BIS OXFORD ECONOMICS

THE COST OF DOING NOTHING REPORT

PREPARED BY BIS OXFORD ECONOMICS FOR THE CONSTRUCTION INDUSTRY CULTURE TASKFORCE (CICT)

DANIEL CROOK AND
ANDREW TESSLER

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To discuss the report further please contact:

Andrew Tessler: atessler@oxfordeconomics.com

BIS Oxford Economics,

Level 6, 7 Macquarie Place, Sydney, 2000

Tel: +61 2 8458 4200

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$4.2 billion

Productivity costs, FY18

$1.4 billion

Morbidity costs, FY18

Source: ABS (2018a); BISOE

24

Construction work-related traumatic injury fatalities, 2018

$120 million

Mortality costs, 2018

Source: BISOE

148,620

Estimated number of employees with mental illness, FY18

217

Estimated male construction worker suicides, 2018

12%

Of construction employees were female, FY18

Source: BISOE

This report highlights some of the key economic costs of the current construction culture. As such it helps highlight some of the key issues within today's construction industry. Conversely addressing such costs – and in particular, the reasons behind them – will bring about significant benefits to society.

The lost wellbeing from work-related fatalities, injuries or illnesses was found to incur a significant cost, estimated to be at least $6.1bn in FY18. ABS statistics indicate that the construction sector had 66,548 work-related injuries/illnesses in Financial Year 2017-18 (FY18), with the industry having the highest incidence rate of any employment sector. The industry also recorded 24 work-related fatalities in 2018. The greatest cost of work-related fatalities/injuries were estimated to be the impacts on lost productivity ($4.2 billion in Net Present Value (NPV) terms) with 3,033 workers becoming partially or fully incapacitated. The morbidity (i.e. long term loss of quality of life) cost of these injuries/illnesses was also significant, estimated to be $1.4 billion in FY18. The administration and medical costs related to construction work-related injuries/illnesses in FY18 were estimated to be $307 million and $99 million, respectively, in NPV terms.

Other significant wellbeing impacts of the current construction culture investigated include the prevalence of ill-mental health and stress experienced by employees in the sector. It was estimated that 148,620 construction employees had a moderate/severe mental illness in FY18. A significant economic cost of mental ill-health was the potential loss of productivity through increased presenteeism. Although estimated at $643 million in FY18, we were unable to exclusively attribute the current construction culture as the cause of employee mental illness due to causality considerations (there could be many reasons for such mental stress). Male construction workers were also found to have significantly higher suicide rates compared to male non-construction workers. The marginal mortality cost of male construction worker suicides was estimated to be $533 million in 2018, however as is the case with mental health due to the complex reasons behind employee suicide, we were unable to directly link the current construction culture as the cause of this marginal cost.

Another potential cost of the current construction culture is the low level of female representation within the workforce. The industry currently has the lowest female representation of any employment sector, at 12%. Although growth in overall female representation with the sector has remained weak, female representation in full time employment increased to 7.2% in FY18. This increase in female representation in the construction sector has differed by occupation, potentially assisted by increased rates of non-school qualifications of women allowing the distribution of female employees within the sector to shift towards the higher wage occupations. Despite the increase in female representation, the industry remains well behind other employment sectors in achieving gender equality. Apart from issues of equity, a potential cost of the current construction culture's inability to attract, recruit and retain female employee is it exacerbates an already growing labour shortage.

270,506

Construction workers work more than 50 hours per week, FY18

Source: BISOE analysis

The current construction culture is also known for its rigid work practices and long work hours. The construction sector had the third highest average hours worked per employee in FY18, at 40.5 hours per week. 23% of construction employees were reported to be regularly working more than 50 hours per week. The potential productivity cost associated with employees consistently working overtime was estimated to be $708 million. This cost represents the increased absenteeism not accounted for by work-related injuries/illnesses as well as the increased presenteeism, reduction in worker morale and increased turnover rates. As is the case with the mental illness/suicide issues noted above, we have not directly incorporated this into the results but have noted its material significance "below the line".

Fig 1. Summary of estimated costs of the current construction culture

Cost Category	FY18
Fatalities/Injuries/Illnesses:	
Productivity	$4,166,073,753
Morbidity	$1,410,039,138
Administration	$306,950,442
Mortality	$120,000,000
Medical	$98,609,683
Total	**$6,101,673,016**
Additional Costs (Not included in Total)	
Long Work Hours - Productivity	$707,560,019
Mental Illness - Presenteeism	$642,988,805
Male Worker Suicide - Marginal Mortality	$532,801,466

Source: BISOE analysis

1. INTRODUCTION

This aim of report is to examine the workplace issues within Australia's construction industry and the economic cost of doing nothing to address these issues.

The economic costs can be measured using an economic welfare framework, which is the same framework used by Australian policymakers. This framework examines the current state of play in the construction industry, including impacts on:

- wellbeing;
- diversity; and
- long work hours/fatigue

that continue to affect society.

Highlighting these impacts points to the converse – that society could be better off if these issues were addressed.

To some extent these issues are interwoven and not all of the effects can be fully quantified. However, an important starting point from a quantitative perspective is to examine the cost of construction injuries arising from a given year (2017-18 in this case).

The rate of construction injuries (and mental health issues) has an obvious impact on wellbeing of the construction workforce. Moreover, injuries in turn may have many underlying factors. These may include a lack of workplace diversity and long work hours with associated fatigue. Construction injuries may therefore act as a marker of deeper, underlying issues. Accordingly, quantifying these points to the scale of the problem and the benefits which could be obtained should these be dealt with.

At the same time, it is important to document issues such as diversity and the impact of work hours and fatigue, as apart from contributing to injuries, these are important cultural issues in their own right. If initiatives are to be taken to address the culture of the construction industry and the impact of workplace injuries, it will be important to address these underlying factors as a part of this.

2. WELLBEING

The most straightforward way to analyze the economic costs of the current construction work culture is to investigate the loss of employee wellbeing as a result of work-related injuries and illnesses. In addition, employee wellbeing may also be affected by mental health impacts which might be associated with working within the industry.

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Construction work-related traumatic injury fatalities, 2018

Fatalities per 100,000 employees, 2018 (2003-12)		
1. Agriculture	11.22	(16.45)
2. Transport	6.07	(11.63)
3. Mining	3.32	(6.71)
4. Construction	2.04	(4.45)
5. Utilities	1.95	(4.27)

Source: ABS (2018a)

66,548

Construction work-related injury or illnesses, FY18

Work-related injuries/illness per 1,000 employees, FY18 (FY10)		
1. Construction	58.8	(59.1)
2. Manufacturing	58.4	(71.2)
3. Health Care	54.6	(64.6)
....		
15. Mining	27.2	(50.8)
16. Property & Business Services	23.5	(54.8)
17. Finance & Insurance	14.8	(23.3)

Source: ABS (2018a)

We examine the impact of both of these effects (and the extent to which they can be quantified) on wellbeing below.

Unless otherwise indicated, we have based our quantitative analysis on the 2017-18 financial year (FY18). This is the most recent year in which comparable data exists across a number of diverse sources.[1] Likewise, unless otherwise expressed, prices and values are in 2020 dollars.

2.1. WORK-RELATED FATALITIES, INJURIES OR ILLNESSES

A significant cost of the current construction culture is the prevalence of work-related injuries, illnesses and fatalities. These work-related injuries, illnesses and fatalities incur significant economic costs. These include (but are not limited to) impacts on:

- mortality;
- productivity;
- morbidity; and
- medical and administrative costs.

There were 24 work-related traumatic injury fatalities in 2018 (Safe Work Australia 2019). This is third most of any sector, with the construction sector responsible for 17% of all of Australia's work-related fatalities that year. On a positive note, the fatality rate of employees in the construction sector in 2018 is more than half that of the average fatality rate between 2003-12, down to 2.04 deaths per 100,000 employees. However, to provide some context, this reduction in worker fatalities has been seen across all industries (with agriculture, forestry & fishing remaining the deadliest at 11.2 fatalities per 100,000 employees in 2018).

It is also important to distinguish between construction fatalities (mortality) and the situation in respect of injuries and illnesses (morbidity). ABS' (2018a) *Work-Related Injury Survey* (WRIS) estimates there were 66,548 work-related injuries or illnesses in the construction sector in FY18. The survey also revealed that the construction industry now has the highest incidence rate of workplace injuries or illnesses of any sector. Given that it previously ranked tenth in FY10, these statistics imply that the construction sector has failed to implement any successful improvements to reduce the incidence rate of workplace injuries over the past eight years. This is in contrast to industries such as electricity, gas, water and waste services sector or the mining sector

[1] Note however that various other data sources drawing on older data sets have also been used in this analysis. This reflects the episodic nature of some of the specialized reports used to develop figures for this report. Wherever possible the most recent data and reports have been used in such cases.

which have both reduced the frequency of work-related injuries/illness by more 40% since FY10.

According to the most recent Australian workers compensation statistics (Safe Work Australia 2020), 94% of serious claims in the construction industry in FY18 were for injury or musculoskeletal disorders with the remaining 6% of serious claims for diseases. (A serious claim is defined as a claim that compensates the worker for more than 1 week off work and excludes fatalities and journey claims.)

The compensation statistics also indicate that 24% of construction employees were self-employed and therefore not entitled to compensation in FY18 (Safe Work Australia 2020). Compared to other industries, the construction industry had the 3rd lowest proportion of employees eligible for compensation.

The *Work-related injuries and fatalities in construction 2003 to 2013* report by Safe Work Australia (2015a) provides a detailed breakdown about the employees that incur such injuries, type of injury/illness suffered and how the injury occurred. Safe Work Australia (2015a) also highlights the fact that, based on the most recent available data (2009-2010), only 35% of construction workers that incurred a work-related injury or illness applied for workers compensation, compared to an average of 41% across all industries. This may be due to a number of factors:

- *Self-employment* – As indicated, workers compensation is not available to self-employed workers and there a high proportion of these within construction.
- *Small time losses*– Workers may not apply for compensation when the amount of time lost is low.
- *Stigma (general and mental illness)* - It is suggested by Markey *et. al.* (2015) that workers compensation claims may be under representative of the true prevalence of work-related injuries/illnesses due to the stigma attached to worker's compensation. The stigma includes personal stigma, perceived stigma, self-stigma and structural stigma. Markey et. al. (2015) also suggest that workers who have made claims for psychological injuries suffer a strong stigma and discrimination because these types of injuries are so poorly understood. This finding may explain the limited number of mental illness claims made by workers in the construction industry.[2]

94%

Serious claims are injury and musculoskeletal disorders, FY18

24%

Construction employees are not entitled to compensation, FY18

35%

Injured/Ill employees applied for workers' compensation, FY10

Source: Safe Work Australia (2020)

Figure 2 shows the age distribution of injuries in comparison to the age distribution of the workforce. The older age cohorts are represented disproportionately in the injury statistics, implying an increased incidence rate compared to the younger age cohorts. This is particularly apparent in the recent FY18 survey, where more than 50% of injuries were incurred by workers above 45 years of age, despite only accounting for 33% of the workforce. This may be a result of increased risk of injury in the industry in the older age cohorts due to the high physical demands of the industry.

[2] The issue of self-employment limiting claims is an important one for the industry. Nonetheless, note that this study measures the total economic costs of injuries, whether or not compensation was paid.

Fig 2. Work-related injuries in the construction industry

Age Group	FY10 – FY12		FY18	
	% of injuries	% of workers	% of injuries	% of workers
Less than 25 years	21%	23%	8%	17%
25 - 34 years	24%	27%	21%	28%
35 – 44 years	23%	22%	18%	22%
45 – 54 years	19%	18%	26%	19%
55 years & over	13%	10%	27%	14%

Source: Safe Work Australia (2015a); Safe Work Australia (2021)

The dramatic change in the age distribution of injuries between the two surveys can be attributed to differing length of time periods. The survey in Safe Work Australia (2015a) was across a three-year period whereas the survey in Safe Work Australia (2021) was over just a single year, increasing the possibility of sample size bias (Faber and Fonseca 2014). To account for this bias, the estimated average age of injury was weighted by the duration of the respective survey. Assuming the distribution within age cohorts is continuously uniform, the estimated median age of worker at the time the work-related injury/illness occurs is 39.2 years old.

The quantitative impacts of mortality and injury statistics are estimated below.

2.1.1. Mortality Costs

24

Construction work-related traumatic injury fatalities, 2018

VSL = $5.0m (2020 dollars)

$120 million

Mortality Costs, 2018

Source: BISOE analysis

Economists use the value of statistical life (VSL) as a means to measure the cost or benefit of certain initiatives[3].

The Department of Prime Minister and Cabinet (PM&C) (2021) provides a credible estimate that the VSL is $5.0 million in 2020 dollars using ABS Wage Price Index data and a value of statistical life year (VLY) is $217,000 based on a private time preference discount rate of 3%[4]. This estimate is developed through a willingness to pay approach which quantifies the value society places on reducing the risk of dying. The life in question is assumed to be the life of a young adult with at least 40 years of life ahead. As indicated, this represents a statistical life and not the life of any particular person.

Our analysis specifically examines the economic cost of the current construction industry culture in 2018, therefore multiplying the number of fatalities in 2018 by the latest estimate of the VSL (i.e. 24*$5 million) indicates that the cost of construction work-related traumatic injury fatalities in 2018, was $120 million. For the report to have a consistent year of reference, we have

[3] Note that the VSL is not intended to imply the price of a person's life, rather it is a statistical measure which reflects the amount people are willing to pay to reduce the risk of death.

[4] Accordingly, we have used a real discount rate of 3% throughout this analysis for the purposes of consistency. We also note that Safe Work Australia (2015) uses a real 3.4% discount rate in its assessment of the cost of workplace injuries. Office of Best Practice Regulation (OBPR) (2020) generally recommends a 7% discount rate for cost-benefit analysis but also notes that different rates could be used to match research findings and/or international data. The 3% rate used by PM&C based on past research is based on Australian results made consistent with past international research. We have also adopted 7% and 10% discount rates (consistent with OBPR) as a sensitivity test to these results.

assumed that the mortality costs in 2018 are equivalent to the mortality cost in FY18.

2.1.2. Productivity Costs

25,954

Estimated serious construction work-related injury/illness, FY18

$4.2 billion

Estimated productivity costs, FY18

Source: BISOE analysis

When workers fall sick or are injured on the job, they are unable to fully participate in economic activity. This means that the economy as a whole becomes less productive due to the lost labour, regardless of whether such workers are paid compensation. This represents an economic cost. In addition, since it impacts on economic growth over the longer term, a less productive workforce affects the long run wellbeing of all Australians.

The productivity costs examined in this section are the direct costs of time off work following a work-related injury or illness. This estimate includes the productivity costs of ongoing partial and full incapacities in future years acquired because of work-related injuries/illnesses which took place in FY18.

Figure 3 shows the distribution of the days absent from work following an injury/illness in the construction industry provided by Safe Work Australia (2021) ahead of their update to Safe Work Australia (2015a). The results show that the distribution has shifted away from no time off comprising the greatest proportion of absences following injuries to 1 - 4 days absent following a work-related injury/illness now being the most common absence duration. While it is difficult to draw concrete conclusions on the basis of a two-year comparison, the apparent lengthening of time off due to injuries is a case for concern.

Fig 3. Distribution of the duration of absences following injuries/illnesses

Duration of Absence	FY10	FY18
No time off	37%	21%
Part of a day	10%	8%
1 – 4 days	13%	32%
5 – 10 days	14%	10%
11 days or more	15%	19%
Had not returned to work	12%	10%[5]

Source: BISOE analysis; Safe Work Australia (2015a); Safe Work Australia (2021)
NB Figures may not sum to 100% due to rounding

Almost two thirds of injured/ill workers return to work with a week of the incident occurring. Despite this shift in distribution, the proportion considered a serious injury, greater than 1 week of absence, is generally unchanged between surveys (41% to 39%). A five-day work week is assumed, implying that an absence more than 5 days is an absence greater than 1 week.

The Safe Work Australia (2015a) provides a further breakdown of the distribution of the duration of absences following a serious claim using data from the Safe Work Australia *National Data Set for Compensation-based Statistics* (NDS) over a three-year aggregate period. This allows for a greater disaggregation of the serious claims, shown in Figure 4. Comparing the latest survey with the previous survey shows that the distribution of the duration of absences of serious claims is largely unchanged, albeit marginally more

[5] BISOE estimate due to incomplete results in the latest survey, originally reported as 0% causing the distribution to only sum to 90%. Using the original estimate (0%) reduces the productivity costs by $714 million.

skewed towards the longer duration of absence cohorts. We assume that the three-year aggregate (FY16-FY18) measure, shown in Figure 4, is representative of the distribution of the duration of absences of serious claims in FY18.

Fig 4. Distribution of the duration of absences of serious claims

Duration of Absence	FY10 – FY12	FY16 - FY18
1 to 5 weeks	48%	46%
6 to 11 weeks	18%	18%
12 to 25 weeks	14%	15%
26 to 51 weeks	8%	9%
52 weeks and over	12%	12%

Source: Safe Work Australia (2015a); Safe Work Australia (2021)

NB Figures may not sum due to rounding

It is important to recognise that not all work-related injuries/illnesses receive compensation or are reported, as detailed in Section 2.1. To account for this undercounting, the distribution of the duration of absences from the aggregated NDS statistics is applied to the ABS estimated number of work-related injuries/illnesses to estimate the number of injuries that occurred across the duration of absence cohorts in FY18.

Fig 5. Cases & productivity costs across absence duration cohorts, FY18

Duration of Absence	FY18	Productivity Cost
No time off	13,975	-
Part of a day	5,324	$800,065
1 – 4 days	21,295	$16,001,309
5 – 10 days	6,655	$15,001,228
2 to 5 weeks	5,391	$28,355,686
6 to 11 weeks	4,700	$60,036,163
12 to 25 weeks	3,858	$107,273,202
26 to 51 weeks[6]	2,316	$1,626,508,635
52 weeks and over:		
of which partially incapacitated[7]	2,907	$2,078,828,303
of which fully incapacitated[8]	126	$233,269,163
Total	**66,548**	**$4,166,073,753**
Total (7% discount)	66,548	$2,840,752,309
Total (10% discount)	66,548	$2,287,136,406

Source: BISOE analysis; Safe Work Australia (2021)

NB Figures may not sum due to rounding

A breakdown of the productivity cost of work-related injuries/illnesses across the absence duration cohorts are detailed in Figure 5. It is estimated that productivity cost of work-related injuries/illnesses in the construction industry in FY18 is $4.2 billion in Net Present Value (NPV) terms, based on an average remaining 27.8 year working life. 95% of the productivity cost occurs in the

[6] Includes lifelong partial incapacity assumption given duration over 6 months.

[7] Conservatively assumed to have an average absence duration of 52 weeks.

[8] It is assumed that 0.19% of all work-related injuries result in the injured/ill employees are permanently incapacitated with no return to work. Consistent with statistics from Safe Work Australia (2015b).

cohorts that incur some form of lifelong incapacity, despite only accounting for 8% of work-related injuries/illnesses that occur.

2.1.3. Morbidity Costs

Productivity costs represent economic costs to the economy as a which will also ultimately affect living standards. Morbidity costs are separate to these. They represent the direct loss of wellbeing borne by the injured/ill employee in terms of a reduced quality of life.

To estimate the lost quality of life over the duration of the injury/illness we utilise the disability affected life year (DALY) weights estimated as part of the World Health Organisation (WHO) *Global Burden of Disease* study (Global Burden of Disease Collaborative Network 2020). One DALY represents the loss of the equivalent of one year of full health due to either premature mortality (YLL) or disability (YLD) due to a disease or health condition.

The distribution of health condition/diseases incurred by the work-related injuries/illnesses in each absence duration cohort is not made available by the current WRIS or Safe Work Australia surveys. Therefore, it is necessary to estimate a weighted average DALY weight of all work-related injuries that are incurred by employees in the Australian construction industry. The estimation of the weighted average DALY weight, shown in Figure 6, is heavily skewed towards musculoskeletal disorders as most work-related injuries/illnesses in the construction were shown to be musculoskeletal injuries (Safe Work Australia 2020).

Fig 6. DALY weights and weighting scale to estimate a weighted average construction work-related injury/illness DALY weight

Health state name	Weighting	DALY Weight
Injury & musculoskeletal disorders		
- Severity level 1	47.8%	0.079
- Severity level 2	37.0%	0.117
- Severity level 3	9.6%	0.317
Diseases		
- Severity level 1	2.9%	0.133
- Severity level 2	2.2%	0.396
- Severity level 3	0.6%	0.523
Weighted Average	**100.0%**	**0.118**

Source: BISOE analysis; Global Burden of Disease Collaborative Network (2020)
NB Figures may not sum due to rounding

A breakdown of the morbidity cost of work-related injuries/illnesses across the absence duration cohorts are detailed in Figure 5. It is estimated that the morbidity cost of work-related injuries/illnesses in the construction industry in FY18 is $1.4 billion in NPV terms, based on an average remaining 43.97 years of life (ABS 2020a). Similar to the productivity costs, 95% of the morbidity costs of construction work-related injuries/illnesses are incurred by the absence cohorts with lifelong impacts.

Fig 7. Cases & morbidity costs across absence duration cohorts, FY18

Duration of Absence	FY18	Morbidity Cost
No time off	13,975	-
Part of a day	5,324	$800,065
1 – 4 days	21,295	$5,225,193
5 – 10 days	6,655	$4,898,619
2 to 5 weeks	5,391	$9,259,489
6 to 11 weeks	4,700	$19,604,681
12 to 25 weeks	3,858	$35,029,835
26 to 51 weeks[9]	2,316	$550,861,044
52 weeks and over		
- Of which partially incapacitated[10]	2,907	$703,660,609
- Of which fully incapacitated[11]	126	$81,338,409
Total	**66,548**	**$1,410,039,138**[12]
Total (7% discount)	66,548	$876,900,934
Total (10% discount)	66,548	$691,985,036

Source: BISOE analysis; Safe Work Australia (2021)

NB Figures may not sum due to rounding

2.1.4. Medical & Administration Costs

The medical costs of work-related injuries/illnesses include the medical and rehabilitation costs incurred as a result of the injury/illness as well as the costs of carers and aids, equipment and modifications. The administration costs of work-related injuries/illnesses include the legal costs, investigation costs, travel costs and transfer costs incurred as a result of the injury/illness.

This analysis assumes that the medical and administrative costs of work-related injuries/illnesses are directly correlated with (i.e. proportionate to) the value of productivity lost. Safe Work Australia (2015b) estimates the economic costs borne by the employer, worker and community because of work-related injuries/illnesses and follows a similar approach to this analysis. This allows for correlations of medical and administration costs to productivity costs to be estimated.

Figure 8 details both the assumed cost correlation of the administration and medical costs to the productivity costs as well as the estimated costs of each group in FY18. The administration and medical costs of construction work-related injuries/illnesses in FY18 are estimated to be $307 million and $99 million in NPV terms, respectively, based on an average remaining 43.97 years of life.

[9] Includes lifelong partial incapacity assumption given duration over 6 months.

[10] Conservatively assumed to have an average absence of 52.

[11] It is assumed that 0.19% of all work-related injuries result in the injured/ill employees are permanently incapacitated with no return to work. Consistent with statistics from Safe Work Australia (2015b).

[12] Uses the BISOE estimate in Figure 3, originally reported as 0% (due to incomplete results in the latest survey) causing the distribution to only sum to 90%. Using the original estimate (0%) reduces the morbidity costs by $241 million.

Fig 8. Costs of work-related injuries/illnesses across conceptual groups

Conceptual Group	Cost Correlation	BISOE estimated costs, FY18
Productivity Costs	-	$4,166,073,753
Administration Costs	0.074	**$306,950,442**
Medical Costs	0.024	**$98,609,683**

Source: BISOE analysis, Safe Work Australia (2015b)

NB Figures may not sum due to rounding

2.1.5. Cost of work-related fatalities, injuries and illnesses

The total cost of work-related fatalities, injuries and illnesses in the current construction culture In NPV terms (at a 3% real discount rate) is estimated to be $6.1 billion in FY18. As shown in Figure 9, productivity costs account for 68% of the total cost with morbidity costs accounting for a further 23% of the total cost.

As an additional sensitivity analysis of the total cost of the work-related fatalities, injuries and illnesses, we have included estimates of the total costs under different discount rates suggested by OBPR (2020) cost benefit analysis guidance note, 7% and 10% respectively. Increasing the discount rate to 7% from 3%, decreases the total cost by 33% compared to baseline. Increasing the discount rate to 10%, decreases the total by 47% compared to baseline.

Fig 9. Cost of work-related fatalities, injuries and illnesses

Cost Category	Cost	% of Total
Productivity Cost	$4,166,073,753	68%
Morbidity Cost	$1,410,039,138	23%
Administration Cost	$306,950,442	5%
Mortality Cost	$120,000,000	2%
Medical Costs	$98,609,683	2%
Total	**$6,101,673,016**	**100%**
Total (7% discount)	$4,063,795,602	
Total (10% discount)	$3,252,170,244	

Source: BISOE analysis

NB Figures may not sum due to rounding

2.2. MENTAL ILLNESS AND STRESS

This section will examine the prevalence of ill-mental health and stress experienced by employees in the construction sector and the associated economic costs. The complex nature and limited understanding of what leads to construction employees suffering from ill-mental health prevents this analysis from discerning the ill-mental health economic costs that are a product of the construction culture from the construction employee ill-mental health economic costs that a result of non-work-related factors.

2.2.1. Psycho-social workplace risk factors for mental illness

A report into mentally healthy workplaces in NSW by SafeWork NSW (2017a) provides an insight into the status of employee mental health in the Australian construction industry. The study uses individual-level data from the *Household, Income and Labour Dynamics of Australia* (HILDA) Survey from 2011 to 2015 to establish a nationally representative panel study across several social and economic indicators.

There is a well-established link between job quality and mental health outcomes (SafeWork NSW 2017b). LaMontagne et. al. (LaMontagne, et al. 2016) analysed the impact of individual job stressors and found significant dose-response relationships of job control, job demand, job security to mental health and subjective wellbeing. As shown in Figure 10, prevalence of low security is very high in the construction industry. The prevalence of low security of female employees is more than 40% higher than males. Job security is a measure that describes one's perceived continuity of employment and the risk of losing one's job.

Fig 10. Prevalence of risk factors for mental illness, construction industry

Job Stressor	Male		Female	
High demands	24.8	(11th)	17.4	(14th)
Low security	26.7	(3rd)	38.3	(1st)
Low control	19.1	(9th)	12.6	(15th)

Source: SafeWork NSW (2017a)

A contributing factor to the low levels of job security in the construction industry is existing workplace arrangements. Daily hire employment is particularly common within the industry. Despite daily hire employee's forming part of the full-time workforce, where they are entitled to most of the employment conditions provided by the *Fair Work Act,* their minimum period of notice of termination is one working day. Therefore, like casual employees, daily hire employees have no guarantee of ongoing employment. This form of employment is closely linked to the concept of precarious employment, which has been consistently shown to have a significant negative impact on a worker's wellbeing (Quinlan 2013).

2.2.2. Mental Illness

148,620

Estimated employees with a mental illness, FY18

78,448

Estimated employees with a severe mental illness, FY18

Source: BISOE analysis

The SafeWork NSW (2017a) details the prevalence of moderate and severe mental illness in the construction industry, shown in Figure 11. The report estimates that 12.6% of male employees and 13.4% of female employees experienced some form of mental illness over 2011 to 2015. This equates to 148,620 employees in FY18, if we assume that prevalence is unchanged. Despite low levels of job security experienced in the industry, the prevalence of mental illness is reasonably low compared to other sectors. However, on an absolute number of employees basis, the construction industry has the fourth highest number of employees with a mental illness, with the health sector estimated to have the most.

Fig 11. Prevalence of mental illness in the construction industry

Job Stressor	Male		Female	
Good mental health – MHI-5 >60	87.4	(8th)	86.7	(5th)
Moderate mental ill-health – MHI-5 50-60	5.9	(13th)	6.7	(12th)
Severe mental ill-health – MHI-5 <50	6.7	(11th)	6.7	(16th)

Source: SafeWork NSW (2017a)

Employee mental ill-health directly impacts their productivity through both increased absenteeism and presenteeism. To avoid double counting the productivity cost from mental health with the productivity costs of work-related injuries and illness which include mental illness/stress (detailed in Section 2.1.2), this analysis will only include excess presenteeism.

SafeWork NSW (2017a) estimated the marginal effect of mental ill-health for the construction sector by correlating HILDA survey questions used in previous studies to assess reduced work performance because of presenteeism. To isolate presenteeism as a result of mental ill-health, the survey respondents were explicitly asked whether they had experienced problems with their work or other regularly daily activities as a result of any emotional problems (such as feeling depressed or anxious). Shown in Figure 12, the report estimated both the general level of presenteeism amongst all construction employees and the average level of presenteeism amongst employees with moderate/severe mental ill-health to calculate the marginal effect. It was estimated that 14.3% of all employees experience presenteeism. The prevalence of those reporting presenteeism increasing dramatically for those specifically with moderate mental ill-health (+24.5%) and then increases even further for those with severe mental ill-health (+51.7%).

Fig 12. Presenteeism in the NSW construction industry

Mental Health Status	% Reporting
All employees	14.3
Moderate mental ill-health	38.8
Severe mental ill-health	66.0

Source: SafeWork NSW (2017a)

To estimate excess presenteeism due to mental illnesses to the entire Australian construction industry we apply the reported rates of presenteeism in the NSW construction industry, as we consider the NSW results to be reasonably representative of the Australian economy given its economic structure is similar to the national economy. Therefore, the productivity cost of excess presenteeism due to mental illnesses in the Australian construction industry is estimated to be $643 million in FY18, as shown in Figure 13. Despite the two cohorts comprising a similar portion of employees, severe mental ill-health accounts for 70% of the total cost due to marginal effect of presenteeism being more than double that of moderate mental ill-health cohort.

Fig 13. Cost of excess presenteeism due to mental illness, FY18

Mental Health Status	Productivity Cost	Cost per employee
Moderate mental ill-health	$190,755,158	$2,718
Severe mental ill-health	$452,233,647	$5,765
Total	**$642,988,805**	$4,326

Source: BISOE, ABS (2021a), SafeWork NSW (2017a)

NB Figures may not sum due to rounding

This report is unable to exclusively attribute the current construction culture as the cause of an employee's mental illness, despite the detailed analysis to estimate the cost of excess presenteeism due to mental illness. VicHealth (2019) details the complexity of mental illnesses, with work-related stressors being just one subgroup of an employee's psychological risk factors.

2.2.3. Suicides

Additional to mortality cost from work-related traumatic injury fatalities is excess mortality cost from suicide among construction workers. The sector is well known for workers being at elevated risk of suicide compared to other workers (Maheen, LaMontagne and King 2020). A recent survey of Queensland construction apprentices found that 35% of male employees had suicidal thoughts in the past 12 months (Ross, Wardhani and Kõlves 2020). The survey also found higher prevalence of suicidal thoughts amongst female construction apprentices than males at 43%, although from a significantly smaller sample.

As shown in Figure 14, male suicide rates are significantly higher than female ones. ABS (2019) reports than males consistently account for approximately three-quarters of suicide deaths. Due to the construction industry having a high portion of male employees, it would seem unsurprising that the sector has a higher suicide rate compared to other industries with higher female employee representation.

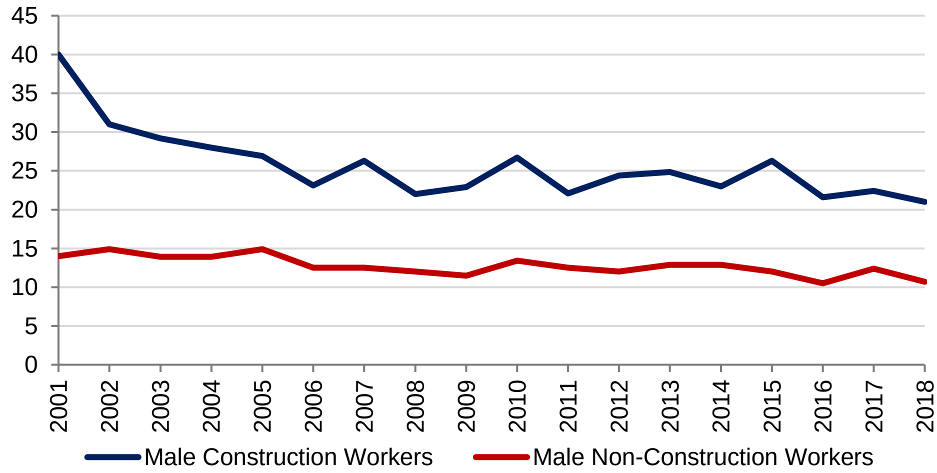
Fig 14. Age-specific death rates for intentional self-harm by sex, 2018

Age Cohort	Male	Female
15 - 24	20.2	6.4
25 - 34	22.7	6.3
35 - 44	25.6	8.2
45 - 54	27.5	8.5
55 - 64	24.9	7.2
65 - 74	15.8	5.0

Source: ABS (2019)

However, according to Maheen, LaMontagne and King (2020) when comparing the age-standardised suicide rates between male construction workers and male non-construction workers the divergence is clear. As shown in Figure 15, suicide rates in male construction workers have consistently been twice the suicide rates seen in male non-construction workers. Figure 15 also shows that both the suicides rates of male construction and non-construction workers have appeared to generally trend decline over the past two decades, although highly volatile. Therefore, suicide rates of male construction workers continue to remain twice that of non-construction workers in 2018.

Fig 15. Age-standardised suicide rates in Australia (per 100,000)



Source: BISOE analysis; Maheen, LaMontagne and King (2020)

This increased incidence of suicide in the construction sector has also been seen internationally (Windsor-Shellard and Gunnel 2019, Roberts, Jaremin and Lloyd 2013). A systematic review and meta-analysis examining suicide by occupation by Milner et. al. (2013) found that workers in low skilled occupations (which includes construction and building industry employees) were at increased risk of suicide compared to high skilled occupations.

To isolate the economic cost of the current construction culture that is contributing to increased incidence of male suicides, we estimate the marginal economic cost of worker suicides using the value of a statistical life (as detailed in Section 2.1.1). As shown in Figure 16, the marginal prevalence of male worker suicides was 10.3 suicides per 100,000 employees compared to male non-construction workers in 2018. This equates to a marginal mortality cost of worker suicide of $533 million in 2018.

Fig 16. Marginal mortality cost of male construction worker suicides, 2018

Marginal Suicide Rate (suicides per 100,000)	Marginal Suicides	Marginal Mortality Cost
10.3	106.5	$532,625,379

Source: BISOE; Maheen, LaMontagne & King (2020); OBPR (2021)
NB Figures may not sum due to rounding

This report is unable to directly attribute the current construction culture as the cause of the increased rate of male employee suicide, despite the detailed analysis to estimate the marginal mortality cost of male worker suicides. The WHO (2006) suggests suicide is a result of a complex interaction between a range of reasons including:

- *Social Economic Status* – increased suicide risk has been found to be associated with lower education, income and access to health services (Taylor, et al. 2004)
- *Access to lethal suicide methods* – employees in occupations with access to lethal means were found to have suicide rates greater than those without means (Milner, Witt, et al. 2017).
- *Quality of psychological working conditions* – low job control and high job demands were associated with increased risk of male suicide after adjusting for social economic status (Milner, Spittal, et al. 2017).
- *Underlying employee vulnerabilities* – Giner et. al. (2016) find several cognitive, temperament, emotional and personality traits that are associated with increased suicidal behaviour.
- *Private contributing factors* - Beyond Blue (2021) suggest that factors such as relationship problems, legal/disciplinary problems, substance abuse and gambling addiction increase the likelihood of suicidal behaviour.

3. GENDER DIVERSITY

3 in 25

Construction employees are female, FY18 (Historical Avg.)

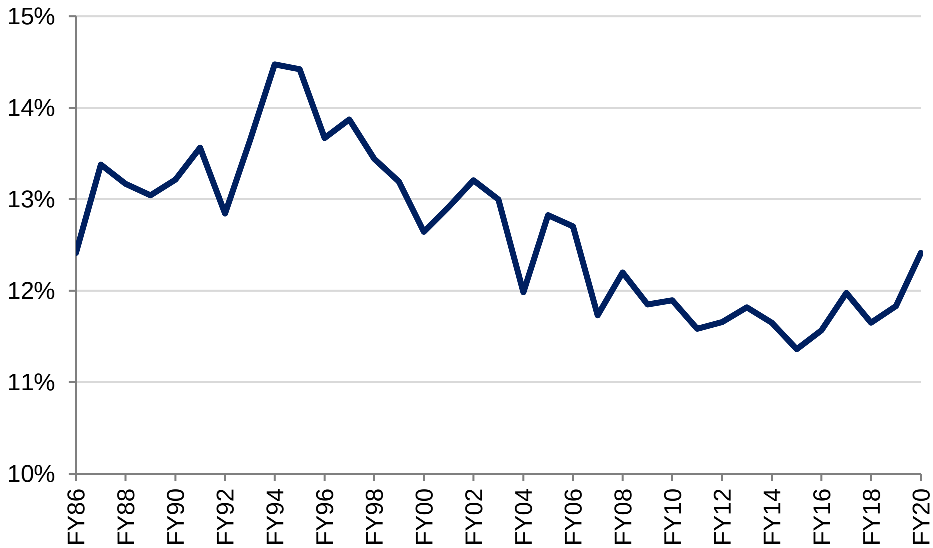
1. Construction	12%	(13%)
2. Mining	16%	(12%)
3. Transport	21%	(22%)
....		
17. Food & Accommodation	65%	(60%)
18. Education	71%	(67%)
19. Health	79%	(77%)

Source: ABS (2021b)

3.1. FEMALE REPRESENTATION

The construction industry is well known for being a male dominated industry. Since FY06 the sector has had the lowest female representation within its workforce of any employment industry. Figure 17 shows the female share of construction employees since FY86. After peaking in FY94 at 14.5%, the female share of employees generally declined through to FY15 troughing at 11.4%. This declining share of female representation within the workforce occurred over a period whilst almost all other sectors saw increases in female representation. Finance was the only other sector to see a decline in female representation, although is still considered a gender balanced industry with 49% of workers female in FY18.

Fig 17. Female share of construction employees



Source: ABS (2021b)

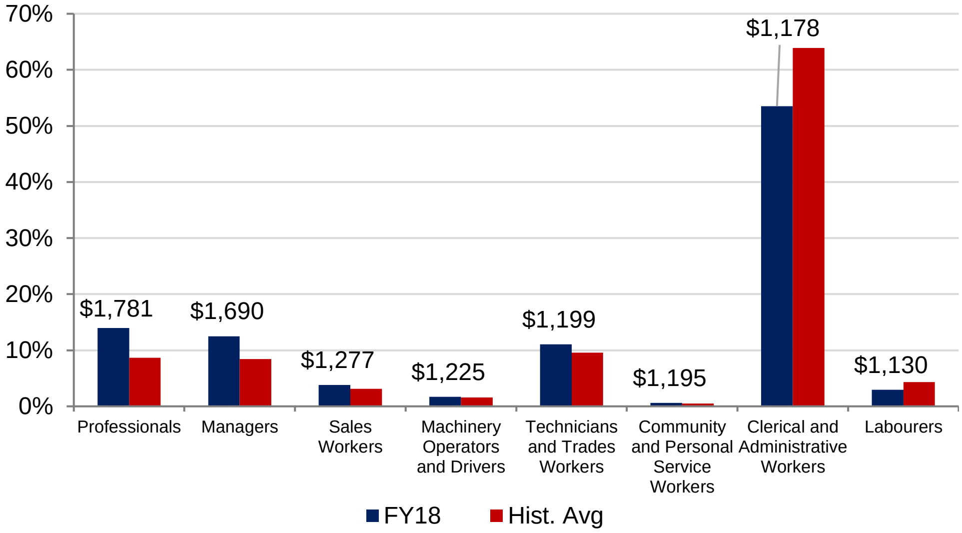
Further disaggregation of the workforce by analysing trends in full-time and part-time employment reveals that this decline was a result of modest growth in female part-time employment, whilst other employment cohorts grew strongly. The average full-time share of female employees is 43%, which distinctly different to male employment with an average full-time share of 92%. Figure 18 also shows that the growth in female full-time employment subgroup outpaced the male full-time category. This comparatively faster growth saw female representation with the full-time construction labour force increase to 7.2% in FY18 compared to the historical average of 6.1%.

Fig 18. Compound annual growth of workforce subgroups, FY86 – F18

Full – Time		Part – Time	
Male	Female	Male	Female
2.6%	3.5%	5.8%	1.9%

Source: ABS (2021b)

Fig 19. Distribution of full-time female construction employees across occupations and respective estimated median wages



Source: ABS (2016a), ABS (2021b), BISOE analysis

24%

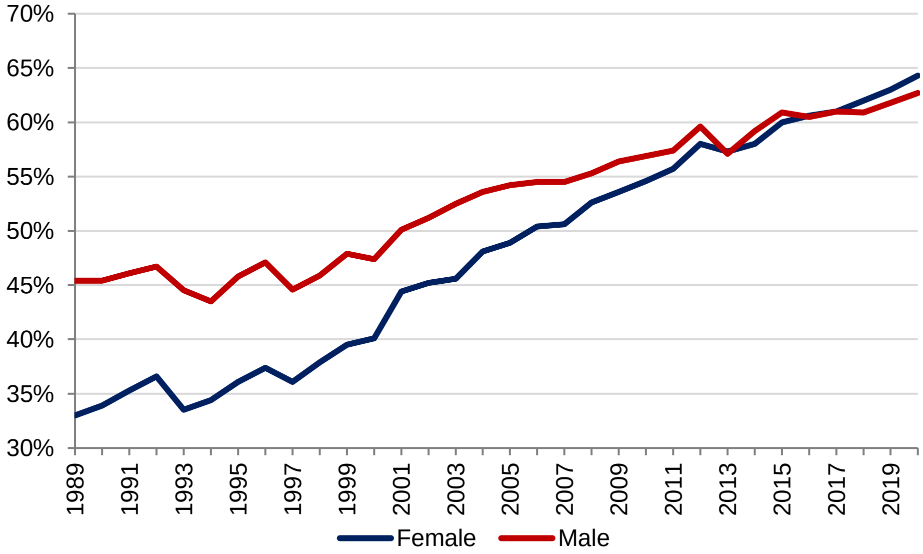
of female construction workers with advanced qualification, 2016

Professionals	64%
Managers	39%
Sales Workers	21%
Machinery Operators and Drivers	18%
Technicians and Trades Workers	18%
Clerical and Administration Workers	14%
Labourers	8%
Community and Personal Service Workers	5%

Source: ABS (2016b)

Analysing the distribution of full-time female employees across occupations, shown in Figure 19, reveals a distinct shift towards manager and professional positions from clerical and administrative workers. Overlaying the median female construction wage earned in each occupation, estimated using ABS Census data (2016a), and assuming a uniform distribution of employees within income cohorts, shows that the most significant indicative shift has occurred with full-time female construction employees moving towards the higher earning positions. These higher wage construction occupations tend to be held by employees with higher levels of education attainment, including non-school qualifications such as bachelor and postgraduate degrees.

Fig 20. Share of persons (15-64 years old) with a non-school qualification



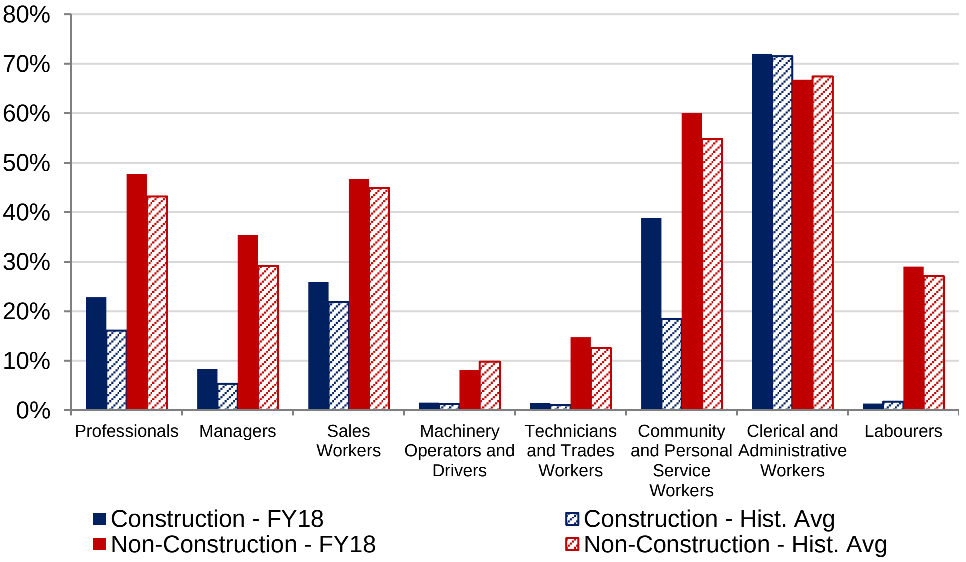
Source: ABS (2020b)

The share of people across Australia's population with a non-school qualification has substantially increased over the past 30 years. Disaggregating by gender shows that the rate of increase has been significantly stronger in females compared to males, as shown in Figure 20. The difference between genders was 12% in 1989 whereas recent data indicates that females had a 160 basis points higher share of persons with a non-school qualification than males in 2020.

The increase in female representation within the full-time construction labour force has differed by occupation, as detailed in Figure 21. Not only has the distribution of female workers across occupations shifted because of a transition in demand for occupations within the construction workforce but female representation within those occupations has also changed. The greatest increase in female representation occurred within the community and personal service worker cohort, up 20%, and in turn significantly closed the gap between the construction industry and non-construction female representation levels with the occupation. Although the occupation represents just 0.1% of the construction workforce and is considered relatively low wage.

Female representation within the higher wage construction industry occupations of professionals, managers and sales workers has increased by 7%, 3% and 4%, respectively. Despite this increase in female representation within construction occupations, Figure 21 also details that the construction industry is still well behind the average female representation in other sectors. Comparing between the construction sector and non-sectors reveals that some occupation categories such as managers, technicians and trades workers and labourers have seen the gap between female representation levels widen. This indicates that the construction industry has fallen behind non-construction sectors to increase female representation in that occupation.

Fig 21. Female share of full-time employees within occupation



Source: ABS (2021b)

The recent *Building Gender Equality: Victoria's Women in Construction Strategy 2019 – 2022* by the Building Industry Consultative Council (BICC) (2019) highlighted several factors that explain the industry inability to attract, recruit and retain female employees including:

- *Impact of schools and vocational training:* young girls being actively discouraged or aren't exposed to the industry whilst at school along with highly gendered careers counselling (Jones, et al. 2017).

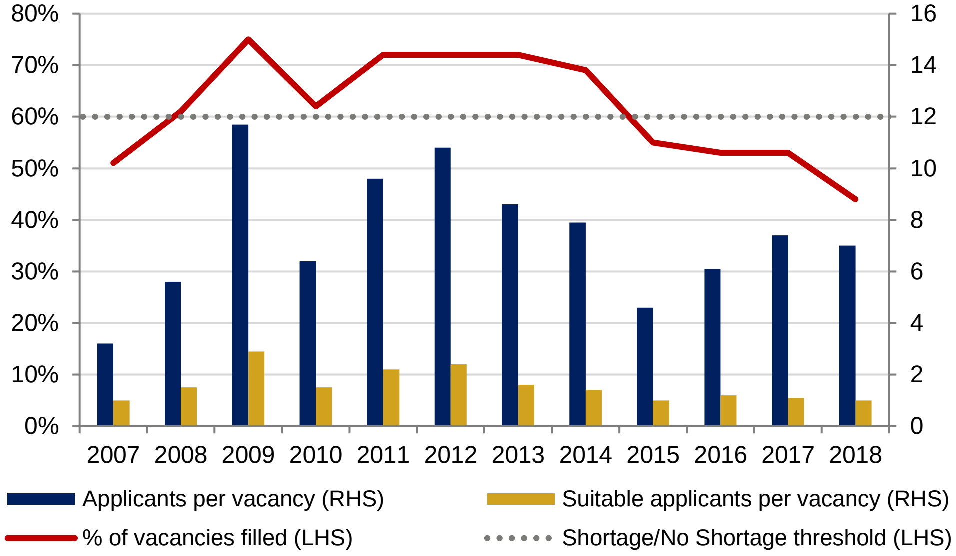
- *Gendered assumptions:* persistence of traditional or outdated views about femininity and women’s work (Francis and Prosser 2013).
- *Lack of female construction role models:* there are currently few prominent and visible female role models in the construction industry (Department of Family and Community Services Women NSW 2013).
- *Employer bias and cultural fit:* hiring workers who are like those already in the workforce (which often means mean), bias in recruitment and selection processes, belief that the work is too dangerous for women and the expectation that women will leave the workforce to have children (Shewring 2009).
- *Recruitment practices:* men are likely to gain employment through informal, internal networks whilst women are more likely to be recruited through formal processes (Galea, et al. 2018).
- *Beyond the commitment from the top:* failure to build support of gender of equality throughout the workforce perpetuates a culture that excludes women (Jones, et al. 2017).
- *Gendered violence:* actions and behaviours that express power inequalities between men and women and cause physical, sexual, psychological or economic harm to woman because they are woman (Jones, et al. 2017).
- *Other health and safety hazards:* failure to provide adequate equipment and other infrastructure including bathroom facilities, sanitary bins and appropriate clothing (Jones, et al. 2017).
- *Rigid workplace practices:* inflexible hours and work arrangements, employer’s unwillingness to account for caring responsibilities, lack of access to paid parental leave or return-to work provisions, expectation to work excessive hours to prove one’s worth (Jones, et al. 2017).

3.2. COST OF LOW FEMALE REPRESENTATION

This widespread issue of low female representations presents a significant cost of the current construction culture. One of the major costs of the construction industry’s inability to attract, recruit or retain female employees is the impact it has on labour supply. Data from the Department of Jobs and Small Business (2018) shows the labour shortage within the construction industry has been growing since 2013, as shown in Figure 22. In 2018 the proportion of labour vacancies filled reached a historic low, falling to 44%. Construction trades in particular shortage were Wall and Floor Tiler (21%), Glazier (24%) and Stonemason (31%).

The COVID-19 pandemic and associated international border closure is expected to have exacerbated the current labour shortage. Although vacancies initially fell during the national lockdown during Q2 2020, the latest data from the ABS (2021c) shows vacancies in the construction sector have since rebounded strongly in early 2021, up 61% on the same time last year. This is on the back of substantial government stimulus particularly targeting residential construction (HomeBuilder) and increased public funding allocated to fast-track major infrastructure projects.

Fig 22. Indicators of labour shortages in Australian construction trades



Source: Department of Jobs and Small Business (2018)

These skill labour shortages can substantially increase labour costs due to increased competition between businesses for a limited number of staff. Labour shortages are also notorious for causing other adverse impacts on mental health and increased safety risk due to increased need for overtime and worker fatigue (Karimi, et al. 2016).

Although difficult to quantify, Jones *et. al.* (2017) found several other potential benefits of increasing female representation in the construction industry. These benefits include bringing about cultural and behavioural change (reported decreases in aggressive behaviour and bullying), improved attention to detail, planning and organisation and improved communication (advantages businesses when dealing with clients). Conversely this could alternatively be considered some of the potential costs of failing to increase female representation within the construction as a result of the current construction culture.

4. WORK HOURS AND FATIGUE

40.5 hours

Average hours worked per construction employee, FY18

1. Mining	49.2 hrs/wk
2. Agriculture	42.5 hrs/wk
3. Construction	40.5 hrs/wk
……………	
17. Retail	30.5 hrs/wk
18. Arts & Recreation	30.4 hrs/wk
19. Food & Accommodation	28.0 hrs/wk

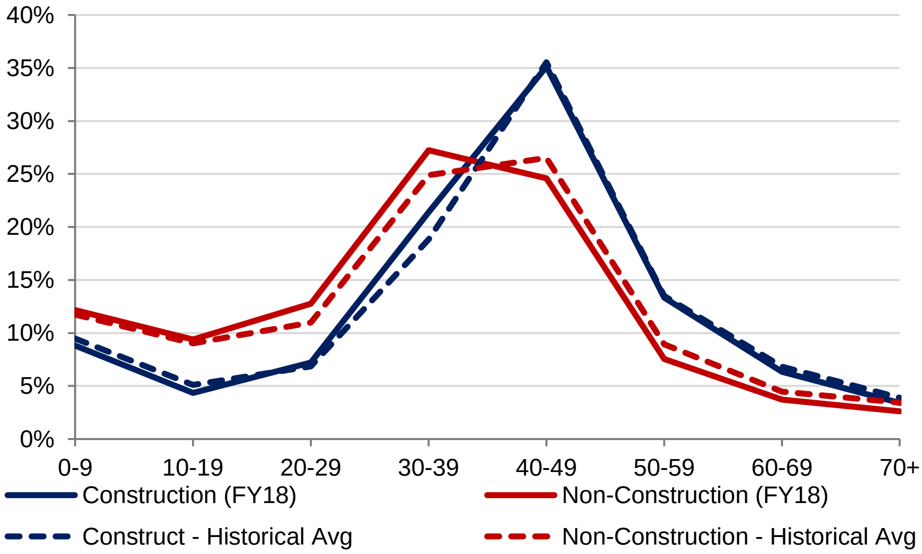
Source: ABS (2021b)

The construction sector is known for long working hours, particularly close to project deadlines. Although it may seem that drawing on existing full-time staff to work more hours to complete the projects avoids the cost of hiring and training new staff, the health and long-term productivity impacts far outweigh the short-term savings. These impacts include fatigue, potentially leading to increased absenteeism and/or presenteeism, as well as increased chance of workplace injury and higher staff turnover. Evidence suggests that the Australian construction sector could gain economic benefits by addressing the current culture towards extended working hours.

4.1. CURRENT WORKING HOURS

The ABS *Quarterly Labour Force Survey* (2021b) provides frequent reporting of hours worked across all industries. Figure 23 shows the distribution of employees is heavily skewed towards the longer hours groups (>40hours) compared to non-construction sectors. Almost 35% of construction employees averaged between 40 to 49 hours compared to 25% of non-construction employees in FY18. The distortion is even more pronounced in employees working more than 50 hours per week, comprising of 23% of construction employees compared to 14% of non-construction employees.

Fig 23. Distribution of average hours worked by employees



Source: ABS (2021b), BISOE analysis

The ABS Labour Force Survey (2021b) reveals that skew towards longer working hours is not a new occurrence in the construction industry. On average over the past 25 years 24% of construction employees were working more than 50 hours per week, compared to 23% in FY18. Comparative to other sectors, limited movement away from extended working hours in the construction sector appears to have occurred over the past 25 years. In other sectors a more pronounced shift to casual/part-time employment has reduced the need for workers to regularly work more than 40 hours.

4.2. COST OF LONG WORK HOURS

It is well documented that the productivity of a construction worker reduces the longer they work extended hours. Chang and Woo's (2017) review of the literature on labour productivity loss due to overtime found that excessive amounts of overtime work could have a serious negative on labour productivity. The overall loss of efficiency was found to not exclusively impact the overtime hours, but all hours worked by the worker that week. In general terms, there is a 1% loss of productivity for each additional hour worked per week above a regular 40 hour working week.

Figure 24 shows a further breakdown of the "hours worked" cohorts in the construction industry, including average hours worked which provides further information about the distribution within "hours worked" cohorts. This shows that almost 40,000 construction employees average more than 76 hours per week. Therefore, this "hours worked" cohort completes 6.8% of all hours worked despite only representing 3.4% of workers. Further disaggregation of the cohorts would allow for a more accurate measure of lost productivity due to regularly working long hours (>40 hours per week).

Comparing the distribution of hours worked cohorts according to the employees usual working hours to the hours actually worked reveals that the redistribution of workers from their usual schedule towards lower hours actually appears to only be occurring amongst workers working less than 44 hours per week. The portion of construction workers actually working more than 45 hours per week is equivalent to the portion of construction workers that usually work more than 45 hours per week. As a result of this balanced actual hours workers to usual hours worked ratio, it is assumed that workers in the higher hours worked cohorts regularly work those long hours rather than for a short period of high demand.

Fig 24. Distribution of average hours worked per construction worker, FY18

Hours Worked	%, Usually Worked	%, Actually Worked	Employees	Average Hours
0 – 39 hours	33.6%	41.8%	489,113	23.98
40 – 44 hours	33.7%	25.2%	295,084	40.43
45 – 49 hours	10.2%	9.9%	116,304	46.15
50 – 59 hours	13.8%	13.4%	156,359	52.09
60 – 69 hours	6.0%	6.3%	74,236	61.22
70 hours & over	2.7%	3.4%	39,911	76.32

Source: ABS (2021b)

NB Figures may not sum due to rounding

The lost productivity due to long work hours discussed in Chang and Woo (2017) is a result of: increased absenteeism from physical, mental and social aspects, increased injury and accidents, reduced supervision and effectiveness, low morale, increased error and omission, reduced quality of work (Hanna 2011). There is significant overlap between the factors listed and the main possible causes of work-related injuries reported in the *WHS Perceptions Survey* (Safe Work Australia 2015c), shown in Figure 25. Many of the most frequently reported causes of work-related injuries in the construction can be linked to work fatigue and high job demands.

Fig 25. Main possible causes of work-related injury in the construction industry, 2012*

Perceived causes of injury	Employers %	Workers %
The worker being careless	69	42
Just not thinking	41	32
Manual task**	33	-
Risk taking	24	19
Unsafe work practices or procedures	21	22
Not having the right equipment**	18	-
Dangerous equipment or machinery	18	28
Alcohol or drugs	17	11
Lack of training or education	13	34
Pressure or stress	7	29
Repetitive work	7	4
Long hours of work**	6	-
Poor decisions by management**	2	-
Dangerous chemicals or substances	1	10
Lack of supervision	1	18
Shift Work**	0	-

Source: Safe Work Australia (2015c)
* Each respondent selected three possible causes, ** Not asked of workers

To avoid attributing the costs of long work hours to costs already estimated previous sections of this report we will conservatively estimate the productivity lost due to consistently working long hours as 0.1% for each hour above 40 hours regularly worked per week, with the workers adjusted productivity applied to every hour they work that week. Applying the reduced worker productivity across all hours worked is due to workers tend to pace themselves for a longer work day/week (Hanna 2011).

The conservative estimate of productivity lost due to long work hours is further justified due both to conflicting findings of the impact of long work hours (Allen Jr, Slavin and Bunn III 2007) and limitations to the potential benefits of reducing worker overtime. Implementing overtime does not require coordinating shift work or the congestion problem of overmanning. Chang and Woo (2017) also report that overtime may maximize equipment use, take advantage of good weather, avoid penalty for late completion and attract workers to the project in times of skilled labour shortages or if the job site is in a remote location, due to increased wages.

The estimated productivity cost of long work hours was $708 million in FY18, shown in Figure 26. This estimated cost includes the increased absenteeism not accounted for by work-related injuries/illnesses as well as the presenteeism due to increased physical and mental fatigue. Also included in this estimate is the reduction in worker morale (Hanna, Taylor and Sullivan 2005) and increased turnover rates (Pencavel 2014). **This report is unable to directly attribute the current construction culture as the cause of the productivity lost as a result of employees regularly working long hours**, despite the detailed analysis to estimate the productivity cost of long work hours.

Fig 26. Workers & productivity costs across hours worked cohorts, FY18

Hours Worked	Employees	Product Cost	% of Total Cost
0 – 39 hours	489,113	-	0%
40 – 44 hours	295,084	$10,520,186	1%
45 – 49 hours	116,304	$67,951,360	10%
50 – 59 hours	156,359	$202,731,224	29%
60 – 69 hours	74,236	$198,561,477	28%
70 hours & over	39,911	$227,795,772	32%
Total	**1,171,007**	**$707,560,019**	**100%**

Source: ABS (2021b), BISOE analysis
NB Figures may not sum due to rounding

There are also broader impacts of long work hours associated with a construction culture of long work hours. Bridges *et. al.* (2020) note that long work hours and associated challenges in balancing work and family commitments is a major hinderance to women's workforce participation. Galea *et. al.* (2018) describe the more acute impacts that the rigid work practices of the current construction (total availability, geographical mobility and long work hours) culture have on women construction workers because of women continuing to carry the greatest caring responsibilities within families. Galea *et al.* (2018) also highlight the report verbal and behavioural shaming and sanctioning inflicted on employees who can't adhere to these rigid work practices. Long work hours combined with inflexible work durations have also been found to be a substantial contributing factor to work-family conflict and cause an imbalance between work and non-work life (Lingard, Francis and Turner 2010).

5. CONCLUSION

This report highlights many of the economic costs of the current construction culture that if addressed would bring about significant benefits to society.

The lost wellbeing from work-related fatalities, injuries or illnesses were found to incur a significant cost, estimated to be at least $6.1bn in FY18. The ABS (2018a) reported that the construction sector had 66,548 work-related injuries/illnesses in FY18, with the industry having the highest incidence rate of any employment sector. The industry also recorded 24 work-related traumatic fatalities in 2018. The greatest cost of work-related fatalities/injuries were estimated to be a result of lost productivity ($4.2 billion in NPV terms) with 3,033 workers became partially or fully incapacitated. The morbidity cost of these injuries/illnesses was also significant, estimated to be $1.4 billion in FY18. The administration and medical costs related to construction work-related injuries/illnesses in FY18 were estimated to be $307 million and $99 million, respectively, in NPV terms.

Other significant wellbeing impacts of the current construction culture investigated were the prevalence of ill-mental health and stress experienced by employees in the sector. It was estimated that 148,620 construction employees had a moderate/severe mental illness in FY18. A significant economic cost of mental ill-health was the loss of productivity through increased presenteeism. Although estimated at $643 million, we were unable to exclusively attribute the current construction as the cause of an employee’s mental illness. Male construction workers were also found to have significantly higher suicide rates compared to male non-construction workers. The marginal mortality cost of male construction worker suicides was estimated to be $532 million in 2018, however due to the complex interaction between a range of reasons leading to an employee suicide, we were unable to directly link the current construction culture as the cause of this marginal cost.

Another potential cost of the current construction culture is the low female representation within the workforce. The industry currently has the lowest female representation of any employment sector, at 12%. Although growth in overall female representation with the sector has remained weak, female representation in full time employment increased to 7.2% in FY18. This increase in female representation in the construction sector has differed by occupation, potentially assisted by increased rates of non-school qualifications of women allowing the distribution of female employees within the sector to shift towards the higher wage occupations. Despite the increase in female representation, the industry remains well behind other employment sectors in achieving gender equality. A potential cost of the current construction culture’s inability to attract, recruit and retain female employee is it exacerbates an already growing labour shortage.

The current construction culture is also known for its rigid work practices and long work hours. The construction sector had the third highest average hours worked per employee in FY18, at 40.5 hours per week. 23% of construction employees were reported to be regularly working more than 50 hours per week. The productivity cost associated with employees consistently working overtime was estimated to be $708 million. This cost represents the increased absenteeism not accounted for by work-related injuries/illnesses as well as the increased presenteeism, reduction in worker morale and increased turnover rates. As is the case with the mental illness/suicide issues noted above, we have not directly incorporated this into the results but have noted its material significance “below the line”.

Fig 27. Summary of estimated costs of the current construction culture

Cost Category	FY18
Fatalities/Injuries/Illnesses:	
Productivity	$4,166,073,753
Morbidity	$1,410,039,138
Administration	$306,950,442
Mortality	$120,000,000
Medical	$98,609,683
Total	**$6,101,673,016**
Additional Costs (Not included in Total)	
Long Work Hours - Productivity	$707,560,019
Mental Illness - Presenteeism	$642,988,805
Male Worker Suicide - Marginal Mortality	$532,801,466

Source: BISOE analysis

TECHICAL APPENDIX

INJURY/ILLNESS PRODUCTIVITY COST CALCULATION

The productivity cost of injuries/illnesses for each absence duration cohort is calculated using the following formula and specified assumptions:

$$Productivity_c = \sum_{t=0}^{n} \frac{\left(Absence_{ct} + (1 - Ability)(52 - Absence_{ct})\right) \times Wage \times (1 + Growth)^t \times Number_c}{(1 + Discount)^t}$$

Where $Absence_c$ is the average duration of absence of injuries in cohort, c, in weeks in year t since the injury occurred. We assume a normal distribution of injury duration within each cohort implying that the average absence is in the center of the specified cohort duration range. $Ability$ is the ability factor of the person.

The ability factor of a partially incapacitated worker is 64% of a worker operating at full capacity and able to carry out his or her duties as normal, whereas the ability factor of a full incapacity is 0%. This is consistent with the assumption in Safe Work Australia (2015b). In the cohorts that are absent from work for less than 6 months, it is assumed that the work-related injuries/illnesses incurred do not result in any lifelong incapacity and the worker is able to resume full duties. Therefore, in these cohorts, the ability factor is 100%.

$Wage$ is the lost productivity per worker, per week of absence. In the absence of construction sector labour profit margin, the average construction workers weekly productive output is assumed to be equivalent to the gross average weekly construction wage in the year the injury/illness occurred (ABS 2021a). $Growth$ is the long run real wage growth per annum (or productivity growth) and is assumed to be 1.5% consistent with current long-term projections for Australian productivity growth (New South Wales Treasury 2016). $Number_c$ is the number of injured/ill workers in cohort, c. $Discount$ is the discount rate used to calculate the net present value and is assumed to be 3%. It is also assumed that the average employee is 39.2 years old at the time of the injury/illness, according to Figure 2, and has 27.8 years of working life left before retirement (Services Australia 2019).

INJURY/ILLNESS MORBIDITY COST CALCULATION

To estimate the morbidity costs of work-related injuries/illnesses a similar approach to the productivity costs is followed. The aggregated distribution of the duration of absence cohorts, detailed in Figure 5, is utilised and morbidity cost for each absence duration cohort is estimate using the following formula:

$$Morbidity_c = \sum_{t=0}^{n} \frac{\left(Absence_{ct} + \ Ongoing_c \times (52 - Absence_{ct})\right) \times DALY \times VLY \times Number_c}{(1 + Discount)^t}$$

Where $DALY$ is the weighted average of construction work-related injuries/illnesses estimated in Figure 6. $Ongoing_c$ is the ratio of the ongoing weighted $DALY$ experienced once the injured/ill employee in cohort, c, returns to work but still has a partial incapacity to the weighted $DALY$ experienced by injured/ill during their absence from work and is assumed to be 0.35 in this analysis. This implies that the DALY weight reduces from 0.118 to 0.041 once the partially incapacitated employee returns to work and we also assume that this lost quality of life remains constant over the remainder of the partially incapacitated employee’s life.

VLY is the statistical value of a life year. VLY is assumed to $217,000 (Office of Best Practice Regulation 2021) for each employee. $Absence_c$ is the average duration of absence of injuries in cohort, c, in weeks in year t since the injury occurred. $Number_c$ is the number of injured/ill workers in cohort, c. $Discount$ is the discount rate used to calculate the net present value and is assumed to be

3%. It is also assumed that the average employee is 39.2 years old at the time of the injury/illness, according to Figure 2, and has a life expectancy of 83.4 years (ABS 2020a).

MENTAL ILLNESS COST CALCULATION

To calculate the marginal costs of presenteeism because of mental ill-health the following formula was utilised:

$$Presenteeism_{ght} = Excess_{gh} \times Productivity \times Wage_{gt} \times 48 \times Employees_{gt}$$

Where $Presenteeism_{ght}$ is the excess productivity lost from presenteeism due to mental ill-health status cohort, h, in gender cohort, g, in year, t. $Excess_{gh}$ is the marginal prevalence of presenteeism by mental ill-health status cohort, h, in gender cohort, g. It is assumed that the prevalence of excess presenteeism is consistent across genders. $Productivity$ is the % of average weekly output per employee lost due to presenteeism and is assumed to 15.3%, consistent with SafeWork NSW (2017a). $Wage$ is the average weekly wage per employee in gender cohort, g, in year, t and is assumed to be equivalent to productive output. $Employees_{gt}$ is the number of employees in the construction sector in gender cohort, g, in year, t.

LONG WORK HOURS COST CALCULATION

The productivity cost of long working hours was estimated using the following formula:

$$Productivity_c = Workers_c \times Lost \times (Average\ Hours_c - 40) \times Average\ Hours_c \times\ Wage \times 48$$

Where $Productivity_c$ is the estimated productivity cost due to long hours of hours worked cohort, c. $Workers_c$ is the number of employees within hours worked cohort, c. $Lost$ is the productivity lost for each hour above 40 hours per week regularly worked. $Average\ Hours_c$ is the average hours worked each week by hours worked cohort, c, and is detailed in Figure 24. $Wage$ is the hourly wage of the average construction worker as per ABS (2021a). It was also assumed that length of the average work year is 48 weeks.

REFERENCES

Allen Jr, Harris M, Thomas Slavin, and William B Bunn III. 2007. "Do long workhours impact health, safety, and productivity at a heavy manufacturer?" *Journal of occupational and environmental medicine* 49 (2): 148-171. doi:10.1097/JOM.0b013e31802f09ee.

Australian Bureau of Statistics. 2021a. "Average Weekly Earnings, Australia." ABS Catalogue - 6302.0. https://www.abs.gov.au/.

Australian Bureau of Statistics. 2019. "Causes of Death, Australia." https://www.abs.gov.au/.

Australian Bureau of Statistics. 2020b. "Education and Work, Australia." ABS Catalogue - 6227.0. https://www.abs.gov.au/.

Australian Bureau of Statistics. 2021c. "Job Vacancies, Australia." ABS Catalogue - 6354.0. https://www.abs.gov.au/.

Australian Bureau of Statistics. 2016b. "Labour force status (LFSP) and Industry (INDP) by Level of Highest Education Attainment (HEAP) by Occupation (OCCP) by Sex (SEXP)." Census Tablebuilder. Accessed May 5, 2021. https://auth.censusdata.abs.gov.au/.

Australian Bureau of Statistics. 2021b. "Labour Force, Australia, Detailed." ABS Catalogue 6291.0.55.001. https://www.abs.gov.au/.

Australian Bureau of Statistics. 2020a. "Life Tables, 2017 - 2019." https://www.abs.gov.au/.

Australian Bureau of Statistics. 2016a. "Occupation (OCCP) and Sex (SEXP) by Total Weekly Personal Income (INCP) by Industry (INDP) and Labour Force Status (LFSP)." Census Tablebuilder. Accessed May 4, 2021. https://auth.censusdata.abs.gov.au/.

Australian Bureau of Statistics. 2018a. "Work-Related Injuries, Australia, 2017-18." ABS Catalogue 6324.0. https://www.abs.gov.au/.

Beyond Blue. 2021. *Suicidal warning signs.* Accessed April 4, 2021. https://www.beyondblue.org.au/the-facts/suicide-prevention/feeling-suicidal/suicidal-warning-signs.

Bridges, Donna, Elizabeth Wulff, Larissa Bamberry, Branka Krivokapic-Skoko, and Stacey Jenkins. 2020. "Negotiating gender in the male-dominated skilled trades: a systematic literature review." *Construction Management and Economics* 38 (10): 894-916. doi:10.1080/01446193.2020.1762906.

Building Industry Consultative Council. 2019. *Building Gender Equality: Victoria's Women in Construction Strategy 2019-2022.* Victoria Government. https://www.vic.gov.au/.

Chang, Chul-Ki, and Sungkwon Woo. 2017. "Critical review of previous studies on labor productivity loss due to overtime." *KSCE Journal of Civil Engineering* 21 (7): 2551-2557. doi:10.1007/s12205-017-1652-0.

Department of Family and Community Services Women NSW. 2013. *Women in trades: the missing 48 percent.* Women NSW Occasional Paper, Sydney, Australia: Department of Family and Community Services Women NSW. https://www.women.nsw.gov.au/.

Department of Jobs and Small Business. 2018. *Construction trades labour market research - Australia.* Department of Jobs and Small Business. https://www.dese.gov.au/.

Faber, Jorge, and Lilian Martins Fonseca. 2014. "How sample size influences research outcomes." *Dental Press Journal of Orthodontics* 19 (4): 27-49. doi:10.1590/2176-9451.19.4.027-029.ebo.

Francis, Valerie, and Adele Prosser. 2013. "Exploring Vocational Guidance and Gender in Construction." *International Journal of Construction Education and Research* 10 (1): 39-57. doi:10.1080/15578771.2012.744371.

Galea, Natalie, Abigail Powell, Martin Loosemore, and Louise Chappell. 2018. *Demolishing Gender Structures.* Sydney: UNSW. https://www.humanrights.unsw.edu.au/.

Giner, Lucas, Hilario Blasco-Fontecilla, Diego De La Vega, and Philippe Courtet. 2016. "Cognitive, Emotional, Temperament, and Personality Trait Correlates of Suicidal Behaviour." *Current psychiatry reports* 18 (11): 1-12. doi:10.1007/s11920-016-0742-x.

Global Burden of Disease Collaborative Network. 2020. *Global Burden of Disease Study 2019 (GBD 2019) Disability Weights.* Seattle, United States of America: Institute for Health Metrics and Evaluation (IHME). doi:10.6069/1W19-VX76.

Hanna, Awad S. 2011. *Impact of Overtime on Electrical Labor Productivity:.* University of Wisconsin Madison.

Hanna, Awad S, Craig S Taylor, and Kenneth T Sullivan. 2005. "Impact of Extended Overtime on Construction Labor Productivity." *Journal of Construction Engineering and Management* 131 (6): 734-739. doi:10.1061/(ASCE)0733-9364(2005)131:6(734).

Jones, Anne, Berwyn Clayton, Naomi Pftizner, and Hugh Guthrie. 2017. *Perfect for a woman: Increasing the participation of women in electrical trades.* Melbourne: Victoria University. https://vuir.vu.edu.au/.

Karimi, Hossein, Timothy R.B. Taylor, Paul M Goodrum, and Cidambi Srinivasan. 2016. "Quantitative analysis of the impact of craft worker availability on construction project safety performance." *Construction Innovation* 16 (3): 307-322. doi:10.1108/CI-10-2015-0050.

LaMontagne, Anthony D, Allison Milner, Lauren Krnjacki, Marisa Schlichthorst, Anne Kavanagh, Kathryn Page, and Jane Pirkis. 2016. "Psychological job quality, mental health, and subjective wellbeing: a cross-sectional analysis of the baseline wave of the Australian Longitudinal Study on Male Health." *BMC Public Health* 16 (Suppl 3): 33-41. doi:10.1186/s12889-016-3701-x.

Lingard, Helen, Valerie Francis, and Michelle Turner. 2010. "It's about time: the impact of fluctating work hours on the work-life balance of project-based construction workers." Edited by C Egbu. *Procs 26th Annual ARCOM Conference.* Leeds, UK: Association of Researchers in Construction Management. 301-309.

Maheen, H, A D LaMontagne, and T King. 2020. *Suicide in the cosntruction industry: 2001 - 2018.* Mates in Construction.

Markey, Ray, Sasha Holley, Louise Thornthwaite, and Sharron O'Neill. 2015. *The Impact on Injured Workers of Changes to NSW Workers' Compensation: July 2012 – November 2015 (Report no.3 for Unions NSW).* Macquarie University.

Milner, Allison, Katrina Witt, H Maheen, and Anthony D LaMontagne. 2017. "Access to means of suicide, occupation and the risk of suicide: a national study over 12 years of coronial data." *BMC Psychiatry* 17: 1-7. doi:10.1186/s12888-017-1288-0.

Milner, Allison, Matthew J Spittal, Jane Pirkis, and Anthony D LaMontagne. 2013. "Suicide by occupation: systematic review and meta-analysis." *The British Journal of Psychiatry* 203 (6): 409-416. doi:10.1192/bjp.bp.113.128405.

Milner, Allison, Matthew J Spittal, Jane Pirkis, Jean-François Chastang, Isabelle Neidhammer, and Anthony D LaMontagne. 2017. "Low control and high demands at work as risk factors for suicide: an Australian national population-level case-control study." *Psychosomatic medicine* 79 (3): 358-364. doi:10.1097/PSY.0000000000000389.

New South Wales Treasury. 2016. "NSW Intergenerational Report 2016." https://www.treasury.nsw.gov.au/.

Office of Best Practice Regulation. 2021. *Best Practice Regulation Guidance Note: Value of statistical life.* Department of the Prime Minister and Cabinet. https://www.pmc.gov.au/.

Office of Best Practice Regulation. 2020. *Cost-benefit analysis guidance note.* Best Practice Regulation Compliance Reporting, Department of the Prime Minister and Cabinet. https://www.pmc.gov.au/.

Pencavel, John. 2014. *The Productivity of Working Hours.* Discussion Paper No. 8129, Germany: Institute for the Study of Labor (IZA), 2052-2076.

Quinlan, M. 2013. "Precarity and Workplace Well-Being: A General Review." In *Safety or Profit? International Studies in Governance change and the Work Environment*, by T Nichols and D Walters, 17 - 31. Baywood.

Roberts, Stephen E, Bogdan Jaremin, and Keith Lloyd. 2013. "High-risk occupations for suicide." *Psychological Medicine* 43 (6): 1231-1240. doi:10.1017/S0033291712002024.

Ross, Victoria, Rachmania Wardhani, and Kairi Kõlves. 2020. *The impact of workplace bullying on mental health and suicidality in Queensland construction industry apprentices.* Mates in Construction. https://mates.org.au/.

Safe Work Australia. 2020. "Australian Workers' Compensation Statistics 2017-18." https://www.safeworkaustralia.gov.au/.

Safe Work Australia. 2015b. "The Cost of Work-related Injur and Illness for Australian Employers, Workers and the Community: 2012-13." Canberra. https://www.safeworkaustralia.gov.au/.

Safe Work Australia. 2015c. "Work Health and Safety Perceptions: Construction Industry." https://www.safeworkaustralia.gov.au/.

Safe Work Australia. 2015a. "Work-related injuries and fatalities in construction, 2003 to 2013." https://www.safeworkaustralia.gov.au/.

Safe Work Australia. 2021. "Work-related injuries and fatalities in construction, Australia." Unpublished raw data.

Safe Work Australia. 2019. "Work-related traumatic injury fatalities Australia 2018." https://www.safeworkaustralia.gov.au/.

SafeWork NSW. 2017a. "Mentally healthy workplaces in NSW: a return-on-investment study." https://www.safework.nsw.gov.au/.

SafeWork NSW. 2017b. "Review of evidence of psychological risks for mental ill-health in the workplace." https://www.safework.nsw.gov.au/.

Services Australia. 2019. "Age Pensions: Who can get it." https://www.servicesaustralia.gov.au/.

Shewring, Fiona. 2009. *The Female 'Tradie': Challenging Employment Perceptions in Non-Tradtional Trades for Women.* Occasional Paper, Adelaide, Australia: National Centre for Vocational Education Research Ltd. https://www.ncver.edu.au/.

Taylor, Richard, Andrew Page, Stephen Morrell, Greg Carter, and James Harrison. 2004. "Socio-economic differentials in mental disorders and suicide attempts in Australia." *The British Journal of Psychiatry* (The British Journal of Psychiatry) 185 (6): 486-493. doi:10.1192/bjp.185.6.486.

VicHealth. 2019. "Evidence Check: Mental wellbeing risk & protective factors." https://www.vichealth.vic.gov.au/.

Windsor-Shellard, Ben, and David Gunnel. 2019. "Occupation-specific suicide risk in England: 2011–2015." *The British Journal of Psychiatry* 215 (4): 594-599. doi:10.1192/bjp.2019.69.

World Health Organization. 2006. "Preventing Suicide: A resource at work." https://www.who.int/en/.

BIS OXFORD ECONOMICS

Sydney
Level 6, 7 Macquarie Place
Sydney NSW 2000
Tel: +61 2 8458 4200

Global headquarters
Oxford Economics Ltd
Abbey House, 121 St Aldates
Oxford OX1 1HB, UK
Tel: +44 (0) 1865 268 900

London
4 Millbank, Westminster
London SW1P 3JA, UK
Tel: +44 (0)20 3910 8000

New York
5 Hanover Square (8th floor)
New York NY 10004, USA
Tel: +1 646 503 3050

Singapore:
6 Battery Road
38-05, Singapore 049909
Tel: +65 6850 0110

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Melbourne
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Email:
mailbox@oxfordeconomics.com

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