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Synthesis of Empirical Evidence on the Association of Work Characteristics with Health Outcomes in Ireland

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Contents

EXECUTIVE SUMMARY

This synthesis of evidence on the association of workplace, job and worker characteristics with negative health outcomes in Ireland distinguishes between health outcomes directly attributed to work, and those not attributed to work. It collates data from four studies examining the following worker health outcomes: mental distress, poor health, illness, musculoskeletal disorders (MSD), stress, anxiety and depression (SAD), job stress, and work-related injury and worker injury. A limitation of this report is that the data is from cross-sectional surveys (the reader is directed to the source reports for a fuller discussion of their limitations), so it is not possible to attribute causation to the patterns that are reported. Therefore, caution is needed not to imply causation when interpreting the results.

WORKPLACE CHARACTERISTICS

Working in certain **sectors** is associated with increased risk of negative health outcomes attributed to work. Working in Agriculture/ Forestry/ Fishing is associated with increased risk of illness and injury. Other sectors associated with increased risk of injury are Transport, Health, Accommodation and Food, while working in Education is associated with increased risk of Stress, Anxiety and Depression (SAD). Health, public administration, and manufacturing are associated with higher levels of job stress. None of the reports modelled the association between Musculoskeletal Disorders (MSD) and workplace characteristics such as risk exposure, sector or size.

Workplace characteristics are also associated with negative worker health outcomes. Workers are more likely to report mental distress or poor health when engaged in **physically demanding work** or when exposed to **psycho-social risk**. Exposure to **chemical/ biological risk** is associated with increased risk of mental distress. Workers are more likely to report job stress if exposed to **emotional demands**, **time pressure**, **bullying/ harassment** and **effort-reward imbalance** (the extent to which workers feel they are underpaid). Finally, workers in **larger organisations** (10 or more employees), in the **private sector** or **'joint/ other sectors'** (which include NGOs and semi-states) are more likely to report poor health.

JOB CHARACTERISTICS

Certain job characteristics are associated with negative health outcomes, such as hours worked, pattern of hours, occupation and nature of contracts. Working **longer hours** is associated with increased risk of work-related SAD, job stress injury. Workers who work longer hours are also associated with mental distress and poor health. Working **shorter hours** is associated with work-related illness and workers engaged in **variable hours** are more likely to report poor health. Working **shifts or nights** is associated with increased work-related injury and work-related illness, and working shifts is further associated with MSD.

The **self-employed** have an increased risk of work-related MSD, and workers on **fixed-term contracts** are more likely to report mental distress. Workers with **lower educational levels** and **trainees** are more likely to report poor health. Finally, certain **occupations** are associated with increased risk of negative health outcomes. Skilled manual, associated professional/ technical, elementary and sales are associated with work-related injury; associated professional/ technical and personal service are associated with illness, and personal service, skilled manual and operatives with MSD. Those working in crafts and related trades have a higher injury risk, and technical/ associate professionals, professionals and managers have higher risk of job stress.

WORKER CHARACTERISTICS

A number of worker characteristics are associated with increased risk of negative health outcomes. **Women** have an increased risk of work-related illness and SAD, and are more likely to report mental distress and poor health. **Men** have an increased risk of work-related injury and MSD. **Older workers** have an increased risk of work-related SAD and illness, and older workers are more likely to report mental distress and poor health. **Younger workers** have an increased risk of work-related injury.

Workers with a **shorter tenure** have a higher risk of work-related injury and illness. Those with a **longer tenure** are more likely to report poor health. **Irish** workers have a higher risk of work-related illness, while **migrant** workers have a higher risk of mental distress and poor health.

DETERMINANTS OF WORKER HEALTH OUTCOMES

Health Outcomes of Workers	Worker Health Outcomes Attributed to Work		
	Increased risk of incidence is associated with the following characteristics:		
	workplace	job	worker
Work-related injury	▪ Construction, transport, health, accommodation & food, agriculture	▪ Longer hours ▪ Shifts or nights ▪ Skilled manual, assoc. professional/ technical, elementary & sales	▪ Men ▪ Younger workers ▪ Shorter tenure
SAD (Stress, Anxiety & Depression)	▪ Education sector	▪ Shift workers ▪ Longer (51 + per week) and variable hours	▪ Women ▪ Older workers
MSD (Musculoskeletal Disorders)	▪ Risk exposure, sector and size not modelled	▪ Self-employed ▪ Shift workers ▪ Personal service, skilled manual, operatives	▪ Men
Illness	▪ Agriculture/ forestry/ fishing	▪ Shorter hours ▪ Shift and night workers ▪ Assoc. professional/ technical and professional service	▪ Women ▪ Older ▪ Irish nationals ▪ Shorter tenure
Job stress	▪ Emotional demands ▪ Time pressure ▪ Bullying/ harassment ▪ Effort-reward imbalance ▪ Health, public administration, manufacturing	▪ Longer hours (over 40+), very short hours ▪ Technical/ associate professionals, professionals, managers	

Health Outcomes of Workers	Worker Health Outcomes Not Attributed to Work		
	Increased risk of incidence is associated with the following characteristics:		
	workplace	job	worker
Mental distress	▪ Psycho-social risk ▪ Chemical/ biological risk ▪ Physical demand	▪ Trainees ▪ Manual ▪ Longer hours ▪ Fixed-term contracts	▪ Women ▪ Older ▪ Migrant
Poor health	▪ Psycho-social risk ▪ Physical demand ▪ Physical risk ▪ Private or 'joint/other' sector ▪ Larger organisations	▪ Trainees ▪ Variable hours ▪ Longer hours ▪ Lower educational levels	▪ Women ▪ Older ▪ Migrant ▪ Longer tenure
Worker injury	▪ Physical risk ▪ Chemical/ biological risk ▪ Physical demand risk ▪ Psycho-social risk ▪ Joint/other sector ▪ Agriculture/ forestry/ fishing	▪ Trainee and non-contracted employee ▪ Crafts & related trades ▪ Longer hours, 51+ per week	▪ Men ▪ Younger workers ▪ Shorter tenure

IMPLICATIONS IDENTIFIED FOR POLICY

Eight studies were examined for policy recommendations on improving workers' health outcomes. Four studies provided recommendations: Russell et al., 2015; Russell et al. 2016, Russell et al. 2018 and Watson et al. 2015. Key policy recommendations in these reports are summarised below; full citations from the reports are provided in Section 4.

1. **Monitoring and Prevention**: There is a need for ongoing monitoring of worker health risks and for preventative actions, particularly among high-risk groups. Where higher risk has been identified, there is value in conducting audits of hazards (Russell et al. 2016).

2. **Awareness and Capacity**: It is important to raise awareness of workplace injury and illness risks and build capacity in risk assessment and prevention (Russell et al. 2016; Russell et al. 2015).

3. **Investment in Inspection**: Inspection has a positive effect but there may be a basis for increased investment in inspection (Russell et al. 2016; Russell et al. 2015). Cuts in public expenditure during the fiscal crisis led to a decline in inspection rates; in 2010 Ireland had just under 19,000 employees per inspector, one of the lowest ratios when compared internationally (Russell et al. 2015).

4. **Work Design and Work-Related Illness**: It is important to adjust work organisation to minimise risk (in particular, long hours, shift work and night work) and to adjust work conditions and demands for an ageing workforce (Russell et al. 2016; Russell et al, 2018).

5. **Targeting of Policy and Actions**: It is advised to target health and safety policies towards sectors with greatest risk of injury or illness, to focus on psycho-social hazards as much as physical risk, and to take account of social patterning to exposure to workplace risks. Those jobs exposed to the highest risks are often those that are also disadvantaged in other respects, such as pay, job security and working conditions (Watson et al. 2015; Russell et al. 2018).

6. **Engagement with the Self-Employed**: It is important to increase HSA engagement with the self-employed to increase reporting of injury and improve protection. The severe under-reporting of injuries among the self-employed to the HSA suggests a need to enhance efforts to engage with this group, especially in the light of the high number of fatalities among self-employed workers (Russell et al. 2015).

7. **Recession and Growth**: Policymakers need to be aware and respond to the need to address possible long-term impacts of the recession on workers' health; equally some

workplace risks and illness increase with employment growth in the absence of countervailing initiatives (Russell et al. 2016; Russell et al. 2015).

8. **Future Changes in Employment**: Policy needs to take into account future changes in employment, especially in relation to ageing, feminisation of the workforce and patterns of employment. Women have significantly lower odds of injury but are more likely to experience work-related illness. A long-term decline in working hours is likely to have a positive impact on work-related health and injury, but emerging trends on variable work hours and zero-hour contracts may undermine this (Russell et al. 2015). The changing nature of work, including a shift to services and an expanding health sector, will mean that illnesses relating to job stress will account for a higher proportion of work-related illnesses in the future (Russell et al. 2018).

AREAS FOR FUTURE RESEARCH

Eight studies were examined for recommendations on areas for future research on workers' health outcomes. Four studies provided recommendations: Russell et al., 2015; Russell et al. 2016, Russell et al. 2018 and Watson et al. 2015. Key recommendations in these reports are summarised below; full citations from the reports are provided in Section 4.

1. **Impact on Employment:** The extent to which workplace injury or work-related illness accounts for people leaving employment (Watson et al. 2015).

2. **Risk Reduction:** The aspects of work and the workplace that might reduce exposure to risk and ameliorate the impact of risks on outcomes (e.g. employer representation, work pressure, autonomy, control over the pace and quantity of work, consultation and supportiveness) (Watson et al. 2015).

3. **Identifying Factors:** To explore the occupational, organisational and behavioural factors that lie behind group patterns in work-related injuries and illnesses in Ireland (i.e. patterns by gender, age and nationality) (Russell et al. 2015).

4. **Changes in Exposure to Risk:** The factors behind the increase in exposure to physical risk in Ireland between 2005 to 2010, e.g. whether it was a response to economic pressures or some other change in the workplace, and the reduction in exposure to psycho-social risk over the same period, e.g. whether it was due to health and safety initiatives, or other workplace initiatives/ policies (Watson et al. 2015).

5. **Continuing Employment:** Ways in which workers who become ill or injured can be enabled to continue in employment (Russell et al. 2015).

6. **Work Absences:** Additional analysis of the duration of work absences due to work-related illness and injury is warranted. This would be best estimated by including information on the sick leave entitlements of individual workers in relevant questionnaires (Russell et al. 2015).

7. I**mpact of Inspection:** Research that disaggregates the effect of inspection rates within industries may also highlight the greater or lesser effectiveness of this intervention in various areas (Russell et al. 2015).

8. **Comparative Analysis:** Comparative analysis of Ireland relative to European countries on: (a) the prevalence of risks, risks by groups, and the consequences of risks, (b) the effectiveness of strategies for reducing the prevalence and consequences of workplace injury and illness (Russell et al. 2015), (c) job stress (Russell et al. 2018).

9. **Data Sources:** To capture more data, e.g. by amending survey questions and conducting longitudinal research: (a) include a prompt to respondents to include mental health problems in future QNHS work-related injury and illness modules, (b) undertake a dedicated working conditions survey in Ireland of sufficient size to allow detailed sub-group analysis, such as a new round of the National Employee Survey, (c) collect and analyse longitudinal data (e.g. TILDA data) to examine work-related illness and job stress, and the long-term effects of work environment and conditions (Russell et al. 2016), and (d) capture more disaggregated data on recipients of Illness Benefit (Russell et al. 2018).

1. INTRODUCTION

The purpose of this report is to summarise findings from previous statistical analysis of the association of work, workplace and worker characteristics with health outcomes of workers in Ireland.

Reports were identified through a search of peer-reviewed databases (e.g. PubMed) and grey literature (Google) using search strings such as "work* AND health". Only reports that undertook statistical modelling of the health outcomes were included.[1] That is, reports that examined the prevalence of a health outcome while using statistical technique to control for other factors that might influence the prevalence of the outcome. The type of statistical analysis undertaken in the reports is multivariate analysis using logistic regression models. Logistic regression is used to examine the relationship between a binary outcome variable (either have a health problem or don't have it) and a number of explanatory variables (e.g. risk exposure, working longer hours, age).

The report provides findings in relation to eight health outcomes, namely work-related injury, SAD (stress, anxiety, depression), MSD (musculoskeletal disorders), work-related illness, job stress, mental distress, poor health and worker injury. Definitions of the outcomes and the actual survey questions on which they are based are provided in Appendices A and B. For more detailed discussion of the concepts which are measured, the reader should refer to the source reports from which the findings are taken.

This report includes outcomes from self-reported cross-sectional surveys. It includes outcomes which the respondent attributed to work and outcomes which the respondent did not attribute to work. The advantage of including the latter is that it includes instances which may be related to work but which a respondent may not attribute to work, while the disadvantage is that it might include instances that are not work-related. Chapter 2 presents the findings for outcomes that are attributed as work-related, and Chapter 3 presents the findings for outcomes that are not attributed to work.

For each outcome indicator, a table summarising findings is presented. The figures presented are either odds ratio or marginal effects derived from the results of logistic regressions. An odds ratio is the odds that an outcome will occur given a particular characteristic, compared to the odds of the outcome occurring compared to a reference group within that characteristic (e.g. the odds of a worker in construction experiencing a work-related injury compared to a worker in services). An odds ratio greater than 1 indicates that the characteristic increases the likelihood of the outcome

[1] Publications that were consulted but not included in analysis were *Summary of Workplace Injury, Illness and Fatality Statistics, 2014-2015* (HSA); Watson et al. (2016), *Social Risk and Social Class Patterns in Poverty and Quality of Life in Ireland: An Analysis of the CSO Survey on Income and Living Conditions, 2004-2013*, Dublin: ESRI; Van Lente, et al. (2012), Measuring Population Mental Health and Social Well-being, *International Journal of Public Health*, Apr;57(2):421-30; O'Connell et al. (2009), *The Changing Workplace: A Survey of Employees' Views and Experiences*, Dublin: ESRI.

relative to the reference group; a ratio of 1 indicates no difference; and a ratio of 0 to 1 indicates that the characteristic reduces the likelihood of the outcome relative to the reference group. Marginal effects show the adjusted percentage of workers in each group or the percentage of workers in each group that we would expect to report a health outcome if they were similar in terms of the other characteristics of jobs and workers in the models (e.g. expected percentage of trainees to report mental distress). This report provides results where the significance level is 5% or less, i.e. the chance that the result occurred by chance is less than 5%.

An important limitation of this report is that the data is from cross-sectional surveys (the reader is directed to the source reports for a fuller discussion of their limitations), so it is not possible to attribute causation to the patterns that are reported. Therefore, caution is needed not to imply causation when interpreting the results. Chapter 4 provides a thematic summary of the implications for policy and research as identified in the studies reviewed.

In preparing this report, the authors followed the Irish Government Economic and Evaluation Service (IGEES) quality assurance process, seeking feedback on:

- the analysis format (structure)
- clarity (quality of writing)
- accuracy (reliability of data)
- robustness (methodological rigour), and
- consistency (between evidence and conclusions).

The report was circulated for review to the following:

- Internal/ Departmental
  - Line management – Research Services and Policy Unit
  - Other divisions/ sections – Health and Wellbeing Programme
- External
  - Institute of Public Health in Ireland

2. WORKER HEALTH OUTCOMES ATTRIBUTED TO WORK

This section presents evidence from studies where worker health outcomes are attributed to work. The health outcomes considered here are work-related injury, SAD, MSD and work-related illness. Levels of risk are presented in relation to workplace, job and worker characteristics.

WORK-RELATED INJURY

Workers in construction, transport, health, accommodation and food, and agriculture have highest risk of work-related injury. Job characteristics associated with this are working longer hours, night or shift work, and working in skilled manual, associated professional/ technical and elementary and sales occupations. Men, younger workers and those with shorter job tenure are at highest risk.

STRESS, ANXIETY AND DEPRESSION (SAD)

Workers in the education sector have highest risk of SAD. It is also higher for shift workers and those working longer and variable hours. Women and older workers have higher rates of SAD.

MUSCULOSKELETAL DISORDERS (MSD)

There are no indications of workplace characteristics associated with MSD. Rates of MSD are higher among the self-employed, shift workers, personal service and skilled manual workers and operatives. Men have highest rates of MSD.

WORK-RELATED ILLNESS

Illness is highest in the agriculture/ forestry/ fishing sector. It is also associated with those working shorter hours, shift and night workers, and associated professional/ technical and personal service workers. Rates of illness are highest among women, older workers, Irish nationals and those with shorter job tenure.

2.1 Work-Related Injury

A little over **35,000** workers report experiencing a work-related injury in 2012, a rate of **18.9 per 1,000** workers.[1] For work-related injuries resulting in 4 or more days absence, the figure is 17,786 or a rate of 9.6 per 1,000.*

Statistical analysis shows that **after controlling for a large number of factors**[2] **workers are more likely to experience work-related injury**[3] according to the following workplace, job and worker characteristics:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure ▪ Not modelled. Sector ▪ More likely in **construction** (2.2 times); **transport** (1.8 times); **health**, **accommodation and food**, **agriculture** (1.5 times for each of the three sectors) compared to services ▪ Private versus public sector is not modelled. Size ▪ Not modelled.	▪ Self-employed are no more or less likely to have a work-related injury than employees[4] ▪ More likely if work **longer hours** (compared to 30 hours per week an injury is 1.5 times more likely if work 30-39 hours, 1.6+ times if more than 40 hours) ▪ More likely if work **shifts** (1.9 times) or **nights** (1.3 times) ▪ Compared to "professionals" more likely for "**skilled manual**" (1.7 times), "**associate professional/ technical workers**" (1.5 times), "**Elementary**" and "**Sales**" occupations (both 1.4 times)[5]	▪ More likely for **men** (23% higher odds of injury) ▪ More likely for **younger workers** ▪ No difference for migrants (once occupation is taken into account) ▪ **Short job tenure** (less than one year)

Source: derived from Russell et al. (2015) *Trends and Patterns in Occupational Health and Safety in Ireland*. Dublin: ESRI.

2.2 SAD (Stress, Anxiety, Depression)

In the period 2002-2013, the rate of SAD among workers averaged at 4 per 1,000.[6**]

In 2012, Ireland had one of the highest proportion of workers experiencing SAD in the EU15, at 31%.

Statistical analysis shows that **after controlling for a large number of factors**[7] **workers are more likely to experience SAD**[8] according to the following workplace, job and worker characteristics:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure ▪ Not modelled. Sector ▪ More likely in **education** relative to the reference of 'other services' (1.5 times) ▪ Private versus public sector is not modelled. Size ▪ Not modelled.	▪ More likely for **shift workers** (1.3 times) ▪ No difference for night workers ▪ More likely for **longer hours (31+)** (3 times for 51+ hours) ▪ More likely for **variable hours** (2 times) ▪ No difference by occupation.[8^]	▪ More likely for **women** (1.5 times) ▪ More likely for **older workers** (2.7 times at 45-54 and 2.5 times at 35-44) ▪ No difference for migrants ▪ Less likely for those with **shorter tenure** (<6 months and 1-2 years); adjusting for exposure, higher risk of SAD for those with less than 12 months' tenure.[8*]

Source: derived from Russell et al. (2016) *Work-related Musculoskeletal Disorders and Stress, Anxiety and Depression in Ireland: Evidence from the QNHS 2002-2013*. Dublin: ESRI.

2.3 MSD (Musculoskeletal Disorders)

In 2013, the MSD rate among workers was **14 per 1,000**.[9**]

In 2012, 49% of work-related health problems were MSD compared to an average of 56% across the EU15.

Statistical analysis shows that **after controlling for a large number of factors**[10] **workers are more likely to experience MSD**[11] according to the following workplace, job and worker characteristics:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure ▪ Not modelled. Sector Higher risk compared to the 'all other services' category in **agriculture** (2+ times), **construction** (2+ times), **health** (1.6 times), **industry** (1.4), **transport** (1.4), **retail** (1.3) – does not control for occupation Size ▪ Not modelled.	▪ More likely for **self-employed** (1.5 times) ▪ No difference per hours worked when occupation is taken into account ▪ More likely for **shift workers** (1.9 times) ▪ More likely for **personal service** and then **skilled manual** and **operatives/ element** relative to the reference of professional/ managerial (1.8 times and 1.5 times)	▪ More likely for **men** (1.4 times) ▪ No difference by age when occupation is taken into account ▪ No difference for migrants ▪ Less likely with **shorter tenure**

Source: derived from Russell et al. (2016) *Work-related Musculoskeletal Disorders and Stress, Anxiety and Depression in Ireland: Evidence from the QNHS 2002-2013*. Dublin: ESRI.

2.4 Work-related Illness

In 2014 the rate of illness in workers was 25.7 per 1,000.*

In 2012 Ireland had one of the lowest percentage of workers to report a work-related illness across the EU15.

Statistical analysis shows that **after controlling for a large number of factors**[12] **workers are more likely to experience work-related illness**[13] according to the following workplace, job and worker characteristics:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure ▪ Not modelled Sector ▪ Highest in **agriculture/ forestry/ fishing** Size ▪ Not modelled	▪ No more or less likely for **self-employed** ▪ Those working **short hours** have the highest risk per hours worked (5-7.8%) ▪ More likely for **shift and night workers** (1.3 times) ▪ More likely for **associate professional/ technical group** and **personal service workers**	▪ More likely for **women** (2008-12) but in 2013-2014 the rate of illness among women fell to 27 per 1,000, almost level with men at 25 per 1,000 ▪ Increases with age, peaking for those aged **45-54** and falling for the over-55s ▪ Higher for **Irish nationals** than migrants ▪ More likely for those with **shorter job tenure** (6 months – 1 year)

Source: derived from Russell et al. (2015). *Trends and Patterns in Occupational Health and Safety in Ireland*. Dublin: ESRI.

2.5 Job Stress

A little over **17% of Irish employees reported job stress in 2015**, an increase from **8% in 2010**. [14***]

Statistical analysis shows that **after controlling for a number of factors**[15] **workers are more likely to experience job stress** according to the following workplace, job and worker characteristics:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure ▪ 21.3 times more likely for those with highest **emotional demands** ▪ 10.4 times more likely for those under greatest **time pressure** ▪ 8 times more likely for those with highest exposure to **bullying/ harassment** ▪ 4.3 times more likely for those with strongest sense of '**effort-reward imbalance**'[16] Sector ▪ Highest for **health**, followed by **public administration** and **manufacturing** Size ▪ Not modelled	▪ Not modelled for employers ▪ More likely for **longer hours** (40+) and **very short hours** ▪ No difference for shift or weekend work ▪ Highest for **technical/ associate professionals**, followed by **professionals** and **managers**	▪ No difference for gender ▪ No difference for age ▪ Nationality not modelled ▪ Tenure not modelled

Source: derived from Russell et al. (2018) *Job Stress and Working Conditions: Ireland in Comparative Perspective*. Dublin: ESRI.

3. WORKER HEALTH OUTCOMES NOT ATTRIBUTED TO WORK

This section presents evidence from studies where worker health outcomes are not attributed to work. The health outcomes considered here are mental distress, poor health and worker injury. Levels of risk are presented in relation to workplace, job and worker characteristics.

MENTAL DISTRESS

Workplace characteristics associated with higher rates of mental distress are exposure to psycho-social risk, chemical/biological risk and physical demand risk. Trainees, manual workers, those working longer hours and on fixed-term contracts are at higher risk of mental distress. Rates are also higher for women, older workers and migrants.

POOR HEALTH

Workplace characteristics associated with high rates of poor health are exposure to psycho-social risk, physical demand risk, physical risk, working in the private or 'joint/other' sector, and working in larger organisations. Trainees, those working variable or longer hours, and those with lower educational levels have higher rates of poor health. Rates are also higher for women, older and migrant workers, and those with longer job tenure.

WORKER INJURY

Workers with exposure to physical risk, chemical/ biological risk, physical demand and psycho-social risk have higher rates of injury. Worker injury is also associated with trainee and non-contracted employees, those in facts and related trades, and those working longer hours (51+ per week). Men, younger workers and those with shorter job tenure have highest rates of injury.

3.1 Mental Distress

The average score for workers **was 2.6 on the WHO-5 item scale** in 2010 (0 indicates low and 10 indicates high distress).[1] ***

Ireland has **the lowest score** among 32 European countries.[2]

Statistical analysis shows that **after controlling for a large number of factors**[3] **higher mental distress among workers is associated with**[4] the following workplace, job and worker characteristics[5]:

Workplace characteristics	Job characteristics	Worker characteristics
Risk exposure[6] ▪ Higher as move from low to medium to high exposure to **psycho-social risks** (3.4 v 4.0 v 4.6) ▪ Higher as move from low to medium to high exposure to **chemical/biological risk** (3.4 v 3.6 v 3.7) ▪ Higher as move from low to medium to high exposure to **physical demand** (3.4 v 3.6 v 3.9) ▪ Differences not statistically significant by level of exposure to **physical risk** in Europe but negative association in Ireland[7*] Sector ▪ No difference between public and private sectors ▪ No difference between the reference of "retail/wholesale" and most sectors, slightly lower for 'other services' and health and social work (3.5 v 3.3)	▪ No information reported on rates among the employed vs the self-employed ▪ Higher among **trainees** than fixed-term and permanent employees (4.0 v 3.6 v 3.4) ▪ Higher for **manual workers**[8] (25-26% v senior officials and managers 20%) ▪ Higher for **longer hours** worked (3.7 v 3.6 v 3.4)	▪ Higher among **women** (3.7 v 3.3) ▪ Higher for **older** workers in Europe (3.7 if 45-54 v 3.5 if 35-44 v 3.3 if 25-34) but lower in Ireland[9*] ▪ Slightly higher for **migrants** than native workers (3.6 v 3.4) ▪ No difference by levels of education in Europe but lower in Ireland[10*]

Source: derived from Watson et al. (2015) *Workplace Risks and Worker Outcomes in Ireland from a Comparative Perspective: An Analysis of the European Working Conditions Survey, 2005 and 2010*. Dublin: ESRI.

3.2 Poor Health

In Ireland, **7% of the workforce** reported 'poor' health in 2010.[11***]

The rate of self-reported health problems was **lowest** across 34 European countries.[12]

Statistical analysis shows that **after controlling for a large number of factors**[13] **higher self-rated 'poor' health by workers is associated** with [14] the following workplace, job and worker characteristics[15]:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure [16] ▪ More likely as move from low to medium to high exposure to **psycho-social** risk (21% v 34% v 50%) ▪ Differences not statistically significant by exposure to **chemical/ biological** risk ▪ More likely as move from low to medium to high exposure to **physical demand** (19% v 29% v 41%) ▪ More likely as move from low to medium to high exposure to **physical risk** (21% v 23% v 26%) Sector ▪ More likely if **joint/**other[17] and **private** sector than public (24% & 22% v 20%) Size ▪ More likely for **workers in larger organisations** (23% if 10-49 workers v 19% if 5-9 workers)	▪ No difference in likelihood between employees and the self-employed ▪ More likely if working **variable hours** or **longer hours** (25% if variable v 23% if 41+ hours or 51+ per week v 20% if 31-40 hours per week) ▪ More likely among workers with **lower educational levels** (23% if lower 2nd level or less v 20% if higher 3rd level) ▪ More likely for **trainees** (35% v 21% if permanent employees)	▪ More likely for **women** (24% v 20%) ▪ Much higher for **older workers** (39% if 55+ v 10% if 15-24 years of age) ▪ Higher for **migrants** than native workers (24% v 21%) ▪ More likely for workers with **longer tenure** (23% if 11+ years v 20% if 2-3 or 4-5 years)

Source: derived from Watson et al. (2015) *Workplace Risks and Worker Outcomes in Ireland from a Comparative Perspective: An Analysis of the European Working Conditions Survey, 2005 and 2010*. Dublin: ESRI.

3.3 Worker injury

The overall risk of injury for Irish workers, according to the European Working Conditions Survey was 6% in 2010.[18***]
Ireland has the sixth lowest rate of injury among the EU34.[19]
Statistical analysis shows that **after controlling for a large number of factors**[20] **workers have a risk of injury**[21] according to the following workplace, job and worker characteristics:

Workplace characteristics	Job characteristics	Worker characteristics
Risk Exposure[22] ▪ More likely as move from low to medium to high exposure to **physical risk** (8% v 10% v 14%) ▪ More likely as move from low to medium to high exposure **to chemical/ biological risk** (8% v 12% v 17%) ▪ More likely as move from low to medium to high exposure to **physical demand risk** (7% v 12% v 19%) ▪ More likely as move from low to medium to high exposure to **psycho-social risk** (8% v 19% v 35%) Sector ▪ Higher for **'joint/other'**[23] relative to the reference of private sector (11% v 9%) ▪ Higher for **agriculture/ forestry/ fishing** relative to the reference of retail/wholesale (13% v 8%) Size ▪ Lower for **variable/ unknown** relative to the reference of 10-49 employees (6& v 10%)	▪ Higher for **trainee employee** than permanent employee (16% v 9%) ▪ Higher for **non-contracted employee** in Europe (11% v 9%) but no relationship in Ireland[24] ▪ Higher for **crafts & related trades** relative to the reference of senior officials & managers (13% v 9%) ▪ Higher for **longer hours, 51+ per week** relative to the reference of 31-40 per week (11% v 9%)	▪ Higher for **men** (10% v 7%) ▪ Higher for **younger workers, 15-24** relative to the reference of 34-44 (11% v 9%) ▪ Lower for **shorter tenure, one year or less**, relative to the reference of 11+ years (7% v 9%)

Source: derived from Watson et al. (2015) *Workplace Risks and Worker Outcomes in Ireland from a Comparative Perspective: An Analysis of the European Working Conditions Survey, 2005 and 2010*. Dublin: ESRI.

4. THEMATIC SUMMARY OF IMPLICATIONS FOR POLICY

Seven studies were examined for policy recommendations on improving workers' health outcomes, and recommendation for future research. Three studies provided recommendations: Russell et al., 2015; Russell et al. 2016 and Watson et al. 2015.

IMPLICATIONS FOR POLICY

1. **Monitoring and Prevention**: There is a need for ongoing monitoring of worker health risks and for preventative actions.

   - '…there is a need for an ongoing focus on monitoring and preventing MSD in the workplace…. [this report] identifies high-risk groups that were suspected but not previously verified, such as the self-employed, where additional efforts for prevention may now be focused' (Russell et al., 2016, p. 45).
   - 'For sectors and occupations where a higher risk of SAD has been identified, there is value in conducting audits of stress-related hazards, such as work demands, organisation of work hours (long hours shift work, night work), control over work, work-family spillover or conflict, and work relationships (support/ conflict). The identification of such risks could support changes in the work organisation, thus reducing these risks' (Russell et al., 2016, p. 46).

2. **Awareness and Capacity**: It is important to raise awareness of workplace injury and illness risks and build capacity in risk assessment and prevention.

   - 'Education on the injury and illness risks associated with variable work hours, shift hours and working nights may… be important in informing employers and employees about the benefits and costs of different working arrangements. This is also true for the self-employed' (Russell et al., 2015, p. 90).

   - 'Supporting employers by raising awareness and improving risk assessment of psychosocial risks is important. Unlike more traditional risks, employers find psychosocial risks more difficult to manage... Additional promotion of [HSA] guidance, perhaps targeted at the higher risk groups identified, should be considered… Given the ongoing changes in employment and emerging psychosocial risks identified at the European level, there is scope to renew and expand (after evaluation of the previous rounds) the Work Positive project. Other forms of communication and information (workshops, lists of occupational psychologists on work-related stress) for employers and employees could be explored to promote awareness, appropriate risk assessment, prevention and management of psychosocial risks' (Russell et al., 2016, pp. 46-48).

- '…investment in the training and mentoring of new recruits is a useful strategy to reduce the risk of workplace injuries' (Russell et al., 2015, p. 90).

3. **Investment in Inspection**: Inspection has a positive effect but there may be a basis for increased investment in inspection.

   - 'The analysis found that higher rates of inspection per 1,000 workers were associated with reduced levels of MSD, suggesting that the inspection regime may be an important element in prevention, though the measure may also capture more general activity by the regulatory authority (the Health and Safety Authority), which may be associated with inspection activity' (Russell et al., 2016, p. 46).

   - 'The figures on inspection rates suggest that enforcement of health and safety legislation in this manner can improve the injury and illness rates in Irish workplaces. However the number of inspections per 1,000 workers is now in decline. Moreover, when ratio of the numbers of workers to the number of inspectors is compared across countries, Ireland has one of the worst ratios, with just under 19,000 employees per inspector. Only Belgium and the Netherlands report a higher ratio but a greater population density might mitigate the negative impact in these countries. The overall level of State support for enforcement and prevention of occupational injury and ill-health has also fallen, as a consequence of very significant cuts in public expenditure across all policy areas to deal with the fiscal crisis. While this study has not undertaken an analysis of the costs and benefits of different interventions, the findings suggest that further falls in the inspection rate could have negative consequences for workers' (Russell et al., 2015, p. 91).

4. **Work Design and Work-Related Illness**: It is important to adjust work organisation to minimise risk (in particular long hours, shift work and night work) and to adjust work conditions and demands for an ageing workforce.

   - 'Long hours of work are strongly associated with SAD, which suggests that action to minimise very long working hours should be taken' (Russell et al., 2016, p. 46).

   - 'The link between work patterns such as shift work and night work for MSD and long hours and shift work for SAD highlights the role of work organisation in preventing work-related illness' (Russell et al., 2016, p. 48).

   - 'Hours of work also need to be considered in addressing workplace stress… Current legislation prohibits average work weeks in excess of 48 hours. However, stress reactions appear to accelerate before this threshold' (Russell et al, 2018, p. xiv).

- ‘The ageing of the workforce… means that efforts to minimise the risks of MSD and to accommodate workers with such conditions are becoming increasingly important… Adjusting working conditions and demands to reflect the capacity of an ageing workforce is likely to be crucial’ (Russell et al., 2016, p. 45).

5. **Targeting of Policy and Actions**: It is advised to target health and safety policies towards sectors with greatest risk of injury or illness, to focus on psycho-social hazards as much as physical risk, and to take account of social patterning to exposure to workplace risks.

- ‘The sectors where risk was highest were agriculture, forestry and fishing, mining and quarrying and manufacturing. This points to a continuing need to target health and safety policies towards these sectors and occupations’ (Watson et al., 2015, p. 88).

- ‘The association between negative outcomes and psycho-social risks is particularly striking… This indicates the need to take this form of workplace risk as seriously as the physical hazards that have been the more traditional focus of health and safety policies’ (Watson et al., 2015, p. 88).

- ‘…the most urgent need for action is in addressing psychosocial risks such as bullying, harassment and violence, and high levels of emotional demands… Formal policies and organisational culture are both important in addressing these risks’ (Russell et al. 2018, p. xiv).

- ‘…creating a supportive organisational environment and culture is a potential antidote to the effect of job stress in jobs where employees face high emotional demands’ (Russell et al. 2018, p. xv).

- ‘The results indicated that there is a significant social patterning to exposure to workplace risks. Those jobs exposed to the highest risks are often those that are also disadvantaged in other respects, such as pay, job security and working conditions…’ (Watson et al., 2015, p. 88).

6. **Engagement with the Self-Employed**: It is important to increase HSA engagement with the self-employed to increase reporting of injury and improve protection.

- ‘The severe under-reporting of injuries among the self-employed to the HSA suggests a need to enhance efforts to engage with this group, especially in the light of the high number of fatalities among self-employed workers. Action to increase the reporting of self-employed workers and to improve protection of this group could include measures to increase the coverage of the self-employed in the social insurance system including benefits related to work-related illness and injury...’ (Russell et al., 2015, p. 91).

7. **Recession and Growth**: Policymakers need to be aware and respond to the need to address possible long-term impacts of the recession on workers' health but also that some workplace risks and illness increase with employment growth in the absence of countervailing initiatives/ policies.

- 'Research in other areas of the labour market has identified the 'scarring' effects of recession. For example, it has been found that the effects of unemployment in the early career can have long-term consequences for occupational attainment, while the effects of unemployment on psychological wellbeing have been found to persist up to 20 years later (Bell and Blanchflower, 2011, Clarke et al. 2001). This means that the impact of the recession may be felt in the longer term. In the case of occupational injury and ill-health it may be that the stresses of insecurity will influence longer-term mental health. Moreover, the effects of serious injury, whether they occur during time of boom or bust, may have long-term economic and health consequences for those affected' (Russell et al., 2015, p. 91).

- 'The pro-cyclical relationship between employment growth and work-related MSD and SAD means that without a countervailing effort from employers, employees and the State, the rates of both these illnesses will increase with the economic recovery' (Russell et al., 2016, p. 48).

8. **Future Changes in Employment**: Policy needs to take into account future changes in employment, especially in relation to ageing, feminisation of the workforce and patterns of employment.

- 'The trends in the composition of the workforce outlined in Chapter 1 also have implications for the future. The Irish workforce is predicted to age significantly over the next decades (CSO, 2013). In the light of the evidence presented here, this trend is likely to have a positive influence on the injury rate but is likely to increase the rate of work-related illness' (Russell et al., 2015, p. 92).

- 'The growing feminisation of the workforce is also likely to have implications for the future. Women are found to have significantly lower odds of injury than men controlling for a wide range of other job and personal characteristics. However, the period since 2008 has seen the emergence of a gender difference in work-related illness whereby women were more likely to experience such illness holding a range of other factors constant. Should this trend continue, greater female employment may lead to an increase in the illness rate' (Russell et al., 2015, p. 92).

- 'The long-term decline in working hours is likely to have a positive impact on work-related health and injury, but emerging trends on variable work hours and zero hours contracts may undermine these positive changes' (Russell et al., 2015, p. 92).

- The changing nature of work, including the long-term shift to services and the continuing expansion of the Health and Care sectors, alongside the rise in professional and managerial occupations, means that illnesses related to job stress are likely to account for an increasing proportion of work-related illnesses in the future' (Russell et al. 2018, p. xv).

IMPLICATIONS FOR FUTURE RESEARCH

1. **Impact on employment.** The extent to which workplace injury or work-related illness accounts for people leaving employment.

   'Future research could supplement this analysis by drawing on surveys of the general population to investigate the extent to which workplace injury or work-related illness accounted for people leaving employment' (Watson et al., 2015, p. 86).

2. **Risk reduction.** The aspects of work and the workplace that might reduce exposure to risk and ameliorate the impact of risks on outcomes (e.g. employer representation, work pressure, autonomy, control over the pace and quantity of work, consultation and supportiveness).

- '…there are aspects of the work and of the workplace that might be expected to ameliorate the impact of risks on outcomes for workers or even to reduce exposure to risk… These include an examination of the impact of employee representation on both exposure to risk and, given a certain level of exposure, on outcomes for workers. Other aspects of the workplace that may mediate the impact of risk on outcomes include work pressure (time pressure, overall pressure, and cognitive demand), autonomy, control over the pacing or quantity of work, consultation and the supportiveness of the supervisor and work colleagues' (Watson et al., 2015, p. 87).

3. **Identifying factors.** Research to explore the occupational, organisational and behavioural factors that lie behind group patterns in work-related injuries and illnesses in Ireland (i.e. patterns by gender, age and nationality).

- 'In the case of all three personal characteristics examined, gender, age, and nationality, further research is warranted to explore the occupational, organisational and behavioural factors that may lie behind these group patterns. In the case of age differences longitudinal research which could identify occupational and sectoral mobility patterns among older workers would also contribute to knowledge of the mechanisms involved. This would also provide a solution to the 'healthy worker' bias whereby those who may have been most impacted by illness or injury have left the labour market. The Irish Longitudinal Study on Ageing (TILDA), a longitudinal study of older people in Ireland, provides data that may be suitable for this purpose' (Russell et al., 2015, pp. 92-93).

4. **Changes in exposure to risk**. The factors behind the increase in exposure to physical risk in Ireland between 2005 to 2010, e.g. whether it was a response to economic pressures or some other change in the workplace, and the reduction in exposure to psycho-social risk over the same period, e.g. whether it was due to health and safety initiatives, or other workplace initiatives/ policies?

- 'The increase in exposure to physical risk in Ireland between 2005 and 2010 is something that warrants further exploration. This does not appear to be due to changes in the composition of jobs or the workforce insofar as we were able to measure them in the present analysis. It would be important to understand whether this increase represents a response to the economic and other pressures associated with the recession or to some other change in workplace practices' (Watson et al., 2015, p. 88).

- 'One of the interesting findings here was the substantial drop in exposure to psycho-social risk between 2005 and 2010. This may have been linked to policy changes in areas outside the health and safety area, such as equality policies or work-life balance initiatives. Future work could fruitfully explore the extent to which there were health and safety initiatives or changes in the areas of equality policies or work-life balance initiatives that may have accounted for this drop in the risk of exposure to psycho-social risks' (Watson et al., 2015, p. 87).

5. **Continuing employment.** To investigate ways in which workers who become ill or injured can be enabled to continue in employment.

- 'The relationship between occupational injuries/ illness, disability and employment is also an issue that would benefit from further research… While not all disability affecting working age adults will be the result of workplace accidents or work-related illness, an important challenge in terms of the health and safety of the workforce is to investigate ways in which workers who do become ill or injured can be enabled to continue in employment.

  Comparative analysis on Ireland's position relative to other European countries could shed light on distribution of different risks and hazards in Ireland compared to elsewhere' (Russell et al., 2015, p. 93).

6. **Work absences.** Additional analysis of the duration of work absences due to work-related illness and injury.

- 'Additional analysis of the duration of absence in the case of illness and injury is also warranted, thought this would best estimated by including information on the sick leave entitlements of individual workers' (Russell et al., 2015, p. 93).

7. **Impact of inspection.**

- 'Further research that disaggregates the effect of inspection rates within industries may also highlight areas where intervention of this sort has been more or less effective' (Russell et al., 2015, p. 93).

8. **Comparative analysis.** Comparative analysis of Ireland relative to European countries on a) the prevalence of risks, risks by groups, and the consequences of risks, and b) the effectiveness of strategies for reducing the prevalence and consequences of workplace injury and illness.

- 'Comparative analysis on Ireland's position relative to other European countries could shed light on distribution of different risks and hazards in Ireland compared to elsewhere. It could also examine whether the groups at risk and the consequences of work-related injury and illness differ across countries. Policy learning (rather than policy transfer) from other countries can highlight effective strategies for reducing the incidence of work-place injury and illness and the burden these place on workers, employers and the wider society' (Russell et al., 2015, p. 93).

- '[In relation to job stress] more detailed comparisons could be made with other European countries using the EWCS, as the modelling in the current report is limited to the UK and Ireland' (Russell et al. 2018, p. xiii).

9. **Data sources.** To capture more data, e.g. by amending survey questions and conducting longitudinal research: (a) include a prompt to respondents to include mental health problems in future QNHS work-related injury and illness modules, (b) undertake a dedicated working conditions survey in Ireland of sufficient size to allow detailed sub-group analysis, such as a new round of the National Employee Survey, (c) collect and analyse longitudinal data (e.g. TILDA data) to examine work-related illness and the long-term effects of work environment and conditions, and (d) capture more disaggregated data on recipients of Illness Benefit.

- 'The way in which survey questions are worded can have a considerable effect on responses. Changes to the question working in the EU harmonised QNHS 2013 (relating to the year 2012), included a specific prompt for respondents to include mental health problems, whereas modules for other years mention only 'illness or disability'. This led to a jump in the number of cases of SAD reports. This suggests that there is an under-reporting of mental health problems in the regular injury and illness module. Consideration should be given to including a prompt to respondents to include mental health problems in future QNHS work-related injury and illness modules. This could be included as a separate question after the existing work-related illness questions so that trends over time based on the existing survey questions might also be continued' (Russell et al., 2016, p. 44).

- ‘More generally, the QNHS contains only broad indicators of the job type (occupation) and sector, and does not contain detailed information on the nature of tasks or exposure to occupational hazards, or, for example, details on shift work or night work patterns, how long workers have participated in such shifts or the exact shift rotation. Such factors have been found to be important in laboratory studies of shift and night work effects. Such detailed information on working conditions can only be collected in dedicated working conditions surveys. While the European Working Condition Survey collects data on some of these factors, the sample numbers (approximately 1,000 per country) limit examination within sub-groups and the survey does not include a specific question on work-related illness. A new round of the National Employee Survey, which was previously carried out in 2005 and 2009, could provide much needed evidence on these issues and their relationship to self-assessed health and work-related illness’ (Russell et al., 2016, p. 44).

- ‘The cross-sectional nature of the QNHS data means that it is not possible to say whether the relationships found between illness and sectors, work patterns and worker characteristics are causal. It also means that the findings are likely to be influenced by selection factors such as the ‘health worker effect’. Those with the most severe work-related illnesses will have left employment, others may have moved to less physically demanding work (leading to errors in the association between illness and the sector-occupation) or have reduced their hours of work (distorting the relationship with working time). The only solution to this shortcoming is to conduct longitudinal research, where the work histories of individuals are collected (whether prospectively through a cohort study or retrospectively) and can then be related to subsequent health outcomes. As successive waves of the Irish Longitudinal Study on Ageing (TILDA) survey are collected this will become a more useful source of data to examine work-related illness and the longer term effects of work environment and conditions’ (Russell et al., 2016, p. 45).

- ‘…the link between job stress and long-term health consequences could be explored using longitudinal data, such as information from the Irish Longitudinal Study on ageing (TILDA)’ (Russell et al. 2018, p. xiii).

- ‘Just as firms and organisations can begin to tackle job stress by gathering information about potential job stressors and mediators, there is scope to improve data collection at the national level. A good starting point would be to capture more disaggregated data on recipients of Illness Benefit… Recording this additional information in the administrative data would facilitate estimates of the cost of job stress to the Exchequer and to the economy more broadly. A new national workplace survey, which was last conducted in 2009/2010, would also provide valuable evidence on stress and changing working conditions in Ireland’ (Russell et al. 2018, p. xvi).

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APPENDIX A: NOTES TO CHAPTER 2

*The findings in the Work-Related Injury and Work-Related Illness sections are from Russell et al. (2015), *Trends & Patterns in Occupational Health and Safety in Ireland*. Economic and Social Research Institute (ESRI). It analyses data from the Quarterly National Household Survey (QNHS) Module on Work-Related Accidents and Illness, Central Statistics Office. The data is for 2001 to 2012. The data reported here in this Report under workplace, job and worker characteristic sections are differences in odds ratios. Odds ratios represent the odds that an outcome (injury) will occur given a particular characteristic relative to a reference group for that characteristic (e.g. for the characteristic of sector of employment the reference group is working in services so the results show the odds of an injury for working in a stated sector relative to services, while controlling for other factors).

**The findings in the SAD and MSD sections are from Russell et al. (2016). *Work-related Musculoskeletal Disorders and Stress, Anxiety and Depression in Ireland: Evidence from the QNHS 2002-2013*. Economic and Social Research Institute (ESRI). This report is based on an analysis of the annual special module on work-related accidents and illness from the Quarterly National Household Survey (QNHS) over the period 2002-2013. The data reported here under workplace, job and worker characteristic sections are differences in odds ratios.

***The findings in the job stress section are from Russell et al. (2018). *Job Stress and Working Conditions: Ireland in Comparative Perspective*. Economic and Social Research Institute (ESRI). This report is based on an analysis of two waves of the European Working Conditions Survey, carried out in 2010 and 2015.

WORK-RELATED INJURY

1. Russell et al. (2015) note that the QNHS Module on Work-Related Accidents and Illness is usually fielded in Quarter 1 and from 2009 it refers to incidents occurring in the 12 months of the preceding calendar year. For example, the module fielded in Q1 2012 asked: “How many, if any, injuries did you incur at work (excluding commuting) during the period January 2011 to December 2011?”. The most recent data comes from the 2013 module which was held in Quarter 2 2013. The module was part of the European-wide labour force survey and a number of changes were introduced so that the data are harmonised across the EU. The information on work-related injuries was collected in two steps. Respondents were initially asked: “In the twelve months previous to this interview have you experienced any accidents at work or in the course of your work?” (NOTE: Accidents outside working hours and accidents during the journey from home to work or from work to home are excluded. However, accidents during a journey in the course of work are included). This is followed by a question on the number of accidents which also introduces the qualification that the incident resulted in an injury: “How many accidents resulting in injury did you have during those months?” Russell et al. (2015) note that “For the analysis that follows, the injury figures include only those who had an accident resulting in an injury i.e. those

who answered 'yes' to both questions. This is the category that is most consistent with the previous modules which ask about injuries incurred at work."

Russell et al. (2015, pp. 18-19) notes that "While the QNHS provides the best randomised national sample of work-related injuries and illnesses there are nevertheless a number of limitations." First, there is the 'healthy worker effect', a selection process through which the most unhealthy/seriously injured leave the labour market and the more healthy workers remain. The QNHS module does not include people who have not worked in the last 12 months, and therefore the extent of work-related illnesses and injuries are underestimated. Second, the un-weighted numbers occupational injury and illness are relatively small since these events are uncommon. Therefore, "frequency tables for sub-groups should be treated with caution", nevertheless "the statistical models take the underlying numbers into account when establishing significance".

2. The factors controlled for are gender; age; Irish national or not; sector; hours worked per week; shift or night work; job tenure; occupation.

3. The outcome indicator modelled is whether a work-related injury was experienced in the past 12 months (the outcome variable is equal to 1 when a work-related injury was experienced, and 0 if no injury occurred). As noted directly above a number of factors are controlled for using statistical analysis. In analysing the dichotomous variable of occupational injury (two outcomes, experienced or not), the factors influencing injury are examined by means of logistic regression models (Russell et al., 2015, pp. 38-39). The figures reported here in this Report are based on Model 10, Table 4.9 on page 48 in Russell et al. (2015). Logistic regression results are reported as odds ratios.

4. Russell et al. (2015) note that the higher rate observed among the self-employed is due to their higher concentration in more risky sectors (such as construction and farming) and work practices such as long working hours.

5. If rates of injury only are examined, and other factors are not controlled for, then Russell et al. (2015) note that over the period 2010-12, work-related injuries were most common among 'operatives' (injury rate at nearly 3%) followed by "associate professional/ technical workers" (injury rate of over 2.5%). "Operatives" includes semi-skilled manual jobs such as assembly workers, fork-truck drivers, scaffolders and sewing machinists, while "associate professional/ technical workers" includes a wide group of workers including paramedics, artists, sports workers, police officers and health and safety officers.

(SAD) STRESS, ANXIETY AND DEPRESSION

6. The QNHS groups stress, anxiety and depression together in one response category and respondents may or may not have a medical diagnosis of their condition. The questions used to measure work-related illness for 2008 to 2013 (excluding 2012) were:

"How many, if any, illnesses or disabilities have you experienced during the 12 months January 20XX to December 20XX, that you believe were caused or made worse by your work?"
"Now thinking about the time(s) when you were in employment during the 12-month period January 20XX to December 20XX, how many days were you absent from your job as a result of your **most recent** work-related illness?"
"Which of the following best describes your most recent work-related illness?

9. Bone, joint or muscle problem
10. Breathing or lung problem
11. Skin problem
12. Hearing problem
13. Stress, depression or anxiety
14. Headache and/or eyestrain
15. Heart disease or attack, or other problems in the circulatory system
16. Disease (virus, bacteria, cancer or other type of disease
17. Other types of complaint
18. None"

In 2012, the wording was changed to:
"In the 12 months prior to this interview and excluding any accidents you might have highlighted already, have you suffered from any physical or mental health problems?
How many of these health problems are cause or made worse by work you are doing or have done in the past?"

Russell et al. (2016) note that that QNHS module on work-related accidents and illness 'is restricted to persons who are currently in employment (or who are temporarily out)… The questions refer only to illnesses that have occurred over the previous 12 months… There were a number of changes in question wording over the period, which primarily affect the illness figures for the 2012 and, to a lesser extent, 2006, due to the harmonisation of the survey for a European-wide survey by Eurostat. For these two years, the survey referred to 'health problems' rather than 'illness' and in 2012 the question explicitly mentioned 'mental health problems' unlike any of the other years, prompting a higher level of reporting of SAD' (p. vii).

A caveat applies in relation to illness, due to the often significant time lapse between exposure to a workplace hazard and the emergence of an illness. The tendency of workers with a chronic illness or a disability to change to a less demanding job may also influence the relationship found between work-related illness and occupation, sector and hours of work (p. 10).

7. The factors controlled for in Model 5 are gender, age group, native/ migrant worker, tenure, job status, hours worked per week, work pattern, and sector. A separate model (Model 8) was run for occupation using the same controls, with the exception of sector.

8. The outcome indicator modelled is whether a work-related SAD illness was experienced in the past 12 months (the outcome variable is equal to 1 when a work-related SAD illness was

experienced, and 0 if no illness occurred). As noted directly above a number of factors are controlled for using statistical analysis. In analysing the dichotomous variable of work-related SAD illness (two outcomes, experienced or not), the factors influencing illness are examined by means of logistic regression models. The figures reported here are based on Model 5 in Table 3.3 on page 38 in Russell et al. (2016). Logistic regression results are reported as odds ratios.

8* The authors note that those with shorter job tenures are less likely to report SAD than the reference group (>5 years). However, when adjustment is made to take account of the lower exposure of those with shorter tenures, 'those with less than 12 months' job experience have a significantly higher risk of SAD illnesses than the most experienced group. However, the low rates of SAD illnesses for those in the one to two year category are unaffected' (Russell et al. (2016), p. 37). Model 8, which includes occupation but not sector, shows no effect for tenure.

8^ With regard to occupation, the authors note 'The restriction of the analysis to 2010-2013 may mean that occupational differences are not detected due to small numbers' (p. 37).

(MSD) MUSCULOSKELETAL DISORDERS

9. Russell et al. (2016) note that musculoskeletal disorders (MSD) cover a broad range of health problems, including a range of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels (p. 2).

10. The factors controlled for are gender, age group, native/migrant worker, job status, tenure, hours worked per week, work pattern, and occupation.

11. The figures reported here are based on Model 4 in Table 3.2 on page 30 in Russell et al. (2016). Logistic regression results are reported as odds ratios.

WORK-RELATED ILLNESS

12. The factors controlled for are gender; age; Irish national or not; sector; hours worked per week; shift or night work; occupation; job tenure.

13. The outcome indicator modelled is whether a work-related illness was experienced in the past 12 months (the outcome variable is equal to 1 when a work-related illness was experienced, and 0 if no illness occurred). A number of factors are controlled for using statistical analysis. In analysing the dichotomous variable of occupational illness (only two outcomes, experienced or not), the factors influencing illness are examined by means of logistic regression models (Russell et al., 2015, pp. 38-39). The figures reported here in this Report are based on the model in Table 4.16 on page 58 in Russell et al. (2015).

JOB STRESS

14. The authors developed a measure of job stress that combines subjective experience (respondents report that they experience stress in their work 'always' or 'most of the time') and the experience of stress reactions (fatigue, anxiety, sleep disturbance). Workers who are subjectively stressed and who report at least one of the three stress reactions are counted as experiencing job stress. To address the issue that stress reactions may arise from a non-work related source, the authors also 'measure the effect of job experience on job stress, while controlling for other external influences, such as household characteristics and financial difficulties' (Russell et al. 2018, p. 20). Although employers and the self-employed are included in the EWCS, this report focuses on employees only.

15. The factors controlled for are sex, age group, children, financial difficulty, job demands, job resources, hours and work schedule.

16. The authors define 'effort/ reward imbalance' as the extent to which workers feel they are underpaid for the work they carry out.

APPENDIX B: NOTES TO CHAPTER 3

***The findings in the Mental Distress, Poor Health and Worker Injury sections are from Watson, Maitre and Russell (2015). *Workplace Risks and Worker Outcomes in Ireland from a Comparative Perspective: An Analysis of the European Working Conditions Survey, 2005 and 2010*. Economic and Social Research Institute (ESRI). It analyses data from the European Working Conditions Survey (EWCS). The data reported in this report under workplace, job and worker characteristic sections are the percentages of people in each group that one would expect to have a higher mental distress score, poor health or injury if they were similar in terms of the other characteristics of jobs and workers in the models.

MENTAL DISTRESS

1. The World Health Organisation five-item Mental Health Index (MHI-5), captures how often in the last two weeks the person felt cheerful, relaxed, full of vigour, rested and interested in life. The items are scored from 1 ('at no time') to 6 ('all of the time'). The MHI-5 is part of the 36-item Short Form health survey (SF-36) (Ware et al., 2000) and has been used widely in a range of international surveys with different population groups. For ease of interpretation, the Watson et al. recode the scale to range from 0, indicating no distress, to 10, indicating a high level of distress.

With regard to the outcome indicator Watson et al. (2015) note that it is "based on the presence of the outcome but without specifically asking the respondent to attribute it to work conditions. The advantage of this approach is that it avoids any bias that might be introduced based on individual or cultural differences in the tendency to attribute such outcomes to working conditions . . . The disadvantage, of course, is that the item will also capture health, mental health and injury outcomes that are largely caused by non-work issues" (p. 56).

Watson et al. (2015) are interested in understanding country differences in mental distress of the workforce. Therefore, the regression models estimated include country as an explanatory variable. The models assume "that differences by gender, age group and so on are similar across countries although". Watson et al. (2015) checked whether the association between mental distress and any of the characteristics of jobs or workers was different in Ireland than in other countries. Of the 50 interactions tested, only the five were statistically significant. This leads the authors to conclude "In general, then, workplace and individual characteristics that are associated with mental distress generally in Europe are associated with mental distress in Ireland as well" (p.69). The five areas where Ireland was different were: physical risk (10 vs. 0), joint/other sector, age 55 and over vs. 35-44, lower 2nd level ed. or less, and higher 2nd level or 3rd level education. These differences are marked with "*" in the table and the detail on this is discussed on table notes for each characteristic.

2. In the Executive Summary Watson et al. (2015) note "Since there may be cultural differences in the way these questions are answered in surveys, we caution against drawing conclusions about

the differences between countries in the levels of health, injury or mental distress. Instead, we focus on the associations between these outcomes and characteristics of jobs and workers, especially the relationship with exposure to workplace risks" (p. xi).

3. The factors controlled for are public/ private sector; job status; workplace size; sector; occupation; tenure; hours worked per week; gender; age group; migrant or not; education; exposure to risk.

4. The outcome indicator modelled is the mean score on the mental distress scale (0 – 10 scale, where 10 = high distress). As noted directly above a number of factors are controlled for using statistical analysis. The multivariate analyses were conducted on the weighted data, with controls for the impact of weights on the standard errors. In analysing the continuous variable of mental distress (measured on a 0 to 10 scale), ordinary least squares regression was used (Watson et al., 2015, pp. 19-20). The figures reported here in this Report are based on Model B in Appendix Table A4.2 in Watson et al. (2015). The regression model estimates the average mental distress score one would expect for each group if all other characteristics in the model were held constant.

5. The sample is one of people who are currently at work; those who are no longer working due to illness are not included.

6. The figures show the association of exposure to these kinds of risk, by showing the adjusted level of mental distress where each kind of risk is low (value = 0 on the 0 to 10 scale), medium (value = 5) and high (value = 10). The figures are calculated based on Model B in Appendix Table A4.2. The model includes exposure to each of the four different kinds of risk as continuous variables. The model results are used to calculate the mental distress scores at these three levels of exposure (low, medium, high) to each type of risk (Watson et al. (2015).

7. After testing for differences for Ireland Watson et al. (2015, p. 69) found that "while there is no general association between mental distress and exposure to physical workplace risk in Europe, there is a negative association in Ireland. In other words, Irish workers who are exposed to high levels of physical risk, like vibration, noise and extremes of temperature, have a lower average score on the mental distress scale (about one point lower on the ten point scale). This may reflect selection into these occupations of people who are less likely to experience mental distress, or a selection out of these occupations (through illness, early retirement, job change and so on) of workers who do experience mental distress. This points to the need for caution in interpreting the associations as causal."

8. 'Manual workers' include skilled agricultural and fishery workers, machine operatives and assemblers, and elementary/ unskilled occupations.

9. After testing for differences for Ireland Watson et al. (2015, p. 70) found that "Older Irish workers are also less likely than their younger counterparts to experience mental distress (about

0.68 points lower for those aged 55 and over compared to adults aged 35 to 44 years old). This, again, may reflect a selection out of the workforce among those experiencing mental distress."

10. After testing for differences for Ireland Watson et al. (2015, p. 70) found that "The pattern by education is also unusual in Ireland, whereby those with lower levels of education report lower levels of mental distress than those with third-level education. There is no overall association between mental distress and level of education among workers in Europe when the other characteristics of the individual and the job are controlled. We could speculate that the unexpected pattern in Ireland may be linked to the impact of the recession on the earnings and work pressure of those with higher levels of education working in the public sector, where many professionals are employed. Alternatively, it may reflect a disproportionate loss of employment among those with lower levels of education in precarious private sector jobs, so that those remaining in 2010 are a relatively select group with more secure (and perhaps better) jobs. However, a fuller investigation of these potential explanations would require considerably more analysis than the scope of the present project allows."

POOR HEALTH

11. In the report "poor health" is classified a response of "fair", "bad" or "very bad" to the question: "How is your health in general? Would you say it is … [Very good, good, fair, bad, very bad]". Watson et al. (2015) explain "We focus on those who regard their health as fair, bad or very bad. This threshold is adopted because in some countries, the proportion of people in the workforce who report their health as bad or very bad is low. Note that this item refers to general health and does not seek to attribute health problems to work" (p. 17). With regard to the outcome indicator Watson et al. (2015) note that it is "based on the presence of the outcome but without specifically asking the respondent to attribute it to work conditions. The advantage of this approach is that it avoids any bias that might be introduced based on individual or cultural differences in the tendency to attribute such outcomes to working conditions . . . The disadvantage, of course, is that the item will also capture health, mental health and injury outcomes that are largely caused by non-work issues" (p. 56).

12. In their discussion of measurement of key concepts Watson et al. (2015) observe that "Self-rated health is a widely-used indicator in sociological and epidemiological studies. It has been shown to be a good indicator of health status and to predict health service usage and to predict mortality in prospective studies (Bowling, 2001; Miilunpalo et al., 1997) . . . We know that there are national differences in self-rated health which are partly the result of cultural differences in response style, rather than differences in the underlying health conditions (Zimmer at al., 2000; Jürges, 2007). For instance, Jürges found that Germans tend to under-rate their health while Scandinavians tend to over-rate it. Given the particularly favourable score on self-rated health items in Ireland (e.g. Figure 1.10.1 in OECD, 2012), it is likely that Irish respondents also over-rate their health." (p. 17) Following analysis of the data Watson et al. (2015) note that "The failure of the wide range of individual and organisational/work characteristics to account for any of the

country differences suggests that much of these differences may be due to underlying cultural differences in reporting" (p. 61).

13. The factors controlled for are public/ private sector; job status; workplace size; sector; occupation; tenure; hours worked per week; gender; age group; migrant or not; education.

14. The outcome variable modelled is the presence of poor health. As noted directly above a number of factors are controlled for using statistical analysis. The multivariate analyses were conducted on the weighted data, with controls for the impact of weights on the standard errors. In analysing the dichotomous indicator of presence of poor health, logistic regression analysis was used (Watson et al., 2015, pp. 19-20). The figures reported here in this Report are based on Model B in Appendix Table A4.1 in Watson et al. (2015). The regression model estimates the rates of poor health one would expect for each group if all other characteristics in the model were held constant.

15. When interpreting the figures, it is important to be aware that the sample is one of people who are currently at work; those who are no longer working due to illness are not included.

16. The figures show the association of exposure to these kinds of risk, by showing the adjusted percentage reporting poor health where each kind of risk is low (value = 0 on the 0 to 10 scale), medium (value = 5) and high (value = 10). The figures are calculated based on Model B in Appendix Table A4.1. The model includes exposure to each of the four different kinds of risk as continuous variables. The model results are used to calculate the expected percentage reporting poor health at these three levels of exposure (low, medium, high) to each type of risk (Watson et al. (2015).

Watson et al. (2015) caution "With these patterns, we need to be careful not to conclude that the relationship is necessarily causal. For instance, other attributes that make it difficult for people to move into better quality work – such as having low skills, household poverty, or living in a disadvantaged area – may explain both why this person works in a risky job and has poor health". (p. 64) Watson et al. (2015) also note "We checked whether the impact of these physical risks, and other job and worker characteristics, in Ireland were similar to their impact in other European countries. We did this by adding interaction terms to the model. None of the interactions were statistically significant, however. This indicates that the associations between self-rated poor health and job or worker characteristics are similar in Ireland to the associations in Europe in general" (p. 65).

17. 'Joint/other sector' includes NGOs and semi-states.

WORKER INJURY

18. The relevant question in the EWCS asks: 'Over the past 12 months, did you suffer from any of the following health problems?... injuries…?' The response proposed is 0 = No, 1 = Yes. With

regard to the outcome indicator, Watson et al. (2015) note that the 'indicator of injury includes all injuries in the last 12 months, not just those that occurred in the workplace... The logic if this approach is that it avoids any bias that might be due to the attribution of health or injury problems to work. It does have a disadvantage, however, in that the health problems or injury may have had an entirely different cause' (p. 70).

19. In the Executive Summary, Watson et al. (2015) note: 'Since there may be cultural differences in the way these questions are answered in surveys, we caution against drawing conclusion about the differences between countries in the levels of health, injury or mental distress. Instead, we focus on the associations between these outcomes and characteristics of jobs and workers, especially the relationship with exposure to workplace risks' (p. xi).

20. The factors controlled for are public/ private sector; job status; size of workplace; sector; occupation; tenure; hours worked per week; gender and age group.

21. The outcome variable modelled is injury. As noted directly above a number of factors are controlled for using statistical analysis. The multivariate analyses were conducted on the weighted data, with controls for the impact of weights on the standard errors. In analysing the dichotomous indicator of injury, logistic regression analysis was used. The figures reported here are based on Model B in Appendix Table A4.3 in Watson et al. (2015). The regression model estimates what one would expect for each group if all other characteristics in the model were held constant.

22. The four groups of workplace risks identified are: physical, chemical/ biological, physical demand and psycho-social. These are defined as (thresholds in brackets – how much of the time):
Physical risk involves exposure to vibration from tools or machinery (around ¾), loud noise (almost all) and extremes of temperature (around half).
Chemical/biological risk involves exposure to smoke, fumes, powder or dust (around half), vapours (around ¼), skin contact with chemicals (around half) or contact with potentially infectious materials (around ¾).
Physically demanding work requires painful or tiring positions (almost all); lifting or moving people (almost all); carrying or moving heavy loads (around ¾) or constant repetitive hand or arm movements (all).
Psycho-social risk includes unwanted sexual attention in the last month, physical violence in the last 12 months or bullying or harassment in the last 12 months.

The above figures show the association of exposure to these kinds of risk, by showing the adjusted percentage injury where each kind of risk is low (value = 0 on the 0 to 10 scale), medium (value = 5) and high (value = 10). The figures are calculated based on Model B in Appendix Table A4.3. The model includes exposure to each of the four different kinds of risk as continuous variables. The model results are used to calculate the expected percentage injury at these three levels of exposure (low, medium, high) to each type of risk (Watson et al. (2015).

23.‘Joint/other’ sector includes NGOs and semi-states.

24. Watson et al. (2015) are interested in understanding country differences in the self-reported injury of the workforce. Therefore, the regression models estimated include country as an explanatory variable. The models assume that ‘differences by gender, age group and so on are similar across countries’ (p. 61) and the figures here show the general pattern across European countries. The figures are based on a model where exposure to risk is controlled. There is only one association that is significantly different for Ireland: in general, employees with no contract had odds of injury that were about 39 per cent higher than permanent employees, but this difference was not found for Ireland (p. 76).