<0.01$); Higher job level (being a supervisor) ($p=0.008$) and working offshore ($p<0.006$) associated with higher anxiety levels
Parkes, 1994[100]	Cross-sectional survey	To compare the sleep patterns of onshore and offshore control-room operators	172 male personnel (84 offshore workers and 88 onshore control-room operators); mean age 42.74±7.21yrs; Country: UK; industry: offshore oil and gas	Sleep duration and quality	Self-rated sleep duration and quality (better sleep quality: higher score on 0-6 scale). Analysis plan: paired t-tests and repeated-measures analyses of variance	Sleep durations longer on leave periods (7.74±0.81 hrs) than during day-(6.99±1.18 hrs) and night (7.20±1.34 hrs)-shifts ($p<0.0001$); Night shift sleep duration longer for offshore personnel (7.20±1.34 hrs vs 5.86±1.26 hrs) than those working onshore ($p<0.0001$). Sleep quality was better on leave periods (4.85±1.20) than during day-(3.20±1.84) and night-(3.66±1.52) shifts ($p<0.0001$). Night shift sleep quality better than day shift ($p< 0.01$). Day shift sleep quality higher for onshore personnel (4.25±1.35) than for offshore (3.20±1.84) employees ($p<0.001$)

Parkes, 1999[61]	Cross-sectional survey	To examine the combined effects of shift work, objective job categories, and work perceptions on health-related outcomes	1320 male personnel (680 day & 640 shift workers); Mean age 38.9±8.9yr; Country: UK Industry: Offshore oil & gas	Psychological distress; Psychosomatic complaints (headaches, musculoskeletal pain, gastric problems and sleep problems)	Psychological distress assessed by The General Health Questionnaire (GHQ-12) (scored 0-0-1-1 for case detection purposes and 2-3 cutting point used to identify potential cases). Analysis plan: Logistical regression	Prevalence of health outcomes: psychological distress (14%); headache (38%), musculoskeletal disorders (47%); gastric problems (31%) and sleep problems (45%). Psychological distress associated with social support (RR=0.76; 95%CI=0.63-0.92, p<0.01). Headaches associated with social support (RR=0.83; 95%CI=0.73-0.94, p<0.01); physical environment (RR=1.14; 95%CI=1.00-1.31, p<0.05); working in management (RR=1.88; 95%CI=1.21-2.91, p<0.01), construction (RR=1.84; 95%CI=1.17-2.89, p<0.01) and drilling (RR=1.64; 95%CI=1.11-2.42, p<0.05). Gastric problems associated with night/swing shift (RR=1.36; 95%CI=1.00-1.84, p<0.05); social support (RR=0.82; 95%CI=0.72-0.94; p<0.01); physical environment (RR=1.25; 95%CI=1.09-1.44, p<0.01). Musculoskeletal disorders associated with working in catering (RR=0.50; 95%CI=0.28-0.89, p<0.05) and drilling (RR=1.68; 95%CI=1.14-2.47, p<0.01); physical environment (RR=1.31; 95%CI=1.15-1.50, p<0.001). Sleep problems associated with night/swing shift (RR=1.81; 95%CI=1.36-2.42, p<0.001); physical environment (RR=1.16; 95%CI=1.01-1.33, p<0.05).

Parkes, 2002[103]	Cross-sectional survey	To examine how individual and environment factors combine to influence sleep among shift workers	786 (456 offshore and 330 onshore) fixed day and rotation shift male workers; aged 18 to 64 yrs; Country: UK; Industry: offshore oil and gas	Sleep duration and quality; smoking	Self-reported sleep duration and quality (good sleep quality: higher score on 0-6 scale), and smoking Analysis plan: Chi-square test and mixed-model analysis of variance	Sleep duration on day shift (6.84±1.00 vs 6.58±0.96) and night-shifts (6.57±1.38 vs 5.62±1.33) higher in offshore workers than onshore workers ($p<0.001$). Sleep duration better on leave periods than day-and night-shifts ($p<0.001$). Sleep quality on day shift (3.96±1.31 vs 3.87±1.36) and nigh-shifts (3.14±1.49 vs 2.81±1.67) better in offshore workers than onshore workers ($p<0.01$). Sleep quality ($p<0.001$) better on leave periods than day-and night-shifts. Smoking was high in offshore (33.6%) than onshore (20.6%) workers ($p<0.001$).
Parkes, 2002[111]	Cross-sectional study	To examine the prevalence of BMI and to evaluate the predictors of BMI	1598 male personnel on 17 installations; mean age was 38.7±8.9yrs; Country: UK; Industry: Offshore oil & gas	BMI; Smoking	BMI calculated from self-reported height (m) and weight (kg) (BMI 25-29.9= overweight, ≥30 obese); self-reported smoking status. Analysis plan: descriptive statistics and multiple regression	36% reported smoking; mean BMI was 25.6±2.8kg/m^2; 7.5% were obese and 47.2% were overweight. Shift pattern ($\beta=0.14$; $p>0.05$) not associated with BMI when adjusted for age.
Parkes, 2003[112]	Cross-sectional and longitudinal studies	To examine the prevalence of BMI and to evaluate the predictors of BMI, and 5 year change in BMI	1598 offshore male personnel; mean age was 38.7 ±8.9yrs; Country: UK; Industry: offshore oil & gas	BMI	BMI calculated from self-reported height (m) and weight (kg) (BMI 25-29.9= overweight, ≥30 obese). Analysis plan: General Linear Model	Over the 5 year period mean BMI significantly increased from 25.6±2.8 to 26.6±2.9kg/m^2 ($p<0.001$); obese rate increased from 9.0 to 14.4%, and overweight from 51.1 to 54.5%. Change of work location (offshore to onshore) was not associated with BMI change.

Parkes, 2015[72]	Cross-sectional survey	To examine the role of overtime in relation to the duration and quality of sleep among North Sea	551 male personnel; Mean age 40.2±8.9, range 20-62 years ; Country: UK; Industry: Offshore oil/gas	Anxiety; sleep duration and quality	Anxiety assessed using the General Health Questionnaire (score 0-21, higher score indicate high level of symptoms). Self-reported sleep duration and sleep quality (good sleep quality: high score on 0-6 scale). Analysis plan: Mixed-model ANCOVA with repeated-measures factor	Low symptoms of anxiety (mean score 4.09±3.63; range 0-21); Sleep duration less during offshore day shift (6.74±0.87hrs) than during leave (7.75±1.00hrs) ($p<0.001$). Working overtime during day shifts associated with short sleep duration ($\beta=-0.53$; $p<0.001$). Sleep quality poorer during offshore day shift (3.92±1.29) than during leave (4.83±1.11) ($p<0.001$). Working overtime during day shifts associated with poorer sleep quality ($p<0.05$)
Parkes, 2015[71]	Cross-sectional survey	To evaluate the association between shift patterns and sleep patterns across the offshore work cycle	1956 personnel working on 24 installations; 99.5% males; mean age 39.9±9.0years; Country: UK; Industry: Offshore oil/gas	Anxiety; sleep duration and quality	Anxiety assessed using the General Health Questionnaire (score 0-21, higher score indicate high level of symptoms). Self-reported sleep duration and sleep quality (good sleep quality: high score on 0-6 scale). Analysis plan: mixed-model ANCOVA	Low symptoms of anxiety (mean score 4.2±3.7; range 0-21); Sleep duration was highest ($p<0.001$) on leave shift (7.9±1.0 hrs) than for day shift (6.9±1.0 hrs) and night shift (6.6±1.4). Sleep duration was longer for fixed-day (6.9 vs 6.57hrs; $\beta=-0.38$, $p<0.001$), and night (6.95 vs 6.59 hrs; $\beta=0.35$, $p<0.01$) shift rosters than swing shift (7N/7D) roster. Working overtime (>16h/week) related to short sleep duration than working no overtime (6.23hrs vs 6.72 hrs, $p<0.02$) on night shifts. Sleep quality better on leave periods (4.9±1.1) than day (3.8±1.3) and night (3.1±1.5) shifts ($p<0.001$). Sleep quality poorer for swing-shift (7N/7D) roster than fixed-day and night rosters ($p=0.001$).
Parkes, 2015[11]	Cross-sectional survey	To examine the additive and, interactive effects of overtime and work environment characteristic on sleep duration and quality	551 male personnel; Mean age 40.2±8.9; Country: UK; Industry: Offshore oil/gas	Sleep quality and duration	Self-reported sleep duration and sleep quality (good sleep quality: high score on 0-6 scale). Analysis plan: Multivariate regression methods	Sleep duration: working overtime ($p<0.001$) related to short sleep duration in day shift workers; job demand ($\beta=-0.16$, $p<0.01$) negatively and supervisor support ($\beta=0.10$, $t=2.71$, $p<0.01$) positively related to seep duration in day shift workers working overtime. Sleep quality: supervisor support associated with higher sleep quality ($B=0.16$; $p<0.005$); working overtime ($B=-0.34$; $p<0.005$) and adverse physical environment ($B=-0.13$; $p<0.05$) associated with poorer sleep quality.

Parkes, 2016[99]	Cross-sectional survey	To examine how age and measures of the psychosocial/physical work environment combine to predict the duration and quality of sleep	971 male day shift personnel; mean age was 40.8± 8.9yrs. Country: UK; Industry: offshore oil and gas	Sleep duration and quality	Self-rated sleep duration and sleep quality (better sleep quality: high score on 0-6 scale). Analysis plan: Hierarchical regression and logistic regression	Sleep duration shorter (6.74 ± .88 hrs) on day shifts than during leave period (7.73±1.03) ($p<0.001$). High workload ($\beta=-0.162$; $p<0.001$) associated with shot sleep. Social support ($\beta=0.105$; $p<0.001$) associated with longer sleep duration. Sleep quality poorer on day shifts (3.87 ± 1.31) than during leave period (4.85±1.08) ($p<0.001$). Job control ($\beta=0.159$; $p<0.001$) and social support ($\beta=0.207$; $p<0.001$) associated with better sleep quality, and adverse physical environment ($\beta=-0.115$; $p<0.025$) associated with poor sleep quality.
Pavičić *et al*., 2019[63]	Cross-sectional survey	To establish the prevalence and stressors of depression and anxiety symptoms among offshore workers	1747 workers in the Middle East; 75% aged 26–45 years; Country: Croatia Industry: Offshore oil and gas	Mental health (depression and anxiety)	Anxiety assessed by Generalized anxiety disorder (GAD) questionnaire (score 5-9 mild, 10-14 moderate, ≥15 severe); Depression assessed using the Patient Health Questionnaire (PHQ)-9 (score 5-9 mild, 10-14 moderate, ≥15 moderately severe/severe); Analysis plan: Ordered logistic regression analysis	15% experience moderate to severe anxiety; 18% experience moderate to severe depression. Working longer rotations/shifts (56 days on/28 days off) associated with more anxiety symptom (OR=1.53; 95%CI=1.15–2.04) compared to 28 days on/28 days off roster

Rebar *et al*., 2018[35]	Longitudinal diary study	To compare health behaviours between on-shift and off-shift periods	64 FIFO workers 79.7% male; mean age 40.39±10.34yrs Country: Australia Industry: General FIFO	Chronic mental and physical health condition; Alcohol intake, smoking, physical activity, relaxation, diet	Self-reported medication for mental problem and physical health condition; Alcohol intake (number of alcoholic drinks), smoking (number of cigarettes smoked), physical activity (minutes taken to exercise), relaxation (minutes taken to relax), diet and sleep quality. Analysis plan: Multilevel models	Mental health medication low (0.08±0.27); no differences between on-shift and off-shift days (γ=1.65; 95%CI=−1.24-4.26). Physical health medication low (m=0.16±0.34); more on on-shift than off-shift days (γ=1.44 (0.36-2.54). Alcohol intake: average 1.05±1.69 per day; intake high on off-shift day than on-shift days (γ=−1.12; 95%CI=−1.48- −0.76). Cigarettes smoked: average 13.22±8.46 per day; smoking high on on-shift days than off-shift days (γ=24.20; 95%CI=0.86-45.88). Daily exercise: average 43.80±58.81mins/day and relaxation (2.78±4.35 hrs/day); less exercise (γ=−10.78; 95%CI=−0.36 to −0.00) and relaxation (γ=−1.22; 95%CI=−1.87- −0.61) on on-shift days than off-shift days. Nutrition quality: modest (0.35±1.01), & poorer on on-shift days than off-shift day (γ=−0.17; 95%CI=−0.33- −0.02). Daily sleep quality: modest (average=0.04±1.04); worse during on-shift compared with off-shift (γ=−0.56; 95%CI=−0.72- −0.40).
Riethmeister *et al*., 2016[34]	Mixed method study (Quantitative part)	To perform a needs assessment to identify the needs of offshore workers with regard to healthy ageing at work	272 offshore workers; 97.3% males; Mean age 44.14±10.7 years. Country: Netherlands Industry: offshore oil & gas	Mental and physical health; Diet; sleep duration and fatigue, BMI	General health was measured with the Short Form-12 (SF-12) (score >50 on a scale 0-100 indicate better health). Self-reported sleep, height and weight (BMI 25-29.9= overweight, ≥30 obese), diet (nutritional rating of food), smoking and alcohol intake status. Fatigue assessed by Checklist Individual Strength. Analysis plan: descriptive statistics and t-test	Good mental (m=54.48±5.66) and physical health (m=52.91±4.74) higher than the normal population (m=50); 7.7% reported musculoskeletal; 82.5% rated their general wellbeing status as very good to excellent. 38.6% reported smoking (3.04±1.9 mean packs per day); 84.1% reported alcohol consumption; 75% rated food offshore as bad or really bad. BMI was 27±3.7 kg/m^2; 46% were overweight and 21% were obese. 73% reported prolonged fatigue; Sleep duration shorter on offshore periods (7.18±0.99 hrs) than days off (7.82±1.01 hrs).

Riethmeister *et al.,* 2018[31]	Longitudinal diary study	To examined the courses of sleep quality and sleepiness in full 2on/2off offshore day shift rotations	42 male offshore workers; mean age 42±12.1yrs; Country: Netherland; Industry: offshore oil & gas	Sleep problems, BMI	Sleep diary and actigraphy for 28 days (7 days pre-, 14 days offshore and 7 days post-offshore); sleep quality (high score on 1-5 scale indicate better sleep quality). Sleepiness asses by KSS (higher score on 1-9 scale indicate high level sleepiness). Self-reported height and weight (BMI 25-29.9= overweight, ≥30 obese). Analysis plan: Generalized linear and linear mixed model analyses	BMI was 26.5±3.4kg/m^2; 44% were overweight and 15% were obese; 76% poor sleepers. Total sleep time (TST) were shorter in the offshore work period (389.3±57.9mins) compared to the pre-(420.1±67.5mins) and post-(427.4±100.8mins) offshore work periods (p<0.001). Sleep efficiency: higher during the offshore work period compared to pre-offshore period (OR=1.81; 95%CI=1.26-2.61; p<0.001) and post-offshore period (OR=1.60; 95%CI=1.08 to 2.38; p=0.021). Subjective sleep quality: lower in the offshore work period (3.3±0.8) compared to the pre-offshore period (3.5±0.8; M_{diff}=0.18; 95%CI=0.08-0.29;p=0.001) and post-offshore work periods (3.5±0.8; M_{diff}=0.26; 95%CI=0.14-0.38;p<0.001). Sleepiness: Evening sleepiness highest during the post-offshore (4.9±2.2) than pre-offshore (4.3±1.9) work periods (p=0.005). Evening sleepiness courses increased during the offshore work period (b =0.06; 95% CI: 0.03–0.08, p<0.001) and decreased during the post-offshore work periods (b= –0.15, 95% CI: –0.25 to –0.08, p=0.004). Morning sleepiness was highest during the offshore (4.0±1.7) than post offshore (3.7±1.6) work periods (p=0.015).
Riethmeister *et al.,* 2018[32]	Longitudinal diary study	To examine daily fatigue scores and changes in circadian rhythm markers over the course of two-week offshore day shift periods	42 offshore day-shift workers; mean age 43.4±11.8 yrs; Country: Netherland; Industry: offshore oil & gas	Fatigue	Daily objective fatigue was measured by reaction times test and Subjective fatigue based on sleepiness assessed using the Karolinska Sleepiness Scale (KSS) at pre-and post-shift for 14 days (Higher scores on 1-9 scale indicate higher subjective fatigue). Analysis plan: Generalized and linear mixed model	Daily objective fatigue: pre-shift (1.00; 95%CI=0.99–1.00, p=0.045) and post-shift (1.00; 95%CI=0.99–1.00, p=0.329) were stable over the course of the two-week offshore day shifts. Daily subjective fatigue: pre-shift was stable (0.01; 95%CI=-0.01–0.04; p=0.306); post-shift increased by 0.05 points per day (95%CI: 0.02 - 0.08, p=0.004)

Riethmeister *et al.,* 2019[33]	Longitudinal diary survey	To investigate the accumulation of fatigue over a two-week off shore period	42 male offshore day-shift workers; mean age 43.4±11.8yrs; Country: Netherland; Industry: offshore oil & gas	Sleep and fatigue, BMI	Fatigue was assessed by sleepiness using the Karolinska Sleepiness Scale (KSS) (Higher scores on 1-9 scale indicate higher subjective fatigue); Sleep duration assessed by actigraph (for 14 work days); Baseline sleep quality by the Pittsburgh sleep quality index (PSQI). Self-reported height and weight Analysis plan: Linear mixed model	BMI was 26.6±3.3 kg/m^2; Sleep quality was poor. Sleep duration was short (6:28±0:52hrs) per day on offshore period; acute sleep loss was 1.32±0.52hr (95%CI: 88.6–94.9), no change over 2 week work period (b=-0.19; 95%CI=1.12-0.73; p=0.679) and chronic sleep loss was 21.20±8.10hrs Fatigue: Pre-shift (3.9±1.6) lower than post-shift (4.5±1.8) fatigue (M_{diff}=−0.32; 95%CI: 0.63-0.01; p=0.042). Post-shift fatigue accumulation faster than pre-shift fatigue (M_{diff} score increased by 0.03 points per day (95%CI: 0.00–0.07; p=0.037).
Sadeghniiat-Haghighi *et al*., 2018[104]	Cross-sectional survey	To assess the sleep quality and the effect of different shift schedules on the sleep quality of offshore oil workers	192 offshore workers; gender NR; mean age 37.0±9.3 yrs; Country: Iran; Industry: Offshore oil & gas	Smoking; sleep duration and quality	Subjective sleep assessed by Pittsburg Sleep Quality Index (PSQI) (sores ≥5 on 0-21 scale indicate poor sleep quality); Self-reported smoking status. Analysis plan: Descriptive statistics	17.7% reported smoking; short sleep duration (6.73±3.61hrs) and 69.0% had poor/impaired sleep quality; Fixed night shift workers (83.3%) were more likely to report impaired sleep quality than fixed day shift (66.1%) and swing (66.6%) shift (p=0.34).

Sadeghniiat-Haghighi *et al*., 2019[65]	Cross-sectional survey	To evaluate the effect of shift work and different shift schedules on sleep quality and duration of sleep	43 participants; 100% male; mean age was 35.9±7.9 years Country: Iran Industry: Offshore oil & gas	Depression; sleep problems, BMI	Depression: Beck Depression Inventory (scores 0-13 (minimal), 14-19 mild depression, 20-28 moderate depression, 29-63 severe depression); Epworth Sleepiness Scale (scores ≥10 on 0-24 scale indicate excessive daytime sleepiness); Insomnia by Insomnia Severity Index (scores ≥8 on 0-28 indicate insomnia); sleep quality assessed by Pittsburgh Sleep Quality Index (sores ≥5 on 0-21 scale indicate poor sleep quality); Changes in sleep patterns over time (for 14 days) by actigraphy. Self-reported height and weight. Analysis plan: Independent t-test and one-way ANOVA	BMI was 22.7±2.4 kg/m^2. Depression symptoms were minimal (m=9.05±8.5); 27% had shift work disorder; 51.2% had less than six mean sleep hours per 24 hours; 72% had poor sleep quality and 67% reported insomnia; Sleep duration (Total Sleep Time) was short for swing shift (7days /7 nights) workers during second working week than first week (340±42 vs 370±58mins; p=0.018). Sleep efficiency high (85±5.1%).
Saksvik *et al.,* 2011[106]	Longitudinal diary study	To investigate how sleep in offshore workers change from day to day pre-, during- and post-work period	19 processing workers; mean age 44.4±8.6 yrs; 68.4% male; Conutry: Norway; Industry: offshore oil and gas	Sleep problems	Daily sleep diary and actigraphy for 4 weeks (sleep quality: high score on 1-5 scale indicate good quality). Analysis plan: Repeated measure ANOVAs	Sleep efficiency: higher in day than night (93% vs 88%; p<0.001) and swing (93% vs 88%; p<0.05) across working week; but higher when working swing shift than night (p<0.01) and day (p<0.05) the first week of work. Sleep quality better during swing than regular day (3.40±0.49 vs 3.37±0.61; p<0.05) and night (3.40±0.49 vs 3.32±0.63; p<0.05) shifts for first week of work. Subjective sleep duration longer on day (431±34.24 vs 417±44.57mins; p<0.05) and night (431±47.01 vs 417±44.57mins; p<0.01) shifts than swing shift across the 2 work weeks.

Sellenger *et al*., 2017[52]	Cross-sectional survey	To examine the prevalence of psychological distress	105 FIFO workers; 44.8% male Country: Australia Industry: Construction	Psychological distress	Psychological distress measured by the K10 scale (16-21 moderate, 22-29 high, 30-50 very high distress). Analysis plan: Kendall tau correlation and Pearson correlation	High (17.1%; 95%CI=15.9-18.3) and very high (8.6%; 95%CI=6.4-10.8) psychological distress compared to the general population (5.8% and 2.4% respectively); feeling socially isolated (r^2= 0.61), and workplace bullying (r^2= 0.31) positively correlated with high psychological distress
Sneddon *et al*., 2013[74]	Cross-sectional survey	To examine the influence of stress and fatigue upon work situation awareness	185 drilling personnel; mean age group was 35–44 years; Country: UK Industry: Offshore oil & gas	Perceived job stress, sleep and fatigue	Job stress was measured using offshore stress scale (higher score on 0-160 scale indicate high stress). Fatigue and sleep disruption assessed by the Australian Maritime Safety Authority scale (a higher score indicated greater sleep disruption (on 14-70 scale) and fatigue (on13-65 scale). Analysis plan: Correlations (Pearson's Product Moment) and regression analyses	Stress level was relatively low (m=57.23±26.24); sleep disruption (m=30.66±7.11) and fatigue (m=31.03±7.49) levels were minimal. Stress (β=-0.34; p<0.01) negatively associated with work situation awareness.
Stewart *et al.,* 2016[113]	Cross-sectional survey	To provide information on body dimensions for the civilian UK male offshore workforce	404 male offshore workforce; mean age 41.4±10.07yrs; Country: UK; Industry: offshore oil & gas	BMI	Objective measurement of Weight (kg) and Height (m). Analysis plan: mean score	BMI was 28.7±4.0 kg/m^2. Workers with less BMI pass egress test simulating the smallest helicopter window emergency exit size (p<0.0001).
Stewart *et al.,* 2017[114]	Cross-sectional survey	To determine the prevalence of overweight and obesity, and compare data with the national population	588 male offshore workers; mean age 40.6±10.7yrs. country: UK; Industry: offshore oil & gas	BMI	Objective measurement of stature (cm) and weight (kg), and 3D body scanning; BMI calculated as kg/m^2 (BMI 25-29.9= overweight, ≥30 obese). Analysis plan: Chi square, univariate analysis of variance and post hoc tests	BMI was 28.3±4.0kg/m^2 increased from 24.9kg/m^2 in 1984; 52% were overweight and 30% were obese; an increase in prevalence overweight by 6% and obesity by 24%. BMI higher than the Scottish normal population (p=0.021).

Sutherland, 1993[54]	Cross-sectional survey	To examine the sources of stress and the link between stress, personal factors, and accident occurrence	310 males working on 97 drilling and production installations; age range 21 to 60 yrs; Country: UK Industry: Offshore oil & gas	Mental health Smoking; alcohol intake	Psychological wellbeing assessed by The Crown Crisp experiential index (CCEI)	Mental health (mean score=23.1) was poor compared to onshore/normal industrial workers (mean score=21.1); 34% reported tobacco smoking status; 16% reported consuming more than 21 units (safe level) of alcohol per week
Sutherland & Copper, 1991[38]	Longitudinal study	To examine the relationships between stress, personality and accident involvement	310 male drilling and production workers; age range 21 to 60 yrs Country: UK Industry: Offshore oil and gas	Psychological wellbeing;	Psychological wellbeing assessed by the Crown Crisp Experiential Index (CCEI) (3 measurement points 6 months apart) Analysis plan: multiple regression	Poor mental well-being predicted by stress from home/work interface (β=0.27; t=3.04, p<0.002), safety and insecurity concerns (β=0 17, t=2.67, p< 0.01), and job dissatisfaction (β=-0.10; t=-2.28, p<0.05)
Thorne *et al*., 2008[102]	Longitudinal diary study	To evaluated sleep on shift schedules differing by only 1 h in work start and finish time	17 offshore night shift male workers; mean age 41±12 yrs. Country: UK; Industry: offshore oil & gas	Sleep duration, BMI	Sleep diaries and actigraphy for last 7 days of offshore work period. BMI measurement NR. Analysis plan: two-way RM-ANOVA	BMI was 27.25±2.95kg/m^2. Night shift schedule with an early start at 18:00h associated with long sleep duration (6.60±0.30hrs vs 5.71±0.27hrs) than late start schedule at 19:00h ($F_{(1,12)}$ = 6.20; p<0.05)
Thorne *et al.,* 2010[101]	Longitudinal diary study	To investigate the effects of timed bright light treatment on sleep and circadian adaptation in offshore night-shift workers	14 offshore night male shift workers; mean age 47.5±9 yrs. Country: UK; Industry: offshore oil & gas.	Sleep duration, BMI	Sleep diaries and actigraphy for last 7 days of offshore work period. BMI measurement NR. Analysis plan: descriptive statistics	BMI was 28.25±2.30kg/m^2. Sleep duration was short (5.89±0.65hrs) and sleep efficiency lower (82.7±6.3%) during the last 7 days of work period.

Waage *et al*., 2009[39]	Cross-sectional survey	To examine Shift Work Disorder among shift workers in the North Sea	103 workers in the North Sea; 95.1% men; mean 39.8±10.2yrs	Health complaints, sleep problems	Subjective Health Complaint Inventory (SHC); Sleep problems by Pittsburgh Sleep Quality Index (PSQI) (sores >5 on 0-21 scale indicate poor sleep disorders); Bergen Insomnia Scale (BIS) (higher score on 0-42 indicate insomnia); Epworth Sleepiness Scale (scores >10 on 0-24 scale indicate excessive sleepiness); Shift Work Disorder diagnosed based on ICSD-2 minimal criteria (yes on 3 items). Analysis plan: Independent t-test and chi-square tests	23.3% had shift work disorder (SWD); self-rated physical health good/very good in workers with SDW (87.5%) and non-SWD (88.6%) (p=0.917). Poorer sleep quality (p<0.001) and more subjective health complaints (p<0.001) in SWD workers (100%) than non-SWD workers (89.9%) (more musculoskeletal (90.9% vs 69.6%, p=0.04), and gastric problems (87% vs 50.6%, p<0.01) in workers with SWD during the last 30 days). 79.4% experience sleep problems during offshore period; sleep problems more in workers with SWD (p=0.003). 96.1% had sufficient sleep on the non-work period high than during work periods (65%).
Waage *et al*., 2010[40]	Cross-sectional survey	To examine the relationship between shift type, and morningness and sleep/health problems in oil rig shift workers	199 purposively selected workers; 96.6% males; mean age was 42.9 years. Country: Norway; Industry: offshore oil & gas	Subjective health complaints; sleep duration, BMI	Subjective health complaints assessed by the Subjective Health Complaint Inventory (SHC) (high scores indicate more complaints). Self-reported height and weight; Sleep was measured by the Pittsburgh Sleep Quality Index (PSQI) (sores >5 on 0-21 scale indicate sleep disorders); Analysis plan: Multiple linear regressions, and post hoc analysis	BMI was 26 kg/m^2; 81% workers described their health as very good or good; Workers reported some subjective health complaints (mean score 7.10±6.16; range 0-87); more musculoskeletal complaints among workers aged >50 years compared younger workers (16.93±45.19 vs 1.75±5.61; range 0-24, p<0.001), low gastrointestinal complaints (1.36±5.70; range 0-24). Swing shift workers reported longer sleep duration than day shift workers (β=0.18; p=0.01).

Waage *et al.*, 2012[107]	Longitudinal diary survey	To investigate sleepiness in the same shift workers during three different shift schedules	28 workers in a processing area; mean age was 44yrs; 68.4% men; Country: Norway; industry: offshore oil & gas	Sleepiness	Sleep and wake diaries of KSS hourly (higher scores on 1-9 scale indicate higher subjective fatigue) and the Accumulated Time with Sleepiness (ATS) once a day for 4 weeks (2 waves 9 months apart). Analysis plan: ANOVA with separate post hoc tests	Sleepiness highest during the first days of night and swing shifts (range p=0.01 to 0.03), and also in the middle of the swing shift work period (range p=0.02 to 0.03). Workers reported more subjective sleepiness after night shift than after day (p<0.01) or swing shifts (p=0.01) on leave periods. No differences in objective ($F_{2,18}$ = 0.61, p=0.27) and subjective ($F_{2,28}$ = 0.14, p>0.05) sleepiness between different shift types.
Waage *et al.*, 2013[37]	Longitudinal study	To examine and compare the workers' subjective health before after a four week leave period and following a two week work period at the oil rig.	188 oil rig workers; mean age 42.9±10.6yrs; 97.3% male. Country: Norway; Industry: offshore oil & gas	Health complaints; sleep quality, insomnia, smoking	Subjective health complaints measured by the Subjective Health Complaints Inventory (SHC) in the last 30 days (measured 2 times, 2 weeks apart) (high scores on 0-87 indicate more complaints); Sleep problems by Pittsburgh Sleep Quality Index (PSQI) (sores >5 on 0-21 scale indicate poor sleep disorders); Bergen Insomnia Scale (BIS) (higher score on 0-42 scale indicate insomnia). Self-reported smoking status. Analysis plan: Paired samples t-test and 2 × 2 ANOVA	81.5% self-reported physical health as good or very good; 23% reported smoking. Swing shift workers (89.3%) reported better health than day shift workers (73.4%) (p=0.02). Poor sleep quality (5.7±2.7 vs 4.5±2.6; p<0.0005) and more complaints of insomnia (12.5±12.9 vs 7.5±6.4; p<0.0005) at the end than start of work period. Swing shift workers reported poorer sleep quality (5.9±2.8 vs 4.5±2.9; p<0.0005) and more complaints of insomnia (13.8±9.6 vs 7.1±6.8; p<0.0005) at the end compared to start of the work period. No differences between day shift workers and swing shift workers for sleep quality at the start (27.8% vs 26.9%, p=0.96) and end (33.3% vs 44.1%, p=0.09) of work period. Daily smoking in day shift workers (23.3%) similar to swing shift (22.6%) workers (p=0.65). No differences in SHCs at the start to the end of the work period (7.2±6.2 vs 6.7±5.5; p=0.12)

Ulleberg *et al*., 1997[93]	Cross-sectional survey	To examine the relationship between job stress, job dissatisfaction, social support, absenteeism and strain	1137 employees; 91% male; mean age 40 yrs. Country: Norway; Industry: Offshore oil & gas	Strain, sleep and gastric problems	Strain assessed by self-reported problems with sleeping and stomach trouble (mean score 1-5, higher score indicate high level of strain). Analysis plan: Stepwise multiple regression analysis	Workers report low to moderate level of strain (1.84±0.70); more sleep difficulties (mean score=2.17±1.13) and low stomach problems (mean score=1.66±0.99). Stress from physical workload (β=0.15; p<0.001), communication and participation in work decisions (β=0.10; p=0.012) and perception of risk: disasters and accidents (β=0.19; p<0.001), satisfaction with employee relations (β=0.23; p<0.001) and extrinsic satisfaction with working condition (β=0.11; p=0.019) associated with high strain; high social support from supervisor (β=-0.09; p=0.015) associated with less strain
Vojnovic & Bahn, 2015[18]	Cross-sectional study	To examine the relationship between demographic information and mental health among FIFO workers	629 FIFO workers; 83% male Mean age 36.80±10.35 (ranged 18–65yrs). Country: Australia Industry: mining and oil & gas	Mental health (depression, anxiety and stress)	Depression, anxiety and stress was assessed by self-report using The Depression Anxiety Stress Scale (DASS-21) (scores on DASS-21 multiplied by 2; Depression: scores 0-9 normal, 10-13 mild, 14-20=moderate, ≥21 severe/extremely severe; Anxiety: 0-7 normal, 8-9 mild, 10-14 moderate, ≥15 severe; stress: 0-14 normal, 15-18 mild, 19-25 moderate, ≥26 severe).	28.3% experienced depression symptoms, 22.3% reported anxiety symptoms and 19.4% reported stress symptoms; 36.31% of participants experienced psychological distress symptoms above the clinical cut-off levels.

Table 2: Summary of qualitative studies

Author	Study design	Aim/objective	Study population/study country and industry	Phenomenon	Data collection methods/ Analysis plan	Summary of findings
Carter & Kaczmarek, 2009[85]	Qualitative study	To explore the psychological impact offshore FIFO employment has on Gen Y	10 male; aged 18-28yrs; Country: Australia; Industry: offshore oil and gas	Psychological wellbeing	Semi-structured interviews. Analysis plan: Thematic analysis	Workers reported financial rewards, long leave periods to engage in social activities to improve their wellbeing, and sense of social belonging at workplace. Workers reported feeling of depression prior to returning to work and during first day at work due to missing out on social events. Workers reported the difficulty with forming and maintaining personal relationships
Devine *et al.,* 2008[105]	Qualitative study	To identify staff perceptions of the types and sources of occupational health and safety hazards at a remote fly-in-fly-out minerals extraction and processing plant	23 to 53 staff purposive sample. Gender: NR; age: NR; Country: Australia. Industry: mining	Fatigue	Focus group discussion lasting 60-90mins. Thematic analysis	Workers reported concerns about high level of fatigue due to roster and sleep difficulties; fatigue improved after change of roster 7N/7D/7L to 8D/6L/8N/6L
Ebert & Strehlow, 2017[82]	Qualitative study	To examine 24/7 on-site chaplains service impact on the health and wellbeing of FIFO personnel	29 employees; 69% male; age 20–60yrs; Country: Australia Industry: mining	Mental wellbeing	Semi-structured interviews. Analysis plan: Thematic analysis	Workers reported of mental distress from anxiety, depression and home/work interference issues; Workers reported on-site chaplaincy provided social support and making effective promotion of the mental health of FIFO personnel working at a remote mine site; chaplains provided active outreach, effective trust building and the on-site availability were identified as central to the service being accessed and overcoming barriers embedded in mining culture and masculinity

Gardner *et al.,* 2018[83]	Qualitative study	To investigate how workers and their partners negotiate the impact of FIFO on their mental health and well-being	34 FIFO workers; 79% male; mean age 41±11yrs; country: Australia; Industry: General FIFO	Mental health and wellbeing	Open ended questions via email. Analysis plan: Thematic analysis	Workers reported FIFO work imposes the sense of living two lives, which comes with the difficulties of adjusting to the differences and pace of the domestic and work lives. Workers reported being trapped in undesired job by high wages; absence from family put strain on relationships with partners due to physical and psychological distance which causes tension and distrust; Some reported feelings of isolation and loneliness due to prolonged absence from their families and impeded communication which manifested in anxiety or depression. Some reported feeling guilty for delegating everyday domestic duties and responsibilities to their partners. Workers indicated the lack of support from employers and general population to FIFO workers to deal with mental health issues, reluctant to seek help for health or well-being issues due to masculinity, stigma, and fear of losing job
Gibson-Smith *et al.,* 2018[49]	Qualitative study	To identify self-care behaviours perceived to require behaviour change within the offshore workforce, and explore perceived potential behavioural determinants	16 offshore workers; 93.8% males; aged 28–57 yrs. Country: Australia; Industry: offshore oil & gas	Health behaviour	Semi-structure one-on-one interviews via telephone. Analysis plan: Deductive and Thematic analysis	Workers identified behaviours requiring change including reducing alcohol use and smoking, eating healthily and increasing physical activity. Workers indicated eating behaviour was influenced by ‘‘…. availability of healthy/unhealthy food options offshore ’’. Workers reported physical activity influenced by ‘‘…increasing the number of opportunities for workers to exercise and improving gym facilities offshore’’.
Perring *et al.,* 2014[110]	Qualitative study	To investigate how facilities located within on-site mining camps support the everyday life of FIFO mining workers	7 FIFO workers; 6 males; Aged 20-59 years. Country: Australia; Industry mining	Physical activities	In-depth semi-structured interview	Workers reported engaging in sporting activities more than once a week. Some stated time constraints due to long shift hours and travels times to and from worksites, fatigue and management (not proactive) and not well-maintained facilities limits creational activities influence engagement in physical activity. Most participate in alcohol drinking (culture of drinking).

Pirotta, 2009[86]	Qualitative study	To explore the experiences owomen working at mine sites on a Fly In, Fly Out (FIFO)	20 women working FIFO; mean age 31.2yrs (23-49); Country: Australia; Country: Mining	Psychological wellbeing	Semi-structured interviews. Analysis plan: Thematic analysis	FIFO workers reported financial reward, long leave periods, and sense of community living at camps. Workers reported social life disruptions; difficulties developing friendships and intimate relationships. Workers reported sense of isolation and loneliness. Workers reported feeling of depression, anxiety and physical exhaustion due to long work hours
Rodrigues *et al.,* 2001[51]	Qualitative study	To evaluate how offshore drilling workers perceived shift work at high seas and its impacts on their life and working conditions	51 male workers on mobile drilling; mean age of 37.6yrs; Country: Brazil; Industry: offshore oil & gas	Psychosomatic symptoms	Psychosomatic symptoms assessed through comprehensive interview. Analysis plan: Thematic analysis	Conflicts related to social and domestic arrangements were considered high; "pre-boarding stress syndrome" characterised by anxiety, sleepiness, bad mood and other psychosomatic symptoms in the last days-off was reported. Workers reported poor sleep at the first and the last 2-3 days of the leave periods. Workers reported concerns of sleepiness during the day after night shifts.
Riethmeister *et al.,* 2016[34]	Mixed method study (qualitative aspect)	To perform a needs assessment to identify the needs of offshore workers with regard to healthy ageing at work	19 supervisors (14 males) & 49 offshore workers; age 22-67yrs. Country: Netherlands Industry: offshore oil & gas	Sleep, fatigue, nutrition	Semi-structured interviews of supervisors and Focus group discussion with workers	Workers identified being far away from home, work home/family conflicts, worries of lack of privacy (sharing cabins), and lack of flexible work arrangement influence their health and social life. Workers experience of mental exhaustion (due to long shift hours). Workers reported of culture of masculinity with the mentality of 'no get sick'. Food and nutrition were identified as major health concerns; criticized the easy access of unhealthy food and the unhealthy eating behaviours of offshore workers. Workers reported issues of fatigue (due to long shift hours), and sleep disturbances (due to environmental stressors such as motion and noise of platforms, and accommodation arrangements);
Torkington *et al.,* 2011[84]	Qualitative study	To explore how FIFO/DIDO mining affects the psychosocial well-being of miners	11 current/former FIFO/DIDO workers; 81.8% male; aged 20-59 years. Country: Australia. Industry: mining	Psychosocial wellbeing, alcohol, fatigue	Semi-structured interviews. Analysis plan: Thematic analysis	Workers indicated been satisfied with Job and life; '… enjoy work environment and interact with colleagues' and have enough days off to be with family and friends; Workers expressed minimal mood, but worries about missing out on family events, and difficulties maintaining social life. Workers reported of 'culture of drinking'; enjoyed by some and non-drinkers do not fit in socially. Some workers reported fatigue due to tiredness and sleep disturbance.

Wright & Griep, 2019[81]	Qualitative study	To understand how working in the petroleum industry affects oil workers' psychosocial health and wellbeing	14 individuals (12 males, 2 females) Country: Canada Industry: Petroleum	Psychological health and wellbeing; musculoskeletal problem	Semi-structured interviews. Analysis plan: Thematic analysis	Workers reported stigmatization or discrimination as working dirty work and substance abusers from their communities. Workers reported mental strain/emotional difficulties in maintaining relationships or work-family relationships especially among those with young children, and family not appreciative of their work; face with adopting behaviours and bullying to fit into work social environment; workers are faced with culture of hard work and intolerance for weakness which leads to working while sick. Workers reported difficulty in balancing work and social lifestyle (having to switch off work brain and put on social brain); workers lack controls over their jobs; Workers experienced physical pain on regular basis: common are muscle and joint pains, neck and back pains, and leg and feet pains