Centre for
**Construction Work Health and Safety Research**

# Work-ability: Exploring the interaction between bodily pain and mental health in manual, non-managerial construction workers

## FINAL REPORT

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# Part 1: Introduction

## 1.1 Background and problem

The World Health Organization emphasises that work is good for individual's physical and mental health (Burton, 2010). Work provides financial security for individuals and their families, a sense of identity and status (Kuhnert & Palmer, 1991), and access to social resources (De Witte, 1999). Yet, construction work is physically demanding, and incidences of physical injury and work disability are high. Construction workers suffer from physical health complaints including musculoskeletal disorders, cancers, asthma, contact dermatitis and noise-induced hearing loss (Peterson & Zwerling, 1998; Stocks et al., 2010). Compared with other industries, construction workers suffer from high levels of burnout, work-life conflict, and early retirement due to injury (Lingard & Francis, 2009). The high level of stress in construction jobs has been explained by the need to undertake highly demanding work (both physically and psychologically) in an organisational environment characterised by low levels of autonomy, control or support (Leung et al., 2008; Love et al., 2010). Construction workers also experience higher rates of mental distress than the general male population (Borsting Jacobsen et al., 2013, Bowers et al., 2018), and the construction industry continues to have one of the highest rates of suicide (Turner et al., 2017).

International research shows that construction workers' physical health and exposures to psychosocial risks interact to produce work disability and early retirement (Lund et al., 2001; Stattin and Järvholm, 2005). Even compared to other manual occupations, workers engaged in direct construction activity experience high levels of work incapacity (Arndt et al., 2005). For example, in Germany up to 63% of construction workers retire early due to permanent disability (Siebert et al., 2001).

Many countries, particularly members of the Organisation for Economic Cooperation and Development, face an aging population. As the population ages, the construction industry in many countries is facing a labour shortfall. For example, in the United States (US) the median age of construction workers has increased from 37.9 years in 2000 to 42.7 years in 2015 (US Bureau of Labor Statistics, 2016). The Bureau of Labor Statistics also estimates that between 2012 and 2022, the number of jobs for construction labourers in the US will rise by 25%, compared to an average of just 11% across all other job categories (US Bureau of Labor Statistics, 2013). Given these demographic trends, helping construction workers to maintain good health and the ability to stay in employment as they age should be a priority (Noone, 2013; Schwatka et al., 2012). Supporting the work ability of workers will contribute to a sustainable construction workforce which

is equipped to meet current and future work demands, as well as help workers to attain the positive benefits associated with work.

## 1.2 Research aim and objectives

While it is understood that workers of the Australian construction industry experience high levels of mental distress and physical injury, the interaction between these factors and their impact on work ability is not well understood. To address this limitation, this study aims to contribute to our understanding of work ability by exploring the association between musculoskeletal bodily pain and the impact this has on the mental health of construction workers. The objectives of the study are to:

1) Explore the association between musculoskeletal bodily pain and mental health.

2) Identify how the bodily pain-mental health interaction impacts on work ability.

3) Develop an integrated approach to occupational health and safety and health promotion to better understand work ability.

4) Using a social ecological framework, which recognizes that aspects of the physical and organisational work environment significantly shape workers' health (McLeroy et al., 1988; Ettner and Grzywacz, 2001), identify strategies at individual, environment and organisational levels which promote work ability and health.

The conceptual overview of the research is presented in Figure 1.1.

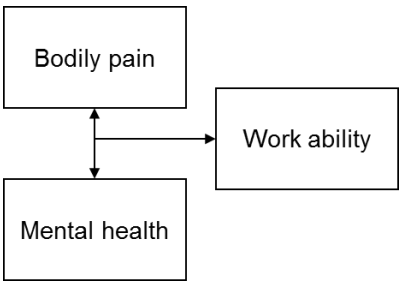


**Figure 1.1: Conceptual overview of the research**

## 1.3 Report Layout

The report is structured according to six key sections:

| | | |
|---|---|---|
| 1) | Introduction | Describes the background to the research and introduces the research problem. Provides an overview of the health and wellbeing of site-based construction workers. The research aim and objectives are presented, and the report structure is outlined. |
| 2) | Literature review | Describes the work ability concept, provides a definition of health, and outlines an ecological approach to worker health and wellbeing. |
| 3) | Research methods | Outlines the methods and procedure applied to the research. The sampling strategy of the target population is described, followed by the survey and interview instruments. Data analysis methods are also described. |
| 4) | Data analysis | A description of the sample is outlined, followed by the results of the survey data analysis and interview data analysis. |
| 5) | Discussion of results | The results of the research are considered in the context of the research objectives. The literature is utilised to guide interpretation of the findings. |
| 6) | Recommendations and conclusions | The contributions of the research are outlined and topics for further research are proposed. Limitations of the research are acknowledged. |

# Part 2: Work and Health

## 2.1 Work ability

Work ability means having the health and basic competence required for managing work tasks, assuming that the work tasks are reasonable and the work environment is acceptable (Tengland, 2011). Work ability is understood to be the product of a complex interaction between: (i) the physical and mental demands placed on people by their work; (ii) workers' general health including limitations to their ability to perform a job due to disease or ill-health; and (iii) the resources available to workers to meet the demands of their work (Ilmarinen, 2009).

Ilmarinen et al. (2005) present a model of work ability which considers the balance between an individual's resources and the demands of their work. Resources associated with the individual include health and functional capacity, occupational competence, and attitudes and motivations towards work. Demands relate to work and include working conditions, the organisation of work, the work community, and management. Work demands are associated with the physical, psychosocial and organisational contexts workers encounter. In recognition of the spill-over effect between work, family and community domains, the environment and societal surroundings are also incorporated in the model of work ability. Ilmarinen et al's (2005) model contends that for work ability to remain positive, the demands of work should not exceed the personal resources that a worker is capable of providing in an occupation.

## 2.2 Models of health in the workplace

Health is described as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organization, 1948, p.100). Workplaces have been identified as environments which can support work ability through health promotion and disease prevention (Anger et al., 2015; Kuoppala, et al., 2008; World Health Organization, 2008). Health promotion programs are interventions put in place by employers to improve the lifestyle choices and health of workers as a way of preventing chronic illness (Comcare, 2010). There is growing support for an integrated approach to 'occupational health safety and health protection' with 'health promotion and disease prevention' in the workplace, to prevent injury and advance health and wellbeing (Anger et al., 2015; Pronk, 2013; Sorenson et al., 2011). To progress the integrated approach to health, the National Institute for Occupational Safety and Health launched the Total Worker Health program in 2011 (Schill & Chosewood, 2013; Sorenson et al., 2011).

In recognition of the interaction between the worker and characteristics of work in shaping health outcomes, the ecological model for health promotion was developed to identify environmental constraints on behaviour and ways of understanding the causes of poor health (McLaren and Hawe, 2005). According to McLeroy et al. (1988, p.355), behaviour is determined by the following:

(1) intrapersonal factors: characteristics of the individual such as knowledge, attitudes, behaviour, self-concept and skills.

(2) interpersonal processes and primary groups: formal and informal social network and social support systems, including the family, work group, and friendship networks.

(3) institutional factors: social institutions with organisational characteristics, and formal (and informal) rules and regulations for operation.

(4) community factors: relationships among organisations, institutions, and informal networks within defined boundaries.

(5) public policy: local, state, and national laws and policies.

Mcleroy et al's (1988) ecological model for health promotion complements Ilmarinen et al's (2005) model of work ability. Both models recognise that health outcomes are dependent upon behaviour which is a product of the worker, their role, and their working environment. This research draws on the integrated approach to worker health by considering work ability in the context of the interaction between the physical health and mental health of construction workers and the conditions in which these occur.

## 2.3 Health and work ability of Australian construction workers

The male-dominated construction industry is the third largest industry in Australia, employing 9.4% (1.16 million) of the nation's workforce (Australian Bureau of Statistics, 2018). The construction industry workforce in Australia is relatively young compared to other industries. Forty-three percent of construction workers are aged between 15 and 34 compared to 38% across all industries. Thirty-five percent of the industry's workforce is over 45, compared to 39% for all industries. While the workforce is comparatively young when considered against other industries, consistent with broader demographic trends, the construction industry workforce is also ageing. The proportion of the industry's workforce aged 55 and over increased to 15.8% in February 2015, representing an increase of 7.2% between 1995 and 2015 (Department of Employment, 2016). Maintaining good health is essential for people to continue working, and this is of particular importance in an aging

workforce. Recent research found that construction workers' health does not reflect their chronological age (calendar age). Instead, their functional age (health status) is equivalent to an older age group, again confirming that these workers have poor health for their age (Lingard and Turner, 2017a). Many construction workers also suffer from permanent work inability and are forced to stop working due to health problems before they reach the pension age (Oude Hengel et al., 2012; Brenner & Ahern, 2000; Welch, 2009). Research confirms that poor health often precedes early retirement (de Wind et al., 2013; van den Berg et al., 2010).

The construction industry in Australia has poor levels of work health and safety. The Australian Work Health and Safety Strategy 2012-2022 identified the construction industry as a priority industry for work health and safety, due to the high number and rate of work-related injuries and illnesses (Safe Work Australia, 2012). A recent Safe Work Australia report revealed that in the 11-year period 2003 to 2013, there were 401 work-related fatalities in the construction industry, an average of 36 every year. The report also reveals that 156 construction workers are injured each day at work. Of the injuries requiring absence from work, the construction industry has four times the proportion of workers who do not return to work following their injuries than in all other industries (12% compared with 3%) (Safe Work Australia, 2015).

# Part 3: Research Methods

## 3.1 Participants

The target population of the research was site-based workers who undertake manual labour. To access this population, we partnered with Incolink, a joint enterprise of employer associations and industry unions in the commercial building, construction and civil allied industries in the Australian States of Victoria and Tasmania (https://www.incolink.org.au). Site-based workers who undertook a health check facilitated by Incolink were invited to participate in the research. All construction sites were located in Melbourne, Australia. Ethics approval was obtained from the RMIT University ethics committee.

## 3.2 Methods

A mixed-methods approach was used in the research, consisting of a survey and an interview. Details of each instrument are outlined below. Surveys were completed onsite during work time. Participants who completed a survey were invited to participate in a subsequent interview at a mutually convenient time.

## 3.3 Survey Instrument

A constraint of the survey instrument was its requirement to be brief. Our industry partner stipulated that the survey should take no more than 10 minutes to complete. While this limited the number of variables which could be measured, it did allow us to measure the variables central to the research questions.

The survey instrument consisted of the following sections:

1) Demographic information inclusive of year of birth, gender, work role, years worked in construction, work hours, travel time, and sleep adequacy.

2) Work ability was measured using three items from Ilmarinen et al. (2015) and three items from Tuomi et al. (1998). Example items are “How would you describe your capability to perform the tasks and activities necessary for your work?” and “Assume that your work ability at its best has a value of 10 points. How many points would you give your current work ability? (0 means that you are completely unable to work, 10 means work ability at its best)”.

3) Musculoskeletal pain was measured using three items from Nabe-Nielsen et al. (2014). An example item is “To what extent do you have pain in the upper part of your neck or back?” The response format was a 6-point Likert scale, where 1 = never and 6 = daily. An additional four items explored whether the musculoskeletal pain had originated from work-related tasks, and response options where yes or no.

4) Mental health was measured using the Depression, Anxiety and Stress 21-item scale (Lovibond and Lovibond, 2004). An example item is “I tended to over-react to situations”. The response format is a 4-point Likert scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Higher scores reflect a higher level of depression, anxiety and stress. Each factor has seven items that are summed to compute a score which can be considered alongside population norms which range in severity from normal, to mild, moderate, severe, and extremely severe (Lovibond and Lovibond, 2004, p.26).

5) The Warwick-Edinburgh Mental Well-being 14-item scale (Tennant et al., 2007) was used to produce an overall measure of positive mental wellbeing. An example item is “I’ve been feeling optimistic about the future”. Each of the 14 items in the scale are scored from 1 (none of the time) to 5 (all of the time) and a total scale score is calculated by summing the 14 individual item scores. The minimum score is 14 and the maximum is 70, where a higher score indicates better wellbeing.

## 3.4 Interview Instrument

To provide context around survey findings, interviews were conducted to enable a finer-grained understanding of the relationship between musculoskeletal pain and mental health. Questions were based on the themes of:

1) Experience, frequency and management of body pain.

2) Impacts of body pain on mental health.

Interviews were conducted over the phone, with the majority held outside of working hours. Interviews ranged from 10 minutes to 50 minutes in duration.

The interview data was subject to thematic analysis, undertaken according to the steps recommended by Braun and Clarke (2006).

# Part 4: Data Analysis

This section commences with analysis of the survey data and is followed by interview data analysis. For each of these datasets, the participant demographics are outlined, the data analysis method is briefly described, and the results are presented.

## 4.1 Survey participant demographics

Sixty-seven participants from the commercial sector of the construction industry completed the survey. All survey participants were male, which is reflective of the industry's male-dominated workforce. Participants' age ranged from 20 to 57 years, with the mean age of 35.9 years and median age of 34 years. Seventeen (25.4%) participants were in the 20-29 age category, 30 (44.8%) were in the 30-39 age category, 13 (19.4%) were in the 40-49 age category, and seven (10.4%) were in the 50 years and over age category. The average weekly working hours was 47.9, average travel time per week was 9 hours, and average hours of sleep per night was 6.7. When asked whether they got enough sleep to feel refreshed for the next day of work, 1.5% of participants indicated never, 16.4% indicated rarely, 44.8% indicated sometimes, 34.3% indicated often, and 3% indicated that they always got enough sleep. Participants' occupations are summarised in Table 4.1. In the "other" category, occupations consisted of fire sprinkler fitter, communications technician, plant operator, landscaper, leading hand, bricklayer, joinery installer, floor layer and concreter.

**Table 4.1: Occupation of survey participants**

| Occupation | Number | Percentage |
|---|---|---|
| Carpenter | 14 | 20.9 |
| Plumber | 11 | 16.5 |
| Labourer | 9 | 13.4 |
| Electrician | 8 | 11.9 |
| Site foreman / site manager | 6 | 9.0 |
| Plasterer | 3 | 4.5 |
| Scaffolder | 3 | 4.5 |
| Other | 13 | 19.3 |

## 4.2 Survey results

### Origin of pain

Participants were asked if the musculoskeletal pain they experienced had originated from work-related tasks, and results are outlined in Table 4.2. For each type of pain, more than half of the participants indicated that their pain had originated from the work environment.

**Table 4.2: Pain originating from work-related tasks**

| Type of pain | Yes (%) | No (%) |
|---|---|---|
| Pain in upper part of neck or back | 59.7 | 40.3 |
| Lower back pain | 67.2 | 32.8 |
| Pain in other joints (fingers, shoulders, hips, knees, ankles) | 59.7 | 40.3 |

### Ability to conduct work tasks

Participants were asked three questions about their ability to carry out their current work tasks on a scale of 1 (extremely poor) to 10 (extremely good), and mean scores are outlined in Table 4.3. Results are presented by age category and suggest that capacity decreases with age. The exception to this is the 50 and over age group who report a higher ability than the 40-49 age group to conduct work tasks. Participants were also asked to rate their current work ability compared with their lifetime best from 1 (unable to work) to 10 (work ability at its best). Participants perceived that their current levels of work ability are lower than those at their lifetime best. One-way analysis of variance (ANOVA) indicated there were no significant differences between age groups on each of the work ability indicators.

**Table 4.3: Ability to conduct work tasks according to age group**

| Question | 20-29 | 30-39 | 40-49 | 50 and over |
|---|---|---|---|---|
| State of health for the work you do. | 8.00 | 7.43 | 7.23 | 7.86 |
| Capability to perform the tasks and activities necessary for your work. | 8.65 | 8.33 | 7.92 | 8.57 |
| Ability to meet the physical demands of your work. | 8.76 | 8.30 | 7.92 | 8.29 |
| Current work ability compared with lifetime best. | 8.47 | 8.23 | 8.08 | 8.00 |

*Note: Rating is from 1 to 10 with higher scores indicating better capacity.*

Analysis was conducted to determine whether origin of pain (from work-related activities or not) had an impact on perceived ability to conduct work tasks. Independent-samples t-test found no significant differences between participants whose pain had originated from work and those whose pain was not work-related on the four work ability indicators.

### Physical and mental demands associated with work

Participants were asked to indicate their current work ability on a 5-point scale with respect to the physical demands and mental demands of their work. There was little difference between the mean scores for each age group as summarised in Table 4.4, and ANOVA confirmed there were no significant differences.

To explore the effect of age in more depth, the variables were analysed according to age category and response, and results are shown in Table 4.4. None of the participants indicated that their work ability was ‘very poor’ or ‘rather poor’ due to the physical demands or mental demands of their work. The proportion of participants’ rating their ability to undertake physical tasks as being “very good” steadily declined from the lowest to the oldest age group This dropped from 41.2% for the 20-29 age group and steadily decreased to 14.3% for the 50 and over age group. Likewise, participants in the 20-29 age group were most inclined to rate their ability to undertake mental demands as “very good” and this steadily deceased for the 30-39 and 40-49 age groups, and then increased for the 50 and over age group.

**Table 4.4: Work ability according to current physical and mental demands**

| Demand type | Mean | Response (%) | | | | |
|---|---|---|---|---|---|---|
| | | Very poor | Rather poor | Moderate | Rather good | Very good |
| Physical demands | | | | | | |
| 20-29 | 4.35 | - | - | 5.9 | 52.9 | 41.2 |
| 30-39 | 4.10 | - | - | 20.0 | 50.0 | 30.0 |
| 40-49 | 3.85 | - | - | 38.5 | 38.5 | 23.1 |
| 50 and over | 4.00 | - | - | 14.3 | 71.4 | 14.3 |
| Mental demands | | | | | | |
| 20-29 | 4.13 | - | - | 23.5 | 35.3 | 35.3 |
| 30-39 | 4.04 | - | - | 23.3 | 43.3 | 26.7 |
| 40-49 | 3.85 | - | - | 30.8 | 53.8 | 15.4 |
| 50 and over | 4.29 | - | - | - | 71.4 | 28.6 |

Analysis was conducted to determine whether origin of pain had an impact on physical and mental demands. Independent-samples t-test found no significant differences between participants whose pain had originated from work and those whose pain was not work-related for the two variables.

### Type and frequency of pain

Participants were asked about the type and frequency of pain they experience on a 5-point scale, with a higher score indicating increased pain frequency. There was little difference between the mean scores between age groups as shown in Table 4.5, and ANOVA confirmed there were no significant differences.

To explore the effect of age in more depth, the variables were analysed according to age category and response, and results are shown in Table 4.5. A proportion of all age groups experienced upper back and neck pain at least a couple of times a week, with a proportion of the 50 and over group experiencing daily pain. A proportion of all age groups experienced lower back pain daily apart from the 40-49 age group. A proportion of all age groups experienced pain in other joints (fingers, shoulders, hips, knees, ankles), with the 20-29 and 30-39 age groups experiencing pain daily.

**Table 4.5: Type, mean, and frequency of pain experienced by age group**

| Pain type | Mean | Response (%) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Never | Seldom | Once a month or less | Couple of times a month | Couple of times a week | Daily |
| Upper part of neck or back | | | | | | | |
| 20-29 | 3.31 | 11.8 | 11.8 | 23.5 | 29.4 | 17.6 | - |
| 30-39 | 3.50 | 10.0 | 16.7 | 20.0 | 20.0 | 33.3 | - |
| 40-49 | 3.00 | 23.1 | 7.7 | 23.1 | 38.5 | 7.7 | - |
| 50 and over | 3.43 | - | 28.6 | 28.6 | 28.6 | - | 14.3 |
| Lower back | | | | | | | |
| 20-29 | 3.63 | 5.9 | 17.6 | 23.5 | 23.5 | 5.9 | 17.6 |
| 30-39 | 3.93 | 10.0 | 10.0 | 10.0 | 26.7 | 26.7 | 13.3 |
| 40-49 | 3.31 | 23.1 | - | 38.5 | 23.1 | 15.4 | - |
| 50 and over | 3.57 | 42.9 | - | - | 28.6 | 14.3 | 14.3 |
| Other joints (fingers, shoulders, hips, knees, ankles) | | | | | | | |
| 20-29 | 3.56 | 17.6 | 11.8 | 17.6 | 11.8 | 17.6 | 17.6 |
| 30-39 | 3.47 | 20.0 | 16.7 | 10.0 | 20.0 | 16.7 | 16.7 |
| 40-49 | 3.46 | 15.4 | - | 46.2 | 15.4 | 23.1 | - |
| 50 and over | 4.00 | 14.3 | - | 14.3 | 28.6 | 42.9 | - |

### Mental health and wellbeing

The mean positive mental wellbeing score for the total sample was 51.3 (SD=7.1) which is slightly above the average score of 47.9 for Australian adults in full time employment (Australian Psychological Society, 2015). There was some variation according to age group, with wellbeing slightly reducing with age, but with a small increase evident in the 50 and over age group. This is in contrast with previous findings which indicate that wellbeing increases with age (Australian Psychological Society, 2015). ANOVA indicated no significant differences between age groups.

The mean Depression, Anxiety and Stress scores for the total sample were: depression=8, anxiety=6, and stress=11 which are all in the range considered normal (Lovibond and Lovibond, 2004). When broken down by age group, level of depression, anxiety, and stress were in the normal range for all age groups apart from participants in the 30-39 group who experienced a mild level of anxiety. ANOVA indicated no significant differences between groups.

According to Lovibond and Lovibond (2004) 'mild' means that the individual is above the population mean but likely still below the typical severity of someone seeking help (ie it does not mean a mild level of disorder).

Health and wellbeing results are summarised in Table 4.6.

**Table 4.6: Health and wellbeing mean score by age group**

| | Positive wellbeing | Depression | Anxiety | Stress |
|---|---|---|---|---|
| 20-29 | M=51.8<br>SD=5.7 | Normal<br>(7) | Normal<br>(6) | Normal<br>(12) |
| 30-39 | M=50.9<br>SD=8.1 | Normal<br>(9) | Mild<br>(8) | Normal<br>(12) |
| 40-49 | M=49.6<br>SD=6.3 | Normal<br>(7) | Normal<br>(5) | Normal<br>(10) |
| 50 and over | M=54.6<br>SD=6.4 | Normal<br>(7) | Normal<br>(6) | Normal<br>(9) |

To explore the experience of mental health and pain in more detail, independent-samples t-tests were used to explore differences between participants whose pain had originated from work-related activities and those who pain had not. Significant differences between the two groups are summarised in Table 4.7. Results suggest that:

- participants whose pain had originated from work and who had upper neck and back pain, lower back pain, and pain in other joints had a significantly higher level of depression severity.
- participants whose pain had originated from work and who had pain in other joints had a significantly higher level of anxiety severity.
- while there was a significant difference in stress between groups for lower back pain and pain in other joints, the level of severity did not differ as both were in the normal range.

- for pain in other joints there was a significant difference between groups for positive wellbeing, with group 1 having a lower score than group 2.

**Table 4.7: Mental health according to origin of pain**

| Mental health indictor | Upper neck and back pain | Lower back pain | Pain in other joints |
|---|---|---|---|
| Depression | Group 1: mean=10 (mild)<br>Group 2: mean=5 (normal)<br><br>t(57)=2.37, p=.021 | Group 1: mean=10 (mild)<br>Group 2: mean=4 (normal)<br><br>t(59)=2.40, p=.019 | Group 1: mean=11 (mild)<br>Group 2: mean=3 (normal)<br><br>t(58)=4.04,p=.000 |
| Anxiety | No significant difference between groups | No significant difference between groups | Group 1: mean=8 (mild)<br>Group 2: mean=3 (normal)<br><br>t(59)=2.95, p=.004 |
| Stress | No significant difference between groups | Group 1: mean=13 (normal)<br>Group 2: mean=7 (normal)<br><br>t(61)=2.96, p=.015 | Group 1: mean=13 (normal)<br>Group 2: mean=8 (normal)<br><br>t(60)=2.15, p=.035 |
| Positive wellbeing | No significant difference between groups | No significant difference between groups | Group 1: mean=49.5<br>Group 2: mean=53.7<br><br>t(60)=-2.31,p=.024 |

*Group 1= participants whose pain had originated from work-related activities.*
*Group 2 = participants whose pain had not originated from work-related activities.*

### Relationship between pain and mood

Participants were asked whether the back and joint pain they experienced affected their mood in a negative way. There was little difference between the mean scores for each age group as shown in Table 4.8, and ANOVA confirmed there were no significant differences.

To explore the effect of age in more depth, the variables were analysed according to age category and response, and results are shown in Table 4.8. Among the 20-29 year age group, 5.9% of participants indicated back and joint pain always had a negative effect on their mood. For the 30-39 year group, 6.7% indicated their mood was always affected, while 16.7% indicated their mood was very often affected by their experience of back and joint pain. Participants from the 40-49 and 50 and over year age groups were less likely to be impacted by back and joint pain.

**Table 4.8: Impact of back and joint pain on mood**

| Age category | Mean | Response (%) | | | | |
|---|---|---|---|---|---|---|
| | | Never | Rarely | Sometimes | Very often | Always |
| 20-29 | 2.38 | - | 70.6 | 17.6 | - | 5.9 |
| 30-39 | 2.97 | 6.7 | 20.0 | 50.0 | 16.7 | 6.7 |
| 40-49 | 2.46 | 15.4 | 23.1 | 61.5 | - | - |
| 50 and over | 2.43 | - | 57.1 | 42.9 | - | - |

To explore the relationship between the work ability indicators, wellbeing and mental health, a Pearson product-moment correlation coefficient matrix was computed. Significant results are outlined in Table 4.9. Analysis revealed a medium to strong positive relationship between the six work ability indicators with wellbeing, suggesting that work ability will be better when workers have a good level of positive wellbeing. In contrast, depression, anxiety, and stress had a negative relationship with four of the work ability indicators, suggesting that work ability is likely to decline when workers experience poor mental health.

**Table 4.9: Bivariate correlations between work ability and wellbeing measures**

| Work ability indicators | Wellbeing | Depression | Anxiety | Stress |
|---|---|---|---|---|
| State of health for the work you do. | .585** | -.531** | -.375** | -.323** |
| Capability to perform the tasks and activities necessary for your work. | .459** | ns | Ns | Ns |
| Ability to meet the physical demands of your work. | .386** | ns | Ns | Ns |
| Current work ability compared with lifetime best. | .443** | -.446** | -.252* | -.412** |
| Physical demands of current role. | .361** | -.302* | -.267* | -.286* |
| Mental demands of current role. | .506** | -.496** | -.344** | -.409** |

ns indicates the result is not significant.

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

## 4.3 Interview participant demographics

Of the 67 survey respondents, 26% (18) participated in an interview. The interview participants' ages ranged from 25 to 57 years, with an average age of 37 years. Four (22.24%) participants were in the 20-29 age category, seven (38.9%) were in the 30-39 age category, four (22.2%) were in the 40-49 age category, and three (16.7%) were in the 50 years and over age category. Average weekly working hours ranged from 36 to 60 hours with an average of 48 hours. Average travel time per week was 11 hours, and average hours of sleep per night was 6.7. Participants' occupations are summarised in Table 4.10.

**Table 4.10: Occupation of interview participants**

| Occupation | Number | Percentage |
|---|---|---|
| Carpenter | 3 | 16.7 |
| Plumber | 3 | 16.7 |
| Electrician | 2 | 11.1 |
| Communications technician | 2 | 11.1 |
| Bricklayer | 2 | 11.1 |
| Scaffolder | 2 | 11.1 |
| Site foreman | 1 | 5.6 |
| Other: labourer, fire sprinkler fitter, floor layer | 3 | 16.7 |

## 4.4 Interview results

Key themes emerging from the interview data consisted of:

(i) Expectation of pain
(ii) Managing pain
(iii) Impact of pain on mental health
(iv) Pressure to work with pain
(v) Work ability and planning for the future
(vi) The stigma of mental health

Each theme is described in the following section and incorporates participants' comments to provide context around their experience.

### Expectation of pain

All participants experienced physical pain arising from their job, irrespective of age or occupation. The frequency of pain ranged from occasional aches to ongoing shoulder, back, and joint pain. There was an understanding by participants that pain was a normal part of manual work. For example, one participant commented: *"Can't blame the [construction] industry. It's just the way it is"* (roof plumber, 45 years old). Another participant commented*:" I think it wears you out over time unfortunately. Most blokes in the trade end up like that [in pain]"* (electrician, 48 years old). One participant reflected on the experience of his father who had worked as a roof plumber: *"My father actually did this for 47 years. And he's nearly 70 now and he can hardly walk. He can't use his hands anymore. What else can't he do? He gets gout bad and he's got arthritis in his fingers. So, that's what I've got to look forward to"* (roof plumber, 45 years old).

There was also acknowledgement by many participants that their pain would increase in accordance with the natural aging process. One participant commented: "*I tend to get sore more often with age. But it's not just the back, it's the knees*" (electrician, 48 years old). Another participant explained: *"[pain occurs] not so much 'cause the work has changed or anything like that, but just age, and just always working the body*" (cable technician, 50 years old).

It was common that the severity of pain increased in cold weather. During the winter months, the majority of participants who worked outside experienced a heightened sense of pain. For example, one participant commented: "*Getting to my age the cold hurts my knees and that. After so many years of going up and down roofs I get sore knees…I feel like I'm getting a little bit of arthritis in my fingers and that's because I've been doing it for so long, but when it's colder they get sore*" (roof plumber, 45 years old). Another participant explained that he experienced more pain in the cold weather: "*When it's cold it's worse. Warm it's not so bad*" (roof plumber, 30 years old).

### Managing pain

The majority of participants did not actively manage their pain while at work. For example, one participant commented: "*you grin and bear it as best you can*" (electrician, 48 years old). Similarly, another commented: "*Well I don't really do anything about it at work. You really can't. You've sort of just got to get through*" (plumber, 25 years old). Of those few participants who did actively manage their pain while at work, various strategies were utilised including stretching, wearing comfortable work boots, lifting with the knees, and getting help to lift heavy items. In instances

where the pain was particularly severe, participants used pain or anti-inflammatory medication. For example, a participant explained: "*I've got a bulged disc in my lower back and sometimes it gives me a little bit of grief. A couple of weeks ago it flared up, but I handle it with anti-inflammatories*" (carpenter, 50 years old). However, there was some hesitation in using medication on a regular basis due to the side and after effects. For example, one participant commented: "*I realised how bad it is for your stomach so, you know, unless I'm real sort of desperate, I mean, I've always got some in my bag*" (fire sprinkler fitter, 50 years old). Similarly, a participant commented: *"I'm still not a big fan of using those [pain medication], because I do find that after I stop using them I tend to be in more pain than what I was in before I started taking them*" (carpenter, 29 years old).

Most participants undertook some form of treatment outside of working hours to manage their pain. This included remedial massage, treatment by an osteopath, physiotherapist, chiropractor, or myotherapist. Some participants only sought treatment when they experienced severe pain, while others were proactive and sought treatment on a regular basis. This may have been weekly, fortnightly, or monthly. For example, one participant commented: "*I have some issues with my neck, shoulders, shoulder blades and kind of ribcage area. So, all my muscles kind of lock up every month. So, I get treatment usually once a month and if it's really bad, I'll probably get two or three treatments in the one-week period*" (technician, 43 years old). In addition to clinical treatment, participants exercised to build strength and stay fit, as well as resting and getting sufficient sleep. For example, a participant commented: "*I'll do different stretches, just to take the strain or a pulling off the knees and off the lower back. And then just weight exercises, and different crunches, trying to sort of strengthen the stomach or the core muscles. Trying to strengthen the leg muscles a bit*" (cable technician, 50 years old).

**Impact of pain on mental health**

Six (33%) participants indicated that pain did not impact at all on their mental health while at work. The other 12 participants experienced varying degrees of stress and worry as a result of their pain. One participant commented: "*You get a bit moody, you just can't move. You're always bending down, picking up pipes and you're always climbing up and down ladders and twist so if your back's sore or if anything's sore, it just, you know, it makes the job that much harder*" (fire sprinkler fitter, 50 years old). Another participant commented: "*I guess if you've got a sore shoulder you're not the happiest person. Yeah, it definitely affects you a little bit. You get a bit more moodier*" (labourer, 32 years old). Similarly, another participant commented: "*I've never thought about the mental side of it. I mean obviously it gets me – I'm frustrated a bit if I've got pain somewhere and worried. It's frustration and anxiety with it I guess*" (cable technician, 50 years old).

As a result of their pain, some participants explained that they changed the way they interacted with others onsite. For example, a participant explained how he reacted to others when he was experiencing pain: "*I've been told by certain people I'm very short with them and impatient*" (technician, 43 years old). This appeared to be a common reaction to the stress and worry associated with body pain.

Aside from dealing with the strain of current body pain, prevention of future pain and injury were at the forefront of participants minds. There was a fear that if the body broke down, there would be no job. It is possible that the pressure to maintain a body which was fit for work created a degree of stress. For example, a participant commented: "*Usually I try and get a massage once a week just to loosen up a bit. Maybe say once every two weeks, probably. That's more just to prevent anything from happening. If [the] body starts to fail then you don't have a job*" (labourer, 32 years old). Another participant commented: "*It's more you just don't want to hurt your back long term, you know, you'd probably start thinking about what if I done it really bad, and what options do I have?*" (carpenter, 32 years old).

**Pressure to work with pain**

There was a feeling of resignation by some participants that they would have to work through severe pain as they had no other options of employment. For example, a participant expected to stay in his role in the foreseeable future even though he experienced back pain. He commented: "*Well, I'm not really trained in much else. I left school at 17 to become an electrician*" (electrician, 48 years old). Another participant commented that his older colleagues worked through extreme pain: *"you just look around the site and you see the older generation and their knees are shot and there's a bloke I'm working with, he's trying to get his knees replaced*" (fire sprinkler fitter, 50 years old). Similarly another participant explained: "*I know a couple of blokes I work with at the moment – one of them is 50, he's decrepit, he's got a very bad back and he's almost miserable because he has no other trade or skill behind him, so he has to work, but he's got constant pain so mentally he's worn out*" (floor layer, 33 years old).

There was acknowledgement that some workers experienced pressure and strain to keep working through their pain as they required the income. For example, a participant who was a floor layer got paid according to the amount of flooring he laid, and therefore felt pressured to keep working through his pain. He commented: "*it's more financial strain – if you're sore or if you've injured yourself, 'cause we're on a metre rate, you don't get paid anything. So, you won't get paid*" (floor layer, 33 years old). Another participant who experienced ongoing neck and shoulder pain commented on the pressure he experienced to maintain an income: "*I've got three young kids and*

*a wife and a mortgage to pay and if I don't work, basically, in this day and age, you can't do what you're trying to do, then there's not too many other options*" (technician, 43 years old).

**Work ability and planning for the future**

Many participants believed that they would be unable to stay in their role in the long term due to injury and associated pain. With this is mind, many were actively planning to move into a less physically demanding role. For example, this participant commented: *"I've sort of spent probably the last four or five years starting to work towards that, where I'm not going to be on the tools so much, because of the pain that my body is in, the pain that I come across sometimes*" (carpenter, 29 years). Some participants were planning on moving off the "tools" into a supervisory role. For example, a participant explained: *"If I can get into a role where you're not on the tools anymore and it's sort of just managing the jobs or something like that, I think I could stay [working]. But, if it didn't turn out like that, I don't reckon the body would be able to handle it. You know, I don't want to retire when I'm 65 and can't stand up straight*" (bricklayer, 31 years old). A participant who worked as a roof plumber was moving into a foreman's role so that he could continue to work into the future. He commented: "*So, that will save my body over the years, you know, the next 20 years*" (45 years old).

**The stigma of mental health**

Participants raised the stigma, awkwardness and an inability to talk about mental health in the construction industry. For example, one participant commented: "*It's a very male dominated – we're all covered in tattoos and we're just blokes and I think, if a conversation – if it took place, that person would, it'd be awkward*" (floor layer, 33 years old). Participants also believed that workers were mostly unlikely to seek help with mental health issues. For example, a participant commented: "*mental health, I would have to say it's going to be one of the biggest issues that is going to come up and is an issue now, in the industry. I think it's a huge problem. I think the amount of people that are not going to get help is going to be huge*" (technician, 43 years old). The association between pain and mental health, and its link to suicide was raised by one participant: "*a friend passed away, committed suicide from it not long ago the other day actually. He had back pain and then he just struggled to get back to work I guess"* (scaffolder, 28 years old). This participant went on to explain that feelings of poor self-worth may have contributed to his colleague's death: *" when someone comes up with an injury they go away and get it fixed or whatever and, or have time off and then they're told to come back to work for maybe one or two days a week and they're too sore to be working but they have to be at work and they're not doing anything at work so they feel useless at work….. and then it makes them a little bit more*

*depressed I guess*". The participant also spoke of isolation and lack of social connectivity experienced by his colleague: "*You know when you start to get in the slump of not doing, being active. I feel that, and then not seeing your friends every day as well at work*".

# Part 5: Discussion of Results

**Interaction between pain and mental health**

Previous research has established that construction workers suffer from a high prevalence of pain and injury (eg. Peterson & Zwerling, 1998; Stocks et al., 2010) and mental distress (eg. Borsting Jacobsen et al., 2013, Bowers et al., 2018). Our research extends the literature by establishing a relationship between pain and mental health. Construction work is physically damaging for workers and leads to mental health complications. Our findings reveal that workers whose pain had originated from work-related activities had a higher severity of depression, anxiety, and stress, and a lower level of positive wellbeing. Together with this, participants who rated their ability to undertake the physical and mental demands of their work as “very good” steadily declined with age.

The construction workers in our sample experienced body pain and injury originating from work-related activities and accepted this as an inevitable consequence of their work. This finding is consistent with previous research indicating that workers have a sense of disempowerment and resignation of poor health caused by the physical demands of their work (Kolmet et al., 2006; Lingard and Turner, 2017b; Langdon and Sawang, 2018). Feelings of disempowerment and resignation are associated with a perceived lack of autonomy and control, of which are known to be damaging psychosocial factors in the workplace (World Health Organization and Calouste Gulbenkian Foundation, 2014). Our findings help to bridge the understanding between pain, psychosocial factors, and mental health for construction workers. Our results suggest that the association between pain and mental health is complex. While pain experienced from undertaking work tasks is associated with poor mental health, the interview data suggested other important factors are at play arising from pain and lack of autonomy and control. Various pressures and stressors arise from experienced pain and anticipated pain and include:

- Staying fit for work and retaining work ability in the face of expected pain and injury.
- A decline in physical ability alongside the natural wear and tear associated with the aging process.
- Being able to work and maintain an income.
- Preventing injury by exercising and strengthening the body.
- Seeking regular clinical treatment to manage pain and injury.
- Working through constant pain into the foreseeable future.

- Feeling trapped in a job that causes painful and distress because of no perceived alternative employment options.
- Moving into a less physically demanding job to maintain employment and an income.

### Relationship between work tasks, pain, mental health, and work ability

The conceptual model in Figure 5.1 illustrates the relationship between the physical demands of the job and pain on mental health and work ability. The experience and anticipation of pain is shaped by the physical demands of the job, perceived low levels of work control and autonomy, and the aging process. Pain can lead directly to diminished mental health and impact on work ability. Pain can also trigger various pressures and stressors for the worker which may lead to diminished mental health. The pressures and stressors present as psychological demands for workers. Stress is a process in which environmental events or forces, referred to as stressors, threaten an individual's well-being, and the individual responds to this threat (Baum et al., 1981). Baum et al. (1981) contend that response to stressors is determined by the degree to which an event is perceived as threatening, harmful, or challenging. Demands that challenge or surpass an individual's ability to adapt to the stressor are likely to result in an interpretation of the demands as being stressful. The appraisal of each stressor will depend on a range of factors including attitudes towards the stressor, prior experience with it, and knowledge of its consequences. In the model, work ability is influenced by a worker's capacity to adapt to the physical and mental demands associated with work activities.

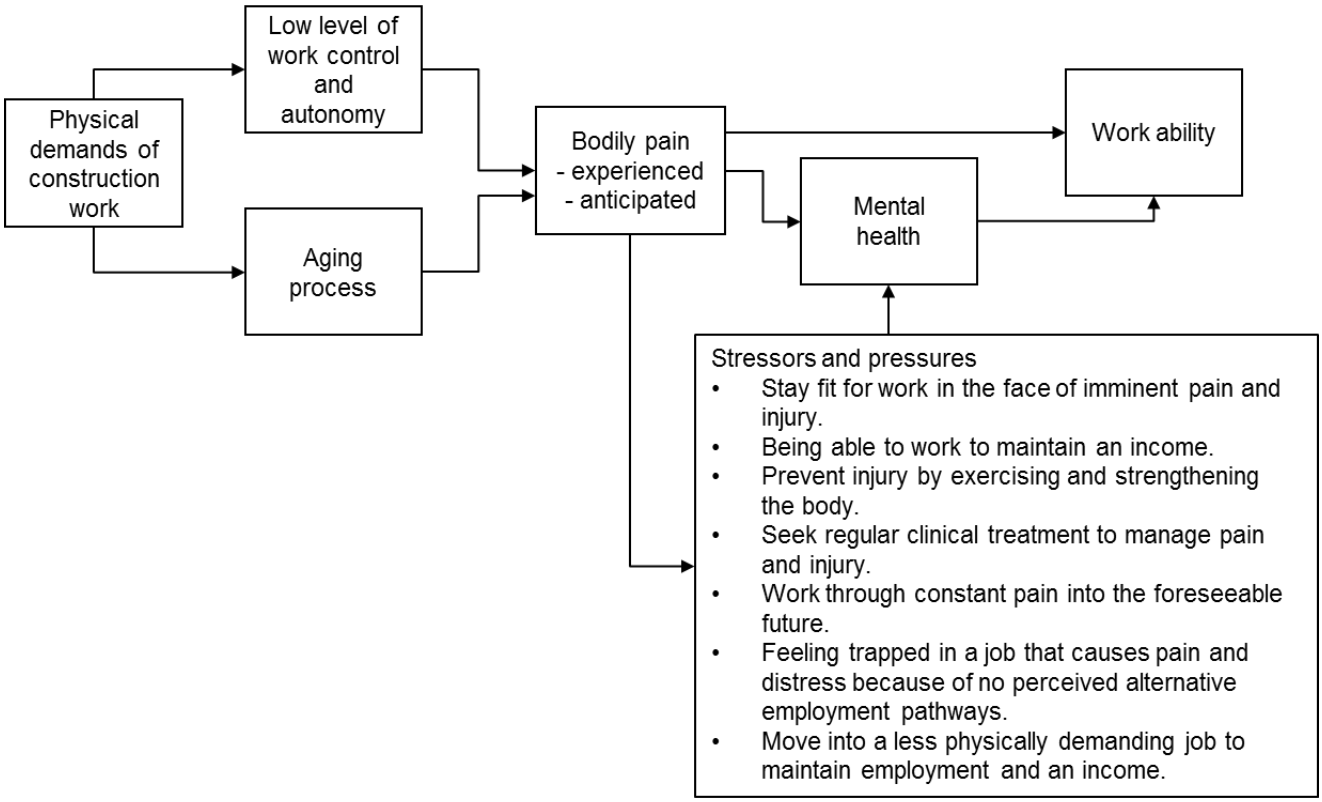


**Figure 5.1: Relationship between physical job demands and pain on mental health and work ability**

### Mental health in construction

Given the high prevalence of pain and injury in the construction workforce and the resultant pain-mental health relationship, it is probable that many workers unknowingly experience poor mental health and wellbeing. This is illustrated by a participant who was asked how his physical pain affected his mental health: "*I've never thought about the mental side of it. I mean obviously it gets me"*. Due to a lack of awareness of the link between physical pain and mental health, construction workers may not be cognisant of their own diminished mental health, nor may they seek the support and treatment they require. This is further exacerbated by the macho work culture evident in the construction industry (Leung et al., 2015) that stigmatises mental health and precludes workers from opening up and seeking help. In situations where workers do seek help for mental health issues, treatment may occur in isolation from the physical aspects of the job and thereby not address the critical factor in workers' experiences.

Our results reiterate the calls for an integrated approach to worker health (McLeroy et al., 1988; Sorenson et al., 2011). Occupational health and safety programs focus on preventing physical

injury, while health promotion programs have sought to advance health and wellbeing. It is evident from the complex relationship between the physical demands of the job and mental health, as shown in Figure 5.1, that a holistic (systems) approach is needed to identify and manage harmful aspects of the work environment which interact and potentially shape the physical and mental health of workers.

# Part 6: Conclusions and Recommendations

This study aimed to contribute to our understanding of work ability by exploring the association between musculoskeletal bodily pain and the impact this has on the mental health of construction workers. Our research shows that physically damaging work can lead to diminished mental health for workers. By drawing on Ilmarinen et al's (2005) model of work ability to position the findings, work demands associated with manual construction work produce pain, injury, and poor mental health which constitute a decrease in the worker's resources, thereby leading to a decrease in work ability. Our results suggest this effect generally increases with age. Our findings contribute to the literature by establishing a clear relationship between physical pain and mental health which is illustrated in a conceptual model outlining the relationship between work tasks, pain, mental health, and work ability.

Our work contributes to the literature on construction worker mental health (eg. Borsting Jacobsen et al., 2013, Bowers et al., 2018) and suggests that work programs designed to promote mental health should not be considered in isolation of the broader work environment. Instead, workers' health should be considered holistically and interventions should focus on the work characteristics which lead to physical and mental strain. Raising awareness with workers on the impact on physical pain on mental health is important. Resources relating to pain management may assist workers to be proactive in preventing and managing pain, but it is also important to fully appreciate the links between pain and mental health in manual, non-managerial workers. Decreasing the injury and pain associated with physical work is a serious challenge for the construction industry. Musculoskeletal disorders (MSDs) are the most common work-related conditions in Australia and are associated with hazardous manual tasks and poorly designed work. Risk factors associated with work-related MSDs include repetition, force required, awkward posture, vibration, and contact stress (Wang et al., 2015), all of which are physical risk factors inherent in manual, non-managerial work tasks.

The study has several limitations. The survey sample was relatively small and future research should explore the effects of pain and mental health using a larger sample in order to address issues associated with statistical margins of error and effect size. Furthermore, the study was based in Australia and therefore results cannot be generalised more broadly. Finally, the research was cross-sectional, thereby precluding the generation of casual inferences. To address this limitation, longitudinal research is recommended which would enable a deeper understanding of

the effect of age and occupation on work ability. Despite these limitations, our research offers critical new insights into the health and wellbeing of construction workers that can inform future work ability research, as well as organisational health promotion and injury prevention programs.

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