



Disability Pay Gaps in Northern Ireland

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Note: To ease readability, percentages have been presented to one decimal place. However, percentages included in the charts and tables may not add up to 100 per cent precisely due to rounding.

Introduction

Pay gaps, differences in average pay between different groups of people, are a topic of considerable policy and media interest in Northern Ireland and elsewhere. Section 75 (S75) of the Northern Ireland Act¹ is underpinned by the promotion of equality and good relations. The nine equality of opportunity categories defined under S75 are age, men and women generally, marital status, people of different religion/religion of upbringing^A, racial group, people who are disabled and those who are not, people who have dependants and those without, political opinion and sexual orientation. Apart from gender pay gaps^{2,3} there is little evidence on the extent of pay levels and pay disparities for other S75 characteristics such as disability. The overarching aim of this research is to use a linked dataset to generate novel information to assist understanding of disability pay gaps in Northern Ireland^B. A separate report on gender pay gaps will also be published by the authors later in 2024.

For disabled and non-disabled employees, the key aims of our research are to:

- compare key job-related and personal characteristics;
- quantify disability pay levels and associated disability pay gaps for a range of job-related and personal characteristics; and
- use statistical modelling to identify key factors associated with (i) disability pay levels and (ii) the disability pay gap.

Policy setting

There is no statutory requirement in Northern Ireland to report pay gaps^C. This report, which produces disability-disaggregated analysis on pay, will be useful to support the development of social inclusion strategies led by the Department for Communities (DFC), in particular the Disability Strategy⁴ and Disability and Work Strategy^D. The research will also inform the Department for Economy (DFE) led economic strategy '*10x Economy - an economic vision for a decade of innovation*⁵' which includes a metric that addresses the disability pay gap. This research is aligned with Article 31 of the United Nations Convention for the Rights of Persons with a Disability (UNCPRD)⁶ and specifically relates to providing appropriate disability-disaggregated research data to inform the formulation and implementation of policy. Statistics on pay gaps for different Section 75 equality groups are keenly sought by central and local government, academics, the third sector and the general public. To meet user need for more information, this output aims to extend understanding of pay gaps with a key focus on differences between disabled and non-disabled employees; however, outside the scope of this research, median pay levels for available S75 groups (all except political opinion and sexual orientation) are provided in Annex 3 (Figure 7) for information.

^A NISRA uses the approach set out in the Fair Employment (Monitoring) Regulations (Northern Ireland) 1999⁷

^B Evidence to support the next Programme for Government in Northern Ireland⁸. The Northern Ireland Assembly was restored in February 2024 following a two-year suspension.

^C Since 2017, there has been a statutory requirement for companies with over 250 employees⁹ to report gender pay gaps each financial year in Great Britain.

^D The development of a new Disability Employment Strategy in Northern Ireland is referenced in the DFC report, 'Disability within the Northern Ireland market'¹⁰.

Key findings

This report analyses disability pay levels and disability pay gaps of employees aged 17 years and over. The data source was the Earnings and Employees Study (EES)¹¹, a research-ready dataset which links the Annual Survey of Hours and Earnings (ASHE)¹² to the 2011 Census. The study is cross-sectional and focuses largely on all (combined full-time and part-time) employees. Information on disability is taken from self-reported information gathered within the 2011 Census. Self-employed workers are not included on the ASHE survey and therefore fall outside the scope of this research.

Disabled and non-disabled employees differed with respect to some characteristics. Compared to non-disabled employees (Tables 1 and 2), a greater share of disabled employees in our dataset:

- Were aged 55 years and over (27.1% self-reported as disabled versus 12.7% with no disability);
- Worked part-time (35.1% versus 29.6%);
- Had no child dependants (69.4% versus 52.4%);
- Had no educational qualifications (24.0% versus 11.1%);
- Had self-reported fair, bad or very bad health (59.8% versus 5.3%);
- Provided unpaid care (22.1% versus 14.7%);
- Lived in social rented accommodation (10.4% versus 5.6%); and
- Lived in the lowest value properties, less than £100,000 in 2011 (47.2% versus 38.2%).

Over a third of non-disabled employees (37.7%) had a degree-level qualification compared to a quarter (25.1%) of disabled employees.

Disability pay gaps quantify the percentage difference in hourly earnings between disabled and non-disabled employees.

In 2011, for all employees, the median hourly pay (excluding overtime) for a disabled employee was £8.75 compared to £9.96 for a non-disabled employee. The resulting median disability pay gap was 12.1%, meaning that disabled employees earned 12.1% less than non-disabled employees. The disability pay gap was 12.9% for males and 11.2% for females, and was higher for full time-time (14.3%) than part-time (9.9%) employees (Figure 4).

For part-time and full-time employees combined (Figures 4 and 5), disability pay gaps were highest for:

- Individuals aged 35-44 years (27.6%);
- Individuals living in houses valued at more than £150,000 (27.2%);
- Individuals doing voluntary work (24.0%);
- Public Sector employees (20.3%);
- Employees working in a professional field (18.7%); and
- Employees living in owner occupied accommodation (17.4%).

Main factors linked with higher hourly earnings for both disabled and non-disabled employees.

(Table 3)

After taking account of other factors (aged 25 and above)

- Degree-level qualification;
- Working in a professional field;
- Public sector employment;
- Males; and
- Full-time employment.

The overall disability pay gap for employees aged 25 and over was 17.6%. After accounting for job-related and personal factors, the 'adjusted' disability pay gap narrowed to 7.0% (Figure 6).

Design and setting

The Annual Survey of Hours and Earnings (ASHE)¹² is the key source^F of information on pay levels and pay gaps in Northern Ireland and provides estimates on hourly, weekly and annual earnings by age, sex, work pattern, occupation and industry, including public versus private sector pay comparisons. The Census of Population and Housing 2011¹³ is a rich source of key sociodemographic and self-reported health data on the population. This research was undertaken using the **Earnings and Employees Study (EES)**¹¹, a research-ready dataset which links together variables from the 2011 ASHE (approximately 1% of all employees in NI) with variables from the Census of Population and Housing 2011, and Capital Value data from the Land and Property Services. Information on disability was not collected on the ASHE. This linkage allowed a comprehensive and nuanced cross-sectional examination of disability pay gaps and enabled the use of person and household characteristics that were not collected in the ASHE.

After removing records pertaining to employees not on adult^F rates of pay and those who were categorised as loss of pay (earnings affected by absence), the study population for analyses comprised 5,194 ASHE respondents aged 17-74 years who had a corresponding Census record in 2011.

Data relate to employees paid by employers only, and do not include self-employment income or income from pensions, property rental or investments. Access to the EES dataset is limited to researchers and research teams with accredited researcher status under the Digital Economy Act (DEA)¹⁴ and subject to approval by each of the data providers and the UK Statistics Authority Research Accreditation Panel (RAP)¹⁵.

Disability definition

This study used self-reported health problem/disability, as collected in the 2011 Census in Northern Ireland¹³. In this report, **'disability'** or **'limitation in daily activity'** is based on respondents having reported that their day-to-day activities were **'limited a little'** or **'limited a lot'** due to a health condition or disability which has lasted, or is expected to last, at least 12 months. People who reported no limitation to their activities are categorised as having **'no activity limitation'**. This definition of disability is broadly consistent with the Government Statistical Service (GSS) harmonised standard and Disability Discrimination Act (DDA¹⁶) 1995 definition (see Annex 2).

Full-time and part-time earnings

Aligned with the most recent pay gaps data published by NISRA², the majority of this research is based on measuring hourly earnings (excluding overtime) for 'all employees' regardless of working pattern and therefore analyses the combined effect of full-time and part-time employees. Where there is focus on a particular working pattern, this is based on the ASHE definition where full-time is defined as working more than 30 paid hours per week. For teaching professions only, the cut-off between part-time and full-time employment is 25 hours per week.

Report structure

Section 1 reports on the distribution of hourly pay in Northern Ireland by disability status. Section 2 provides a descriptive summary of the job-related and personal characteristics for employees with and without a disability in the study sample. Section 3 reports on disability pay levels and disability pay gaps. Section 4 uses regression methods to examine the extent to which job-related and personal characteristics contribute to the disability pay gap in Northern Ireland.

^E Caution should be advised when comparing information on pay levels and pay gaps from different data sources (see Annex 2 - Data and definitions for further information).

^F 'Employees who are not on adult rates are excluded. This includes employees paid at a reduced rate in the pay period for reasons of apprenticeship, training or age. Employees whose pay was affected by absence (e.g. maternity) are also excluded.'

Section 1 Distribution of hourly earnings by disability

Before undertaking analyses of disability pay gaps, it is useful to examine the distribution of hourly earnings by disability status. Aligned with Official Statistics derived from the ASHE survey¹², the measure of earnings used in our analyses is **gross hourly earnings (excluding overtime)**.

Gross hourly earnings (excluding overtime) include basic pay, commissions, shift premium pay, bonus or incentive pay and allowances, but before deductions for PAYE, National Insurance, pension schemes, student loan repayments and voluntary deductions.

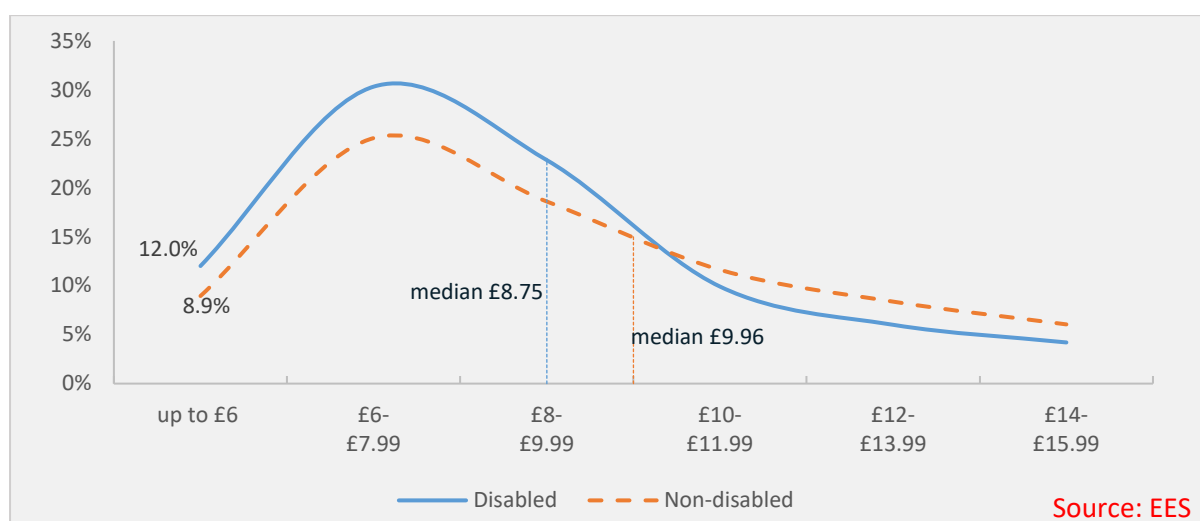
Mean versus median

The mean and the median are commonly used to describe the central position within a set of data. In a skewed distribution^G such as hourly earnings, the mean is very sensitive to small numbers of very high earners. Put differently, adding a single employee with a very high hourly pay to the dataset could increase the mean pay markedly, therefore using the mean in isolation can be misleading. The median measures the hourly pay of the ‘middle’ employee, i.e. the level of earnings at which 50% of employees earn more and 50% earn less. The median therefore takes account of the skewed distribution of pay better than the mean, as the median is much less affected by outliers (abnormally low or high values). A percentile is a value (here hourly pay) where a certain percentage of people fall below, for example, the 75th percentile is the value of hourly pay that 75% of values lie below and 25% lie above.

Overall distribution of hourly earnings by disability

Figure 1A shows the proportion of disabled and non-disabled employees across different bands of the hourly earnings distribution, beginning with earnings up to an indicative minimum wage^H (£6 per hour for 2010 and 2011), and moving up in £2 intervals of hourly earnings. A marginally higher proportion of disabled employees (12.0%) earned wages around the minimum wage (£6 per hour), in contrast to their non-disabled (8.9%) counterparts. Both disabled and non-disabled employees exhibit a clear positive skew in their earnings distribution, where the majority of employees earn lower incomes, and there are relatively few employees with higher earnings. The median hourly pay for employees with a disability was £8.75, compared with £9.96 for those without a disability.

Figure 1A: Proportion of disabled and non-disabled hourly earnings (excluding overtime) in Northern Ireland, 2011: all employees

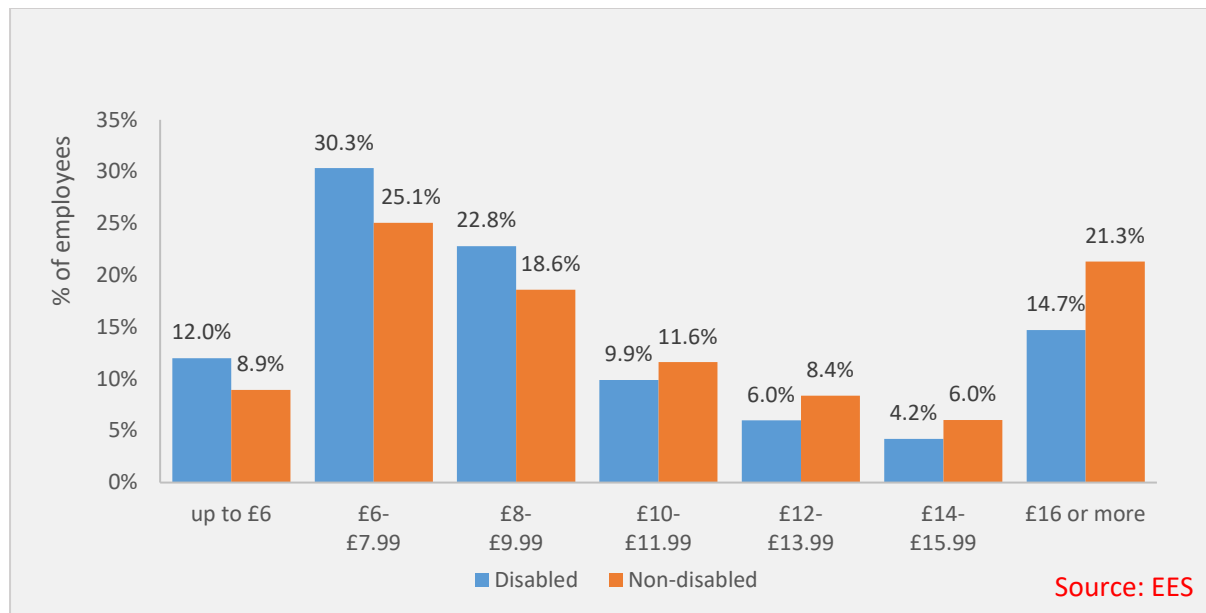


^G Hourly earnings from ASHE is an example of a positively skewed distribution with more jobs at the lower earnings end, tailing off towards higher earnings. This positive skew is illustrated in Figure 13 on the 2023 [Employee earnings in Northern Ireland](#) report².

^H The national minimum wage, for employees aged 21 and over, was £5.93 in 2010 and £6.08 in 2011. See [Table 4](#), ASHE 2017 report.

Figure 1B further captures how hourly earnings vary between disabled and non-disabled employees across the hourly earnings distribution. Moving up the earnings distribution up to £10 per hour, there was a greater proportion of disabled compared to non-disabled employees, with the percentage point difference (5.2%) largest in the £6-£7.99 per hour band. For hourly earnings greater than £10 per hour, there were greater proportions of non-disabled compared to disabled employees. Among employees earnings £16 or more per hour, there was a marked difference in the share of disabled (14.7%) and non-disabled (21.3%) employees.

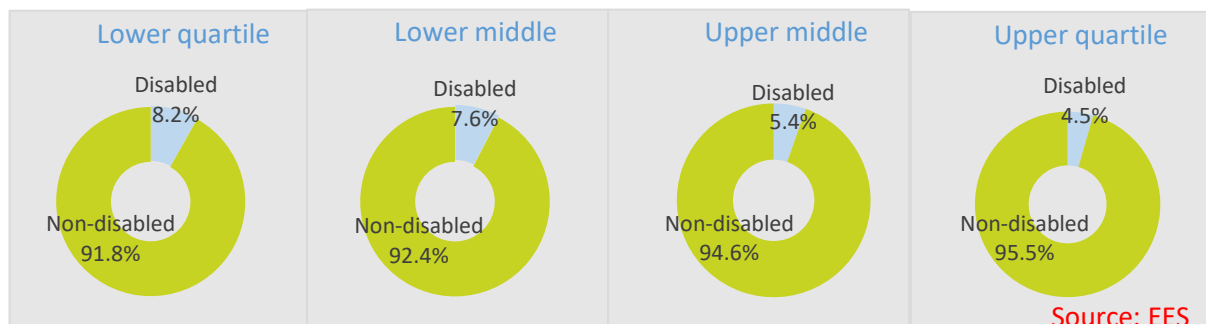
Figure 1B: Proportion of disabled and non-disabled hourly earnings (excluding overtime) in Northern Ireland, 2011: all employees



Disability pay by quartiles

Quartiles are often used to rank hourly pay, or other earnings' metrics, from lowest to highest, dividing employees into four evenly sized groups. Figure 2 below shows the study sample divided into four quartile pay bands from lowest to highest, illustrating the proportion of employees who have a disability in each quartile. In our study sample, 6.2% of all employees (either full-time or part-time) had a disability. Figure 2 shows that the highest proportion (8.2%) of disabled employees was found in the lowest quartile and the lowest proportion was found in the highest quartile (4.5%).

Figure 2: Disabled and non-disabled employees¹ by pay quartile: all employees



¹ Weighted to remove any bias due to non-response and coverage issues with the sample frame, see Annex 2 for further details.

Section 2 A breakdown of the labour market by disabled and non-disabled persons

In our research dataset^J, 6.2% of employees indicated having a disability^K with a higher proportion among part-time (7.2%) compared to full-time employees (5.7%). To inform understanding of disability pay gaps, it is important to first understand differences in labour market characteristics of disabled and non-disabled employees. This section reports differences in labour market characteristics within our research dataset for variables sourced from the (i) ASHE survey and (ii) from Census 2011.

(i) Age, sex and job-related characteristics (ASHE 2011)

The age and sex distribution of employees as well as key job-related characteristics among employees, as recorded in the 2011 ASHE, is presented in Table 1. Annex 2 provides further details on definitions and study variables.

- There were similar proportions of males (48.9% disabled, 49.4% non-disabled) and females (51.1% disabled and 50.6% non-disabled).
- Disability is known to increase with age¹⁷. Among disabled employees, over a quarter (27.1%) were in the 55 years and over age-group, compared to 12.7% of non-disabled employees in this age-group.
- A higher proportion of disabled (35.1%) compared to non-disabled (29.6%) employees were in part-time employment.
- Approximately three in five disabled (57.3%) and non-disabled (61.6%) employees were employed in the private sector.
- Approximately half of disabled (48.3%) and non-disabled employees (52.1%) worked in professional occupations.
- There was a higher proportion of disabled (48.7%) employees working in Greater Belfast compared to non-disabled employees (44.2%). Similarly, there was a higher proportion of disabled (38.6%) employees living in Greater Belfast compared to non-disabled employees (34.1%).

Occupational groups were defined using the nine major groups of the Standard Occupational Classification 2010 (SOC 2010)¹⁸. Due to small numbers and, in line with standard disclosure protocols¹⁹, the nine groups have been aggregated into three composite groups; Professional, Labour and Services.

Combined occupational groups

Professional: Managers, Directors and Senior Officials / Professional Occupations/ Associate Professional and technical Occupations/ Administrative and Secretarial Occupations

Labour: Skilled Trades / Elementary Occupations / Process, Plant and Machine Operatives

Services: Caring, leisure and other Services / Sales and Customer Services

^J All proportions included in Section 2 have been weighted to remove any bias due to non-response and coverage issues with the sample frame, see Annex 2 for further details.

^K The equivalent proportion from the 2011 Census²⁰ based on full-time and part-time employees is higher (7.2%).

Table 1 Distribution of age, sex and job-related characteristics among employees: (i) with a disability (ii) without a disability: all employees, March 2011

Characteristics	Value	Disabled	Non-disabled
		(%) (n=333) ^L	(%) (n=4,861) ^K
Sex	Male	48.9	49.4
Sex	Female	51.1	50.6
Age	17-34	21.3	37.6
Age	35-44	23.8	26.3
Age	45-54	27.8	23.4
Age	55+	27.1	12.7
Working pattern	Part-time	35.1	29.6
Working pattern	Full-time	64.9	70.4
Work Sector	Public	42.7	38.4
Work Sector	Private	57.3	61.6
Occupational group	Professional	48.3	52.1
Occupational group	Labour	30.8	29.3
Occupational group	Services	20.8	18.5
Work location^{LM}	Greater Belfast	48.7	44.2
Work location	Rest of NI	51.3	55.8
Home location^{LM}	Greater Belfast	38.6	34.1
Home location	Rest of NI	61.4	65.9

(ii) Personal characteristics (Census 2011)

Individual and household characteristics of disabled and non-disabled employees, as recorded in the 2011 Census, are shown in Table 2. Key findings are:

- Over two-thirds of disabled employees (69.4%) had no child dependants compared to over a half (52.4%) of non-disabled employees.
- A higher proportion of disabled employees (22.1%) reported providing unpaid care compared to non-disabled employees (14.7%).
- Compared to disabled employees (59.8%), a considerably lower proportion of non-disabled employees (5.3%) reported their health to be fair/ bad or very bad.
- A quarter (25.1%) of disabled employees had a degree compared to over a third (37.7%) of non-disabled employees. Around a quarter (24.0%) of disabled employees had no educational qualifications compared to 11.1% of non-disabled employees.
- A higher share of disabled employees lived in socially rented accommodation (10.4%) compared to non-disabled employees (5.6%). Disabled employees (47.2%) were more likely than non-disabled employees (38.2%) to live in lower value properties (less than or equal to £100,000).
- Disabled employees (14.8%) were more likely than non-disabled employees (7.2%) to have no household access to a car.

^L Proportions for work location and home location based on a reduced denominator due to missing data (see Annex 2 for further details).

^M Work location and home location are based on large geographical areas known as Local Government Districts (LGD's)²¹. Northern Ireland is divided up into 11 LGD's and due to smaller numbers and in line with disclosure protocols¹⁹ it was not possible to report results for each LGD. In this analysis, LGDs were combined and Greater Belfast encompasses Belfast, Antrim & Newtownabbey and Lisburn & Castlereagh Local Government Districts (See Annex 2 for further details).

Table 2 Distribution of personal characteristics among employees (i) with a disability and (ii) without a disability: all employees, March 2011

Characteristics	Value	Disabled (%) (n=333) ^N	Non-disabled (%) (n=4,861)
Marital status	Single	34.0	36.5
Marital status	Married	54.1	55.1
Marital status	Separated/divorced	11.9	8.4
Religion/ religion of upbringing	Catholic	47.2	47.5
Religion/ religion of upbringing	Protestant & other Christian	52.8	52.5
Child dependants	None	69.4	52.4
Child dependants	One or more	30.6	47.6
Educational attainment	None	24.0	11.1
Educational attainment	School level or other ^O	51.0	51.3
Educational attainment	Degree level	25.1	37.7
Country of birth	Northern Ireland	89.4	86.5
Country of birth	Outside of Northern Ireland	10.6	13.5
Voluntary work	No	81.6	82.0
Voluntary work	Yes	18.4	18.0
Self-rated health	Very good/good	40.2	94.7
Self-rated health	Fair/bad/very bad	59.8	5.3
Provides unpaid care	No	77.9	85.3
Provides unpaid care	Yes	22.1	14.7
Housing tenure	Owner occupied	77.9	80.8
Housing tenure	Private rental	11.7	13.6
Housing tenure	Social rental	10.4	5.6
House value	<= £100K	47.2	38.2
House value	>100K and <= 150K	25.7	29.6
House value	>150K	27.2	32.2
Household cars	No cars	14.8	7.2
Household cars	One car	35.9	33.4
Household cars	Two or more cars	49.2	59.4

^N Proportions for marital status and religion based on a reduced denominator due to removal of categories with low numbers (less than 30 employees) see Annex 2 for further details.

^O School level qualification, other vocational qualification or apprenticeship.

Section 3 Disability pay gaps

This section shows how disability pay gaps are calculated and quantifies disability pay gaps at different points of the pay distribution. The focus of this section is to examine disability pay levels and disability pay gaps for a range of characteristics based on median values. Analysis is based on all employees regardless of working pattern. Equivalent results for full-time employees only are presented in Annex 4 (Tables 5 and 6). Unless otherwise indicated, any differences highlighted in this section are statistically significant.

Calculating pay gaps

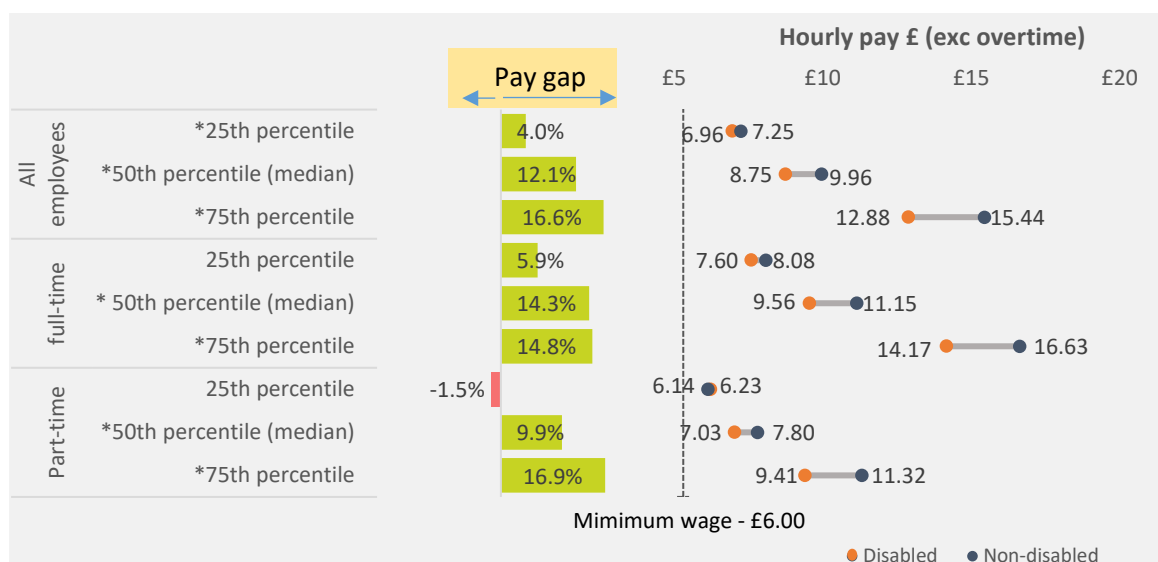
A pay gap is calculated as the difference between median hourly earnings of a group of interest (e.g. disabled employee) and a reference group (e.g. non-disabled employee) as a proportion of the hourly earnings of the reference group (e.g. non-disabled employee). This is the standard way of expressing pay gaps to quantify the extent of any differences in hourly pay. See Annex 2 for further information.

$$\text{Disability pay gap} = \frac{\text{hourly earnings (non-disabled)} - \text{hourly earnings (disabled)}}{\text{hourly earnings (non-disabled)}} \times 100$$

Summary statistics for disability pay gaps

In 2011, the overall median hourly earnings disability pay gap (Figure 3) for Northern Ireland was 12.1%^P given the median hourly pays for employees with a disability (£8.75) and without disability (£9.96). The disability pay gap was larger for full-time (14.3%) than part-time (9.9%) employees. The disability pay gap was larger for higher earners. For all employees, at the 75th percentile disabled employees earned 16.6% less per hour in disability pay gap terms compared to a 4.0% disability pay gap at the 25th percentile. Higher earning, disabled, full-time employees (75th percentile) were paid £2.46 less per hour than non-disabled full-time employees. (£14.17 versus £16.63), representing a disability pay gap of 14.8%.

Figure 3 Summary statistics for disability pay gaps by working pattern^Q



* difference in median hourly pay between disabled and non-disabled employees is statistically significant (Mood's median test²²).

^P The disability pay gap of 12.1% is in line with a disability pay gap of 12.3% for 2021 published by the Office for National Statistics (ONS)²³.

^Q Based on hourly earnings (excluding overtime)

There are a range of characteristics related to wage earning potential. Figure 4 presents disability pay gaps for age, sex and job-related characteristics in relation to median hourly pay for all employees irrespective of working patterns. Disability pay gaps are the focus of the commentary, any notable differences^R in disability pay levels within groups, for example, for people of different ages have been highlighted in the commentary. Pay gaps for full-time employees only are presented in Annex 4 (Tables 5 and 6).

Disability pay gaps – age, sex and job-related characteristics (ASHE 2011)

Age and sex

- In 2011, disabled employees earned on average 12.1% less than non-disabled employees with the disability pay gap slightly higher for males (12.9%) compared to females (11.2%).
- There was considerable variation in pay levels by age. For disabled employees, hourly earnings were highest for persons 45-54 years (£9.61) and lowest for persons aged 17-34 years (£7.61). For non-disabled employees, hourly rates were highest in the 35-44 (£11.65) and 45-54 age groups (£11.41) and lowest for those aged 17-34 years (£8.21). In relative terms, the disability pay gap was highest for persons aged 35-44 years (27.6%) and lowest for persons aged 17-34 years (7.3%).

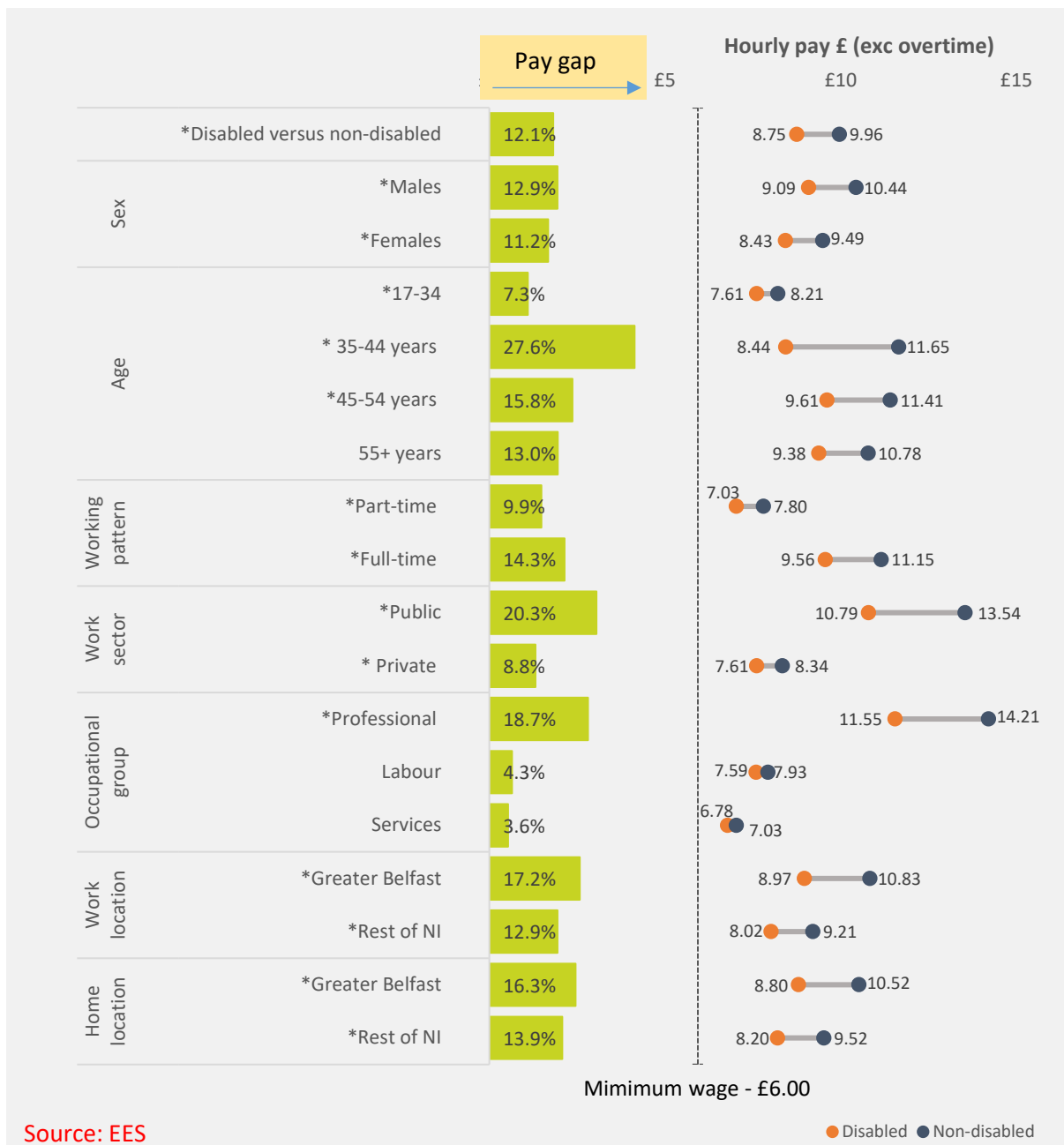
Job-related characteristics

- The disability pay gap was higher for full-time (14.3%) than part-time employees (9.9%).
- The public sector had a disability pay gap of 20.3% reflecting disabled employees earning on average £2.75 per hour less than non-disabled people (£10.79 versus £13.54). Disabled employees in the public sector are more likely to work part-time²⁴ and earnings for part-time workers are lower (see Figure 3) than for full-time workers. This may in part explain the relatively large disability pay gap for combined full-time and part-time employees in the public sector. For full-time only employees (Annex 4, Table 5) the disability pay gap in the public sector was 2.9% and not statistically significant.
- In the private sector the disability pay gap was 8.8% with disabled employees earning £0.73 on average less per hour than non-disabled people (£7.61 versus £8.34).
- An analysis of combined occupational groupings showed that the disability pay gap was largest (18.7%) for professional based occupational groups with disabled employees earning on average £2.66 less per hour than non-disabled employees (£11.55 versus £14.21).
- Disability pay gaps were higher for employees working in Greater Belfast^S (17.2%) compared to working in the rest of Northern Ireland (12.9%). Disability pay gaps were also higher for employees living in Greater Belfast (16.3%) compared to the rest of Northern Ireland (13.9%).

^R Disability pay gaps are not commented on in this section if the associated difference in hourly pay between disabled and non-disabled employees is not statistically significant.

^S Due to small numbers and in line with standard disclosure protocols¹⁹, it was not possible to calculate disability pay gaps for each of the 11 Local Government Districts (LGD's)²¹ in Northern Ireland. Greater Belfast encompasses Belfast, Antrim & Newtownabbey and Lisburn & Castlereagh LGD's.

Figure 4 Disability pay gaps and pay levels by age, sex and job-related characteristics, March 2011: all employees



* difference in median hourly pay between disabled and non-disabled employees is statistically significant (Mood's median test²²)

Interpretation Figure 4 shows, for example, that in 2011 for persons aged 35-44 years, median hourly earnings of a disabled employee were £8.44 compared to median hourly earnings of a non-disabled employee of £11.65. The resulting disability pay gap for employees aged 35-44 years was **27.6%**: $(11.65 - £8.44) / 11.65 * 100$

Disability pay gaps – personal factors (Census 2011)

Figure 5 presents disability pay gaps for personal characteristics in relation to median hourly pay for all employees irrespective of working pattern.

Individual characteristics

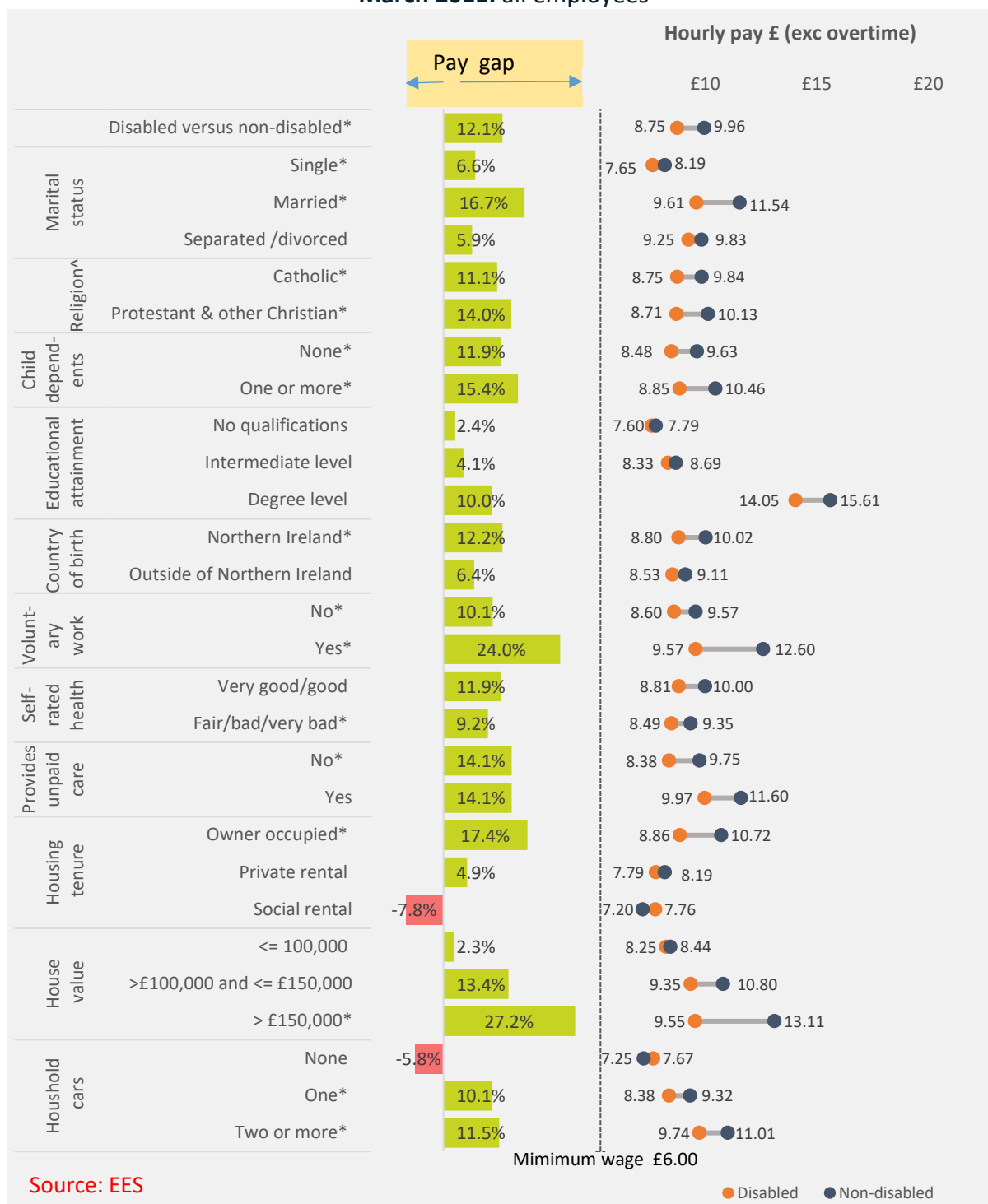
- In terms of marital status, pay levels were highest for married persons for both disabled (£9.61) and non-disabled (£11.54) and the resulting disability pay gaps for married employees (16.7%) was higher than disability pay gaps for single (6.6%) employees.
- Pay levels were similar for Catholic (£8.75) and Protestant and other Christian (£8.71) employees with a disability although due to marginally higher pay among non-disabled Protestants (£10.13) compared to Catholics (£9.84), the disability gap was higher for Protestants (14.0% versus 11.1%)^T.
- The disability pay gap (15.4%) was higher for employees with one or more child dependents in the household than for employees with no child dependents (11.9%).
- The disability pay gap was considerably higher for employees who volunteered (24.0%) compared to those that did not (10.1%).
- The disability pay gap for those not providing unpaid care was 14.1%.

Household and area characteristics

- Median pay was highest for disabled (£8.86) and non-disabled (£10.72) employees living in owner occupied accommodation. The resulting disability pay gap was 17.4%.
- A large disability pay gap (27.2%) was evident for those living in the highest value properties (>£150,000).
- Disability pay gaps were similar for persons with one (10.1%) or two or more household cars (11.5%).

^T A recent EES study²⁵, which considered variations in measured characteristics between Catholics and Protestants found no clear evidence of a Catholic-Protestant wage differential in Northern Ireland as of 2011.

Figure 5 Disability pay gaps by personal characteristics
March 2011: all employees



* difference in median hourly pay between disabled and non-disabled employees is statistically significant (Mood's median test²²) ^ Religion/religion of upbringing

Interpretation Figure 5 shows, for example, that in 2011 for those living in owner occupied accommodation, median hourly earnings for a disabled employee was £8.86 compared to the median disabled employee of £10.72. The resulting disability pay gap for employed persons living in owner occupied accommodation was **17.4%**: $(£10.72 - £8.86) / £10.72 * 100$

Section 4 Modelling the disability pay gap

Section 2 of this report demonstrated that disabled and non-disabled employees differed with respect to many characteristics. For example, disabled employees were more likely to work part-time, have no child dependents and have no educational qualifications. Section 3 showed variation in pay levels and presented disability pay gaps for a range of job-related and personal characteristics. To further examine disability pay gaps, this section uses regression methods to provide further insight into factors that impact pay for disabled and non-disabled employees. Firstly, separate quantile²⁶ regression^U methods were generated for disabled and non-disabled employees, to quantify the unique effect that a particular characteristic (e.g. having a degree) had on earnings. Secondly, further statistical models were run, to incrementally assess the impact of differences in characteristics (e.g. degree-level qualification or type of occupation) between disabled and non-disabled employees on the disability pay gap.

Due to the low numbers of disabled employees in the research dataset, the modelling carried out in this section should be considered exploratory. Caution should be exercised when interpreting the regression analyses and the findings offer only a broad insight into factors influencing pay levels and the disability pay gap.

Modelling factors that influence earnings for disabled and non-disabled employees

Log hourly pay^V (dependent variable) was modelled against a range of explanatory job-related (ASHE-based variables) and personal characteristics (Census 2011 variables). Firstly, minimally adjusted models were run to examine the impact of each individual predictor variable, adjusted for age and sex. Weak predictor variables ($p > 0.2$) were then removed and the model was re-run. The variables in the final models were sex, age-group, working pattern, work sector, type of occupation, work location, marital status, number of dependent children, degree qualification, voluntary work, housing tenure, house value and the number of household cars. Annex 2 provides additional information on the regression methods. The modelling analyses were based on employees aged 25 years and over as key pay-determining factors such as home ownership and marital status are generally not applicable to younger adults aged under 25 years. Therefore, these findings are not directly comparable to those in Sections 2 and 3.

Quantile regression

- Used with non-normal data including skewed distributions such as hourly earnings.
- Typically, median^W values are modelled e.g. estimating differences in median earnings between disabled and non-disabled employees.
- Other percentiles can also be modelled to examine differences in earnings at selected percentiles, for example, the 25th or 75th percentiles. This is useful as it indicates changes in the pay gap at different points of the pay distribution, effects which cannot be captured by Ordinary Least Squares regression^X that focuses on the mean.
- Like all regression techniques, quantifies the unique effect that a particular characteristic (e.g. being married) has on earnings for a particular group (e.g. disabled employees), while accounting for all other characteristics included in the model.

^U Regression analysis can identify statistical relationships between factors; however, it cannot imply causation.

^V The dependent variable is the log of hourly pay as the distribution of pay is positively skewed. Taking the log of hourly pay makes the distribution more symmetrical and helps the data approximate a normal distribution so enhances the validity of the assumptions used in regression.

^W Median not as impacted as the mean on the influence of extreme values (outliers).

^X Ordinary Least Squares regression is a statistical technique that models a linear relationship between a dependent variable, and one or more explanatory variables (characteristics).

Separate regression models were run for disabled and non-disabled employees due to different earnings distributions observed between the two groups (Figure 1A) and to examine if differences between job-related and personal characteristics for disabled and non-disabled employees were evident at different points of their respective earnings distributions. Table 3 presents quantile regression results at the 25th percentile, median and the 75th percentile for non-disabled and disabled employees separately. Results based on mean earnings using conventional OLS regressions are included in [Annex 5](#) (Table 7) for comparison. Unless otherwise indicated, any differences highlighted in the commentary are statistically significant.

Results

As the dependent variable (hourly earnings) is log transformed, modelling results have been translated into percentage changes^Y in earnings, as shown in Table 3. Full modelling results are presented in [Annex 5](#) (Table 7). After adjusting for the effect of other study variables in the model, we found for employees aged 25 years and over that^Z:

Age and sex

- At the median, males earned more than females, for both disabled (10.0%) and non-disabled (14.6%) employees. Further up the earnings distribution (75th percentile), this differential was more pronounced (disabled males earned 22.4% more, non-disabled males earned 20.7% more).
- For higher earners (75th percentile) aged 35-44 years, there was an earnings premium^{AA} for non-disabled (14.5% more) employees, compared to employees aged 25-34 years.
- For non-disabled employees aged 45 years and above (compared to 25-34 years), earnings' premiums incrementally increased throughout the entire earnings spectrum. The premiums were 8.9%, 12.3% and 14.2% at the 25th, 50th and 75th percentiles respectively.
- For disabled employees aged 45 years and above (compared to 25-34 years), there was a marked increase moving from the median (15.7% more) to the 75th percentile (25.5% more).

Job-related characteristics

- High earnings' premiums for professionals (compared to non-professionals) increased across the earnings spectrum. At the 25th, 50th and 75th percentiles respectively, disabled employees earned 16.2%, 20.6% and 28.9% more. At the same percentiles, non-disabled employees earned 26.1%, 32.9% and 41.4% more.
- Compared to part-time employees, full-time disabled and full-time non-disabled employees earned more across the earnings distribution. There were notably higher relative earnings for disabled full-time employees moving from the median (15.7%) to the 75th percentile (23.2%).
- Public sector employees earned more than private sector employees, and differentials were broadly similar across the entire earnings distribution of disabled (range: 18.5-23.7%) and non-disabled employees (range: 17.9-20.3%).

Personal characteristics

- At the median, disabled and non-disabled employees with a degree (compared to not having a degree) earned 31.5% and 39.3% more respectively. Having a degree had a higher pay-off for higher-earning disabled employees (75th percentile) who earned 55.4% more per hour. The corresponding percentage for non-disabled employees was also considerable (38.5%).

^Y See worked example under Table 3.

^Z All explanatory variables in this analysis were categorical, which means that one category had to be selected as a reference category, to compare the impact of other categories within the same variable against the outcome.

^{AA} An earning's premium calculated from a regression model refers to the additional income associated with a particular characteristic, relative to another characteristic.

- In terms of household characteristics, there were small earnings premiums for non-disabled employees only. At the median, these premiums were 4.9% for being an owner occupier (compared to not); 7.7% if living in a house valued at more than £150,000 (compared to a house of 150,000 or less) and 4.9% if there was household access to two or more cars (compared to one or none).

Ordinary Least Squares (OLS) coefficients based on mean values (Annex 5, Table 7) for both disabled and non-disabled employees were broadly in line with corresponding quantile regression coefficients at the median (50th percentile). However, the variation in earnings' premiums across different percentiles of the earnings distribution highlights that sole focus on mean values using conventional OLS regression can mask important differences at different points of the earnings distribution.

Table 3 Regression results summary (percentage change) at 25th, 50th and 75th percentiles:
disabled and non-disabled employees: 25 years and above

	25 th percentile	25 th percentile	50 th percentile	50 th percentile	75 th percentile	75 th percentile
↓ Characteristics	Disabled (%)	Non- disabled (%)	Disabled (%)	Non- disabled (%)	Disabled (%)	Non- disabled (%)
Male (vrs females)	5.7	10.2*	10.0*	14.6*	22.4*	20.7*
35-44 years (vrs 25-34 years)	10.0	7.9*	10.3	11.7*	11.4	14.5*
45+ years (vrs 25-34 years)	15.3*	8.9*	15.7*	12.3*	25.5*	14.2*
Public (vrs private)	18.5*	20.3*	21.6*	17.9*	23.7*	18.4*
Full-time (vrs part-time)	14.6*	9.4*	15.7*	12.6*	23.2*	11.8*
Professional occupation (vrs not)	16.2*	26.1*	20.6*	32.9*	28.9*	41.4*
Work in Belfast ^{BB} (vrs rest of NI)	3.3	1.6	10.6*	3.2*	2.6	4.0*
Degree-qualified (vrs not)	11.1	24.6*	31.5*	39.3*	55.4*	38.5*
Owner-occupant (vrs not)	3.8	3.5*	-3.1	4.9*	-6.5	5.1
House >£150K (vrs <= £150K)	-4.1	3.4*	-1.8	7.7*	-6.9	14.0*
>=Two cars (vrs no cars/one car)	6.0	2.9*	7.6	4.9*	10.6	6.5*

Note, *P <0.05 indicates relationship between characteristic and earnings is statistically significant.

Percentage changes presented in Table 3 are calculated by exponentiating modelling coefficients (Annex 5, Table 7), subtracting one and multiplying by 100: $(\exp(b)-1)*100$.

For example, at the (25th percentile), the coefficient for a non-disabled degree-qualified employee (relative to non-degree qualified) was 0.2198 and the effect on pay is calculated as

$$\text{percentage change} = (\exp(0.2198) - 1) * 100 = 24.6\%$$

Interpretation Table 3 shows that after taking into account job-related and personal characteristics that for example, at the lower end (25th percentile) of the earnings distribution, non-disabled degree-qualified employees earned 24.6% more than non-disabled employees without a degree. At the upper end (75th percentile) of the earnings distribution, non-disabled degree-qualified employees earned 38.5% more than non-disabled employees without a degree.

^{BB} Greater Belfast is a geographical area encompassing Belfast, Antrim & Newtownabbey and Lisburn & Castlereagh Local Government Districts.

Modelling adjusted disability pay gaps

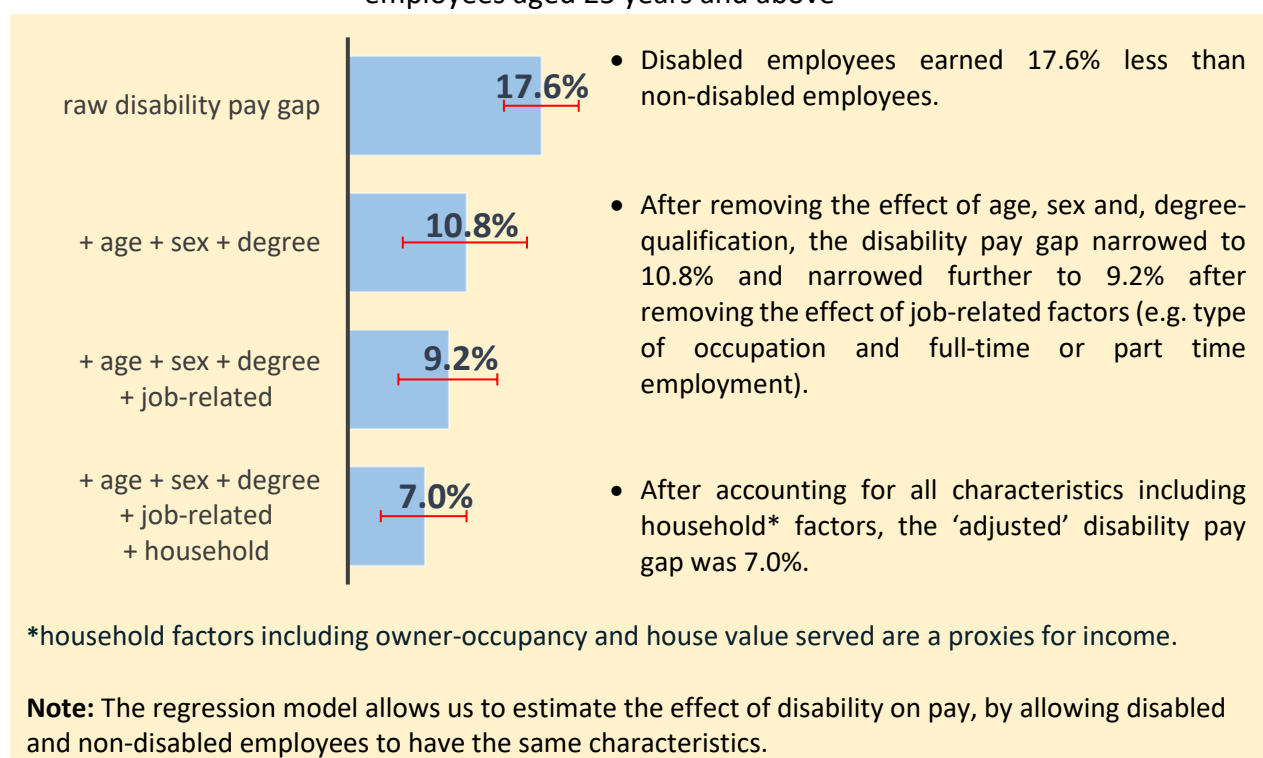
To gain further insight into the disability pay gap, further statistical models were run for employees aged 25 years and above to incrementally assess the impact of differences in characteristics (e.g. degree-level qualification or type of occupation) between disabled and non-disabled employees on the disability pay gap.

For employees aged 25 years and above, the models incrementally adjusted for^{CC}

1. Age, sex and degree-qualification;
2. Job-related characteristics (full-time/part-time, public/private sector and professional/non-professional occupation); and
3. Household characteristics (owner-occupancy, house value and number of household cars).

Figure 6 presents modelling results of the disability pay gap at the median, models were also ran at the 25th and 75th percentiles, see Annex 5 (Table 8 and Figure 8).

**Figure 6 'Adjusted'^{DD} disability pay gaps at the median:
employees aged 25 years and above**



The resulting adjusted disability pay gap of 7.0% is deemed the "unexplained" portion of the model given the data available for this research. There are a number of potential explanations for this including other unmeasured factors e.g. data not available relating to job tenure or seniority level of employee. It is important to note that due to low numbers of disabled employees over 25 years in the dataset, the modelling should be seen as exploratory, providing general insights into factors influencing disability pay and disability pay gaps among the characteristics which could be measured.

^{CC} See Annex 2 for further details on regression methods used.

^{DD} For comparability with the overall pay gap (e.g. 12.1% for employees aged 17 years and over), the raw or 'unadjusted' pay gap was calculated for all available records (n=4,584) for those employees aged 25 and over. The modeling results for the adjusted pay gaps are based on a reduced number of records (n=4,299) which have complete data for all characteristics included in the modelling.

Conclusions

Quantifying pay gaps improves transparency and provides an important evidence base to inform policy which can address the issue of income inequality for people with disabilities and other Section 75 groups. This research study using a novel themed dataset, is the first, to our knowledge, to comprehensively examine pay levels for disabled and non-disabled employees in Northern Ireland. The research found that, when examining median pay levels, the overall disability pay gap for all employees, irrespective of working pattern, was 12.1%. The study findings illustrated that disability pay gaps were evident across a range of characteristics including for job-related factors (public sector workers, for professional occupations and Greater Belfast employees). In terms of individual characteristics, high disability pay gaps were associated with the 35-44 years age group and those doing voluntary work. Disability pay gaps were also evident across household factors including for those living in higher-valued properties and for homeowners.

Exploratory statistical modelling on employees aged 25 years and above showed that after taking account of available job-related and personal characteristics, the primary factors associated with increased income for both disabled and non-disabled employees were possessing a degree, working in a professional field, being employed in the public sector, being male and full-time employment. After simultaneously adjusting for age, sex, degree-qualification, job-related and household factors, the disability pay gap for employees aged 25 years and above, narrowed from 17.6% to 7.0%. While our analysis extends understanding of characteristics associated with disability pay gaps, the analyses only provides a partial explanation. There are a number of other pay determining characteristics not measured in our study which are associated with disability pay gaps, for example, length of time in a particular job and the grade or seniority level of employees.

Study strengths and limitations

This research draws on data from a novel Earnings and Employees Study which links high quality data for the Annual Survey of Hours and Earnings to rich socio-demographic (e.g. religion/religion of upbringing, educational qualifications and health), individual-level and household-level data sourced from the Census. The research enriches the high-quality data from the ASHE survey and extends understanding of pay differences relating to disability in the Northern Ireland workforce. Research findings provide additional insight for those interested in disability disaggregated statistics (UNCPRD)⁶, and organisations interested in disability pay gaps in their workplace.

There are, nevertheless, some limitations. The ASHE survey does not include information on the self-employed which according to the 2011 Census²⁰ had a higher proportion of disabled people (8.9% vs 7.2%) in employment. The proportion of employees with a disability, combined with the sample size of the ASHE meant this study had an insufficient number of disabled employees to robustly examine the combined effect of two or more equality group characteristics (e.g. by disability and sex), or to assess geographic variability in relation to disability pay gaps. The research reflects disability pay gaps in 2011 and a more up-to date study would add additional insight. Despite these limitations, the results extend our understanding of disability pay gaps in the Northern Ireland workforce. Occupational group also an important pay determining characteristic and due to insufficient sample size, this analysis couldn't present occupational groups at a level of granularity below professional, labour or services composite groups.

Scope for future analyses

A longitudinal analyses or a repeated cross-sectional analysis would provide more information on the changes in the disability pay gap over time. This research could be extended to pay gaps of other equality groups. To provide a social mobility context, a longitudinal analysis of the interplay between pay levels and a range of socio-economic factors including parental occupation and educational attainment would be a useful addition to the evidence base. Comparisons to other countries/jurisdictions (for example across the UK) could provide valuable insight into the extent to which job-related and personal characteristics contribute to differences in disability pay gaps.

UK comparisons

The Office for National Statistics (ONS) published disability pay gaps, based on the Annual Population Survey²³. According to the latest ONS figures for 2021, Scotland had the highest disability pay gap (18.5%) followed by England (14.1%). The Northern Ireland disability pay gap was 12.3% while Wales had the narrowest disability pay gap 11.6%. At the UK level, the disability pay gap has increased from 11.7% in 2014 to 13.8% in 2021. It is not possible to make a direct comparison between disability pay gaps reported by ONS and disability pay gaps included in this report due to definitional differences in disability, different time periods and the sampling methodology used in the APS and ASHE surveys.

Workplace support for people with disabilities

The Disability Discrimination Act (DDA)¹⁶ passed by parliament in 1995 and last amended in 2005, requires that employers introduce reasonable adjustments in respect of applicants and employees who are disabled. There are a wide range of workplace supports, including the Access to work (NI)²⁷ programme which can help people with disabilities who wish to take up employment or who are in work and experience difficulty related to their disability.

About ADR UK²⁸ and ADR-NI

ADR UK (Administrative Data Research UK) is a partnership transforming the way researchers access the UK's wealth of public sector data, to enable better informed policy decisions that improve people's lives. ADR UK is made up of three national partnerships (ADR Scotland, ADR Wales, and ADR NI) and the ONS. It is funded by the Economic & Social Research Council²⁹ which is part of the UK Research and Innovation³⁰. Administrative Data Research Northern Ireland (ADR NI) is a partnership between the Administrative Data Research Centre Northern Ireland (ADRC NI, comprising Queen's University Belfast and Ulster University), and the Northern Ireland Statistics and Research Agency (NISRA). Together they support the acquisition, linking and analysis of administrative data sets, developing cutting-edge research to improve knowledge, policy making and public service delivery.

Acknowledgements

Northern Ireland (ADR-NI) takes privacy protection very seriously. All information that directly identifies individuals/organisations will be removed from the datasets by trusted third parties before researchers access them. All researchers using ADR-NI are trained and accredited to use sensitive data safely and ethically, they will only access the data via a secure environment and all their findings will be vetted to ensure they comply with strict confidentiality requirements. The help provided by the staff of the Administrative Data Research Centre - Northern Ireland (ADRC-NI) and the ADR-NI support officers within NISRA Research Support Unit (RSU) is acknowledged. ADR-NI is funded by the Economic and Social Research Council (ESRC). The authors alone are responsible for the interpretation of the data and any views or opinions presented are solely those of the author and do not necessarily represent those of ADR-NI. The NISRA Census and ELMS data have been supplied for the sole purpose of this project. The Research team would like to thank colleagues in the Northern Ireland Statistics & Research Agency, Department for Communities, the Department for the Economy who contributed with comments and knowledge to earlier versions of the report. The authors would also like to thank Mr Brian Grogan (NISRA) for providing expert guidance relating to ASHE data.

Feedback:

Your comments and suggestions are welcome and will assist the research team and ADR NI in continuously developing research outputs. Please send your comments to: John.Hughes@nisra.gov.uk

Annexes

Annex 1 References

1. [Northern Ireland Act 1998. Schedule 9, Paragraph 4 \(3\) \(a\)](#)
2. [Employee earnings in Northern Ireland: 2023](#)
3. [The gender pay gap: what can we learn from Northern Ireland?](#)
4. [Disability Strategy](#)
5. [10x Economy - an economic vision for a decade of innovation](#)
6. [UNCRPD - Article 31](#)
7. [Fair Employment \(Monitoring\) Regulations \(Northern Ireland\) 1999](#)
8. [Programme for Government \(PfG\) 2021](#)
9. [Reporting of gender pay gaps](#)
10. [Disability within the Northern Ireland Labour Market \(2022\)](#)
11. [Earnings and Employees Study \(EES\) 2011](#)
12. [Annual Survey of Hours and Earnings](#)
13. [2011 Census questionnaire](#)
14. [Digital Economy Act 2017](#)
15. [Research Accreditation Panel – UK Statistics Authority](#)
16. [Disability Discrimination Act 1995](#)
17. [Ageing and Public health: Ireland and Northern Ireland](#)
18. [SOC2010 volume 1: structure and descriptions of unit groups - ONS](#)
19. [RSU disclosure protocols](#)
20. [Census 2011: Economic Activity by Long-term Health Problem or Disability: CT0264NI](#)
21. [Local Government Districts](#)
22. [Mood's median test](#)
23. [Disability pay gaps in the UK - ONS](#)
24. [Equality and Human Rights Commission: The disability pay gap](#)
25. [Estimating catholic-protestant wage differentials](#)
26. [Quantile Regression](#)
27. [Access to Work \(NI\)](#)
28. [ADR UK](#)
29. [Economic and Social Research Council](#)
30. [UK Research and Innovation](#)
31. [EES linkage](#)
32. [Ethnic diversity in Northern Ireland](#)
33. [Interpolation of Medians](#)

Annex 2 Data and definitions

2011 Census – 2011 ASHE Linkage

Of all ASHE 2011 records, 88.7% were linked to the 2011 Census. To produce a fully linked dataset, a donor-imputation method³¹ was employed to link the remaining unmatched ASHE individuals to Census individuals with similar characteristics.

Comparing EES and the Annual Population Survey

Caution should be advised when comparing data on disability pay levels and pay gaps from the EES and from the Annual Population Survey²³, published by the ONS. There are a number of possible reasons why pay gaps could be different including different study periods, sampling, definitional differences for disability.

Disability definition

To define disability in this publication, we refer to the self-reported answers to the 2011 Census question, “Are your day-to-day activities limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months? - Include problems related to old age” (“Yes, limited a lot” or “yes, limited a little” or “no”). This is slightly different to the current Government Statistical Service (GSS) harmonised “core” definition: this identifies as “disabled” a person who self-reports having a physical or mental health condition or illness that has lasted or is expected to last 12 months or more that reduces their ability to carry-out day-to-day activities. The GSS definition differs from the DDA definition of disability, excluding the following groups which are “non-core” under DDA: People with a progressive condition (specified in the Equality Act and HIV/AIDS, cancer or multiple sclerosis) that does not currently reduce their ability to carry out day-to-day activities.

Religion/religion of upbringing

The NISRA religion/religion of upbringing category combines information from two questions, as collected in the 2011 Census in Northern Ireland¹³; (i) What religion, religious denomination or body do you belong to?, and of those with no current religion (ii) What religion, religious denomination or body were you brought up in? The derived categories used in this analysis, in line with the main religious groups typically reported for the Northern Ireland population, were (i) Catholic and (ii) Protestant. The Protestant category includes persons brought up in or belonging to the Presbyterian Church in Ireland, Church of Ireland, Methodist Church in Ireland and other (non-Catholic) Christian related denominations. Due to insufficient numbers, and in line with standard disclosure protocols¹⁹, it was not possible to provide data pertaining to the other/ no religion group.

Ethnicity

Due to a smaller number of disabled employees in the study sample and coupled with Northern Ireland not being as ethnically diverse as other countries in the UK³², it was not possible to calculate disability pay gaps for **BAME** (Black, Asian and minority ethnic) groups in line with standard disclosure protocols¹⁹. Median pay for a binary white/non-white ethnic group category is included in Annex 3 (Figure 7).

Local Government District

It was not possible to provide analyses by individual Local Government District²¹ for either home residence or place of work. The 11 Local Government Districts, which became operational in 2014, were therefore aggregated into two composite groups: Greater Belfast and the Rest of Northern Ireland. Greater Belfast included residency (or place of work) in Belfast, Antrim & Newtownabbey and Lisburn and Castlereagh LGD’s.

Weighting

ASHE weighting adjustments were used in Tables 1 & 2 to remove any bias caused by non-response or coverage issues with the sample. The weighting adjustment takes account of both design and population weights. The design weight takes account of different response rates for different groups e.g., those who joined the workforce after the original sample selection and those who moved jobs between sample selection and questionnaire despatch. The population weight takes account of differing response rates by age, sex, occupation and workplace region.

Missing data / removal of categories with low numbers

In Table 1, due to missing data, proportions were calculated on reduced totals for work location (disabled: n= 310 and non-disabled: n= 4,642) and home location (disabled: n= 299 and non-disabled: n= 4,547). In Table 2, categories with less than 30 employees were not considered. The removal of widowed employees resulted in reduced totals for marital status (disabled: n= 322 and non-disabled: n= 4,800). The removal of the 'other religion/ no religion/religion non-stated employees resulted in a reduced total for the religion/religion of upbringing variable (disabled: n=313 and non-disabled: n= 4,605)

Interpolated medians

The median measures the hourly pay of the 'middle' employee i.e. the level of earnings at which 50% of people earn more than and 50% earn less than. Interpolated medians³³ were used in this report, which usually adjust the median slightly upwards or downwards (depending on where the centre of the data is) and take into account where the data is weighted most heavily. More details available from authors on request.

Statistically significant differences in median hourly pay

Mood's median test was used to test if there were statistically significant differences in median hourly pay between disabled and non-disabled employees (see Figures 3-5 and Tables 5 and 6). Statistical significance is used to decide whether we think a difference between median hourly pay for disabled and non-disabled employees reflects a true difference rather than being attributable to random variation in the ASHE sample selection. A 5% standard is often used when testing for statistical significance. The observed change is statistically significant at the 5% level if there is less than a 1 in 20 chance of the observed change being calculated by chance if there is actually no underlying change.

How the Mood's test²² works

This example shows the steps for testing difference in medians between disabled and non-disabled male employees.

Step 1 – calculate the median *m* of the combination of the two samples = £9.85

Step 2 – Calculate the total of observed values in each sample that are greater than the overall median 9.85 and the total of observed values in each sample that are less than or equal to the median.

Table 4 Mood's test to test for significant differences in hourly pay for males

	Observed values			Expected values =(Column total* row total)/ Overall total	
	Disabled	Non-disabled	Total	Disabled	Non-disabled
> 9.85	61	1185	1246	(158*1246)/2450 80.4	(2292*1246)/2450 1165.6
<= 9.85	97	1107	1204	(158*1204)/2450 77.6	2292*1204)/2450 1126.4
Total	158	2292	2450		

Step 3 Perform a chi-square test of independence. If test statistic > critical value (**3.84** for a 2*2 table), there is a statistically significant difference.

$$\text{Test statistic} = \text{sum of } (\text{observed} - \text{expected})^2 / \text{expected} = \frac{(61-80.4)^2}{80.4} + \frac{(97-77.6)^2}{77.6} + \frac{(1,185-1,165.6)^2}{1,165.6} + \frac{(1,204-1,126.4)^2}{1,126.4} = 10.14$$

10.14 > 3.84 - there is a significant difference between the medians of disabled and non-disabled male employees.

Quantile regression

Quantile regression²⁶ is an extension of Ordinary Least Squares (OLS) regression and is used when the conditions of linear regression are not met. While OLS regression estimates the mean of the response variable across values of the predictor variables, quantile regression estimates the conditional median (or other quantiles) of the response variable. For example, in a 25th quantile regression model, the model will estimate the behaviour of the 25th percentile of the conditional distribution of the dependent variable (log hourly earnings).

Log hourly pay^{EE} (dependent variable) was modelled against a range of explanatory job-related (ASHE-based variables) and individual and household variables (Census 2011 variables). Firstly, minimally adjusted models were run to examine the impact of each individual predictor variable, adjusted for age and sex. Weaker predictor variables (p>0.2) were then removed and the model was re-run.

All explanatory variables in this analysis were categorical, which means that one category had to be selected as a reference category, to compare the impact of other categories within the same variable against the outcome. Reference categories in the model were selected if they satisfied one of two criteria: either they had the highest prevalence of disability within a variable, e.g. non-degree qualified for qualification status, or they were the natural choice that would aid interpretation, for example, not owner-occupied for housing tenure. Due to small numbers, many of the explanatory variables in the modelling were dichotomised.

Significance tests for regression coefficients

The tests for significance in quantile regression and linear regression models (e.g. see Annex 5, Table 7), are based on p-values (not displayed), which determine whether the coefficient differs significantly from zero. A p-value less than 0.05 indicates that the coefficient estimate is statistically significant at the 5% level of significance.

Modelling 'adjusted' disability pay gaps

The order variables were incrementally added to the regression model was informed by the effect the characteristic had on the raw disability pay gaps (Section 3) and by the initial modelling analysis (Table 3) which quantified the influence of individual characteristics on earnings for both disabled and non-disabled employees. A different order of adding these variables would have led to different results.

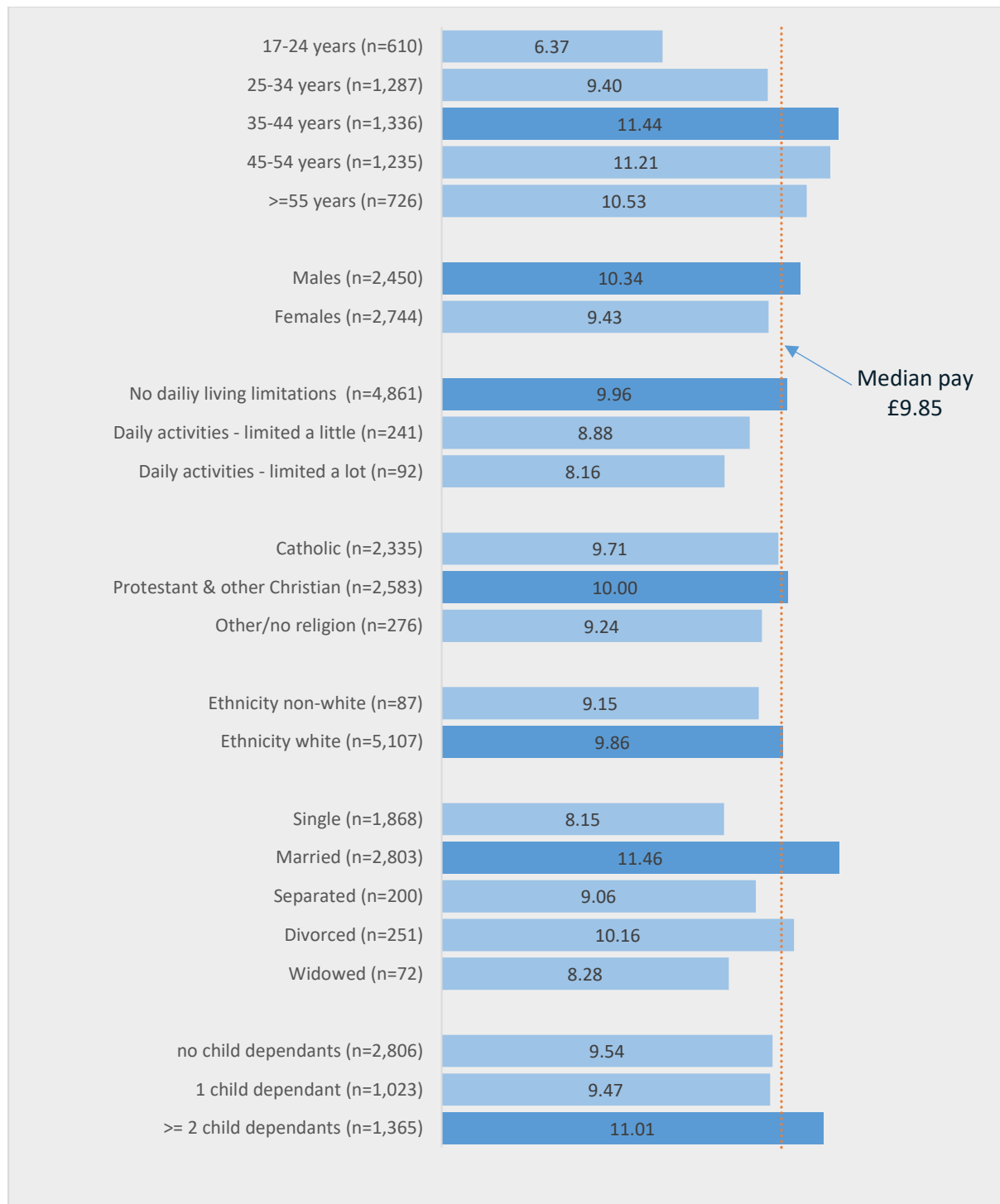
In Figure 8 and Table 8, **95% Confidence Intervals (CI's)** are included for estimated pay gaps. The larger the confidence interval (the longer the horizontal line around the dot), the higher the uncertainty about the size of the pay gap. A 95% confidence interval is calculated such that, if the surveys were repeated many times, the interval would include the actual pay gap 95% of the time.

^{EE} The dependent variable is the log of hourly pay as the distribution of pay is positively skewed. Taking the log of hourly pay makes the distribution more symmetric and the data approximate a normal distribution so the assumptions used in regression are more valid.

Annex 3 Median pay by equality groups: all employees

Figure 7 shows median pay levels for available section 75 equality groups in Northern Ireland. It was not possible to report on political opinion or sexual orientation. Only child dependants can be deduced from the Census; having adult dependants, such as elderly relatives or adult children with disabilities, is not recorded in the ASHE survey or on the 2011 Census.

Figure 7: Median hourly pay levels (£) in 2011 by equality group: all employees



Annex 4 Hourly earnings

Table 5 Mood's median test of the difference in disability pay levels and associated disability pay gaps, by age, sex and job-related characteristics, Northern Ireland 2011: all employees and full-time only employees

Characteristics	Value	All disabled	All non-disabled	Pay gap (%)	Full-time disabled	Full-time non-disabled	Pay gap (%)
All persons		8.75	9.96	12.1*	9.56	11.15	14.3*
Sex	Male	9.09	10.44	12.9*	9.57	11.10	13.8*
Sex	Female	8.43	9.49	11.2*	9.33	11.19	16.6*
Age	17-34	7.61	8.21	7.3*	7.79	9.04	13.8*
Age	35-44	8.44	11.65	27.6*	9.25	12.79	27.7*
Age	45-54	9.61	11.41	15.8*	10.85	12.76	15.0*
Age	55+	9.38	10.78	13.0	11.18	12.31	9.2
Working pattern	Part-time	7.03	7.80	9.9*			
Working pattern	Full-time	9.56	11.15	14.3*			
Work sector	Public	10.79	13.54	20.3*	13.85	14.27	2.9
Work sector	Private	7.61	8.34	8.8*	8.31	9.42	11.8*
Occupational group	Professional	11.55	14.21	18.7*	13.03	14.65	11.1*
Occupational group	Labour	7.59	7.93	4.3	7.67	8.57	10.5
Occupational group	Services	6.78	7.03	3.6	7.78	7.44	-4.6*
Work location	Greater Belfast ^{ff}	8.97	10.83	17.2*	9.32	11.90	21.7*
Work location	Rest of NI	8.02	9.21	12.9*	8.86	10.06	11.9*
Home location	Greater Belfast	8.80	10.52	16.3*	9.34	12.05	22.5*
Home location	Rest of NI	8.20	9.52	13.9*	9.10	10.53	13.6*

* Significant difference, $P < 0.05$ between the hourly pay of non-disabled and disabled employees, as indicated by the Mood's median test²².

^{ff} Due to smaller numbers and in line with disclosure protocols¹⁹, it was not possible to report results for each of the 11 Local Government Districts²¹. Greater Belfast encompasses Belfast, Antrim & Newtownabbey and Lisburn & Castlereagh Local Government Districts (see Annex 2 for further details).

Table 6 Mood's median test of the difference in disability pay levels and associated disability pay gaps, by personal characteristics, Northern Ireland 2011: all employees and full-time only employees

Characteristics	Value	All disabled	All non-disabled	Pay gap (%)	Full-time disabled	Full-time non-disabled	Pay gap (%)
All persons		8.75	9.96	12.1*	9.56	11.15	14.3*
Marital status	Single	7.65	8.19	6.6*	8.11	9.10	10.9*
Marital status	Married	9.61	11.54	16.7*	11.02	12.75	13.6*
Marital status	Separated/divorced	9.25	9.83	5.9	****	****	****
Religion^{GG}	Catholic	8.75	9.84	11.1*	9.95	11.14	10.7
Religion	Protestant & other Christian	8.71	10.13	14.0*	9.29	11.24	17.3*
Child dependants	None	8.48	9.63	11.9*	9.56	10.49	8.9
Child dependants	One or more	8.85	10.46	15.4*	9.35	12.05	22.4*
Educational attainment	No qualifications	7.60	7.79	2.4	8.56	8.43	-1.5
Educational attainment	Intermediate level ^{HH}	8.33	8.69	4.1	8.88	9.30	4.5*
Educational attainment	Degree level	14.05	15.61	10.0	14.42	16.08	10.3
Country of birth	NI	8.80	10.02	12.2*	9.66	11.25	14.1*
Country of birth	Outside of NI	8.53	9.11	6.4	****	****	****
Voluntary work	No	8.60	9.57	10.1*	9.30	10.63	12.5*
Voluntary work	Yes	9.57	12.60	24.0*	10.85	14.30	24.1*
Self-rated health	Very good/good	8.81	10.00	11.9	10.14	11.18	9.3
Self-rated health	Fair/bad/very bad	8.49	9.35	9.2*	9.32	10.57	11.8*
Provides unpaid care	No	8.38	9.75	14.1*	9.23	10.89	15.2*
Provides unpaid care	Yes	9.97	11.60	14.1	13.01	12.76	-2.0

* Significant difference, $P < 0.05$ between the hourly pay of non-disabled and disabled employees, as indicated by the Mood's median test²².

**** Due to smaller numbers and in line with disclosure protocols¹⁹, it was not possible to present results.

^{GG} Religion or religion of upbringing. Other/ no religion has not been reported due to low numbers and in line with disclosure protocols. Proportions have been calculated based on the two main religious groups typically reported for the Northern Ireland population. These are (i) Catholic (ii) Protestant and other Christian group.

^{HH} School level qualification, other vocational qualification or apprenticeship.

Characteristics	Value	All disabled	All non-disabled	Pay gap (%)	Full-time disabled	Full-time non-disabled	Pay gap (%)
Housing tenure	Owner occupied	8.86	10.72	17.4*	9.97	11.91	16.3*
Housing tenure	Private rental	7.79	8.19	4.9	****	****	****
Housing tenure	Social rental	7.76	7.20	-7.8	****	****	****
House value	<= £100K	8.25	8.44	2.3	8.80	9.00	2.2
House value	>100K and <= 150K	9.35	10.80	13.4	10.40	11.91	12.7*
House value	>150K	9.55	13.11	27.2*	10.90	14.82	26.5*
Household cars	No cars	7.67	7.25	-5.8	8.45	7.75	-9.0
Household cars	One car	8.38	9.32	10.1*	8.97	10.33	13.2*
Household cars	Two or more cars	9.74	11.01	11.5*	11.10	12.37	10.3

* Significant difference, P< 0.05 between the hourly pay of non-disabled and disabled employees, as indicated by the Mood's median test²².

**** Due to smaller numbers and in line with disclosure protocols¹⁹, it was not possible to present results.

Annex 5 Regression results

Table 7 Regression results at the 25th, 50th and 75th percentiles and the mean: disabled employees aged 25 years and above

	25 th percentile	25 th percentile	25 th percentile	25 th percentile	75 th percentile	75 th percentile	mean	mean
↓ Characteristics	Disabled	Non disabled	Disabled	Non disabled	Disabled	Non disabled	Disabled	Non disabled
Male (vrs females)	0.0552	0.0970*	0.0956*	0.1366*	0.2019*	0.1878*	0.1008*	0.1535*
35-44 years (vrs 25-34 years)	0.0956	0.0763*	0.0981	0.1107*	0.1081	0.1351*	0.1379*	0.1290*
45+ years (vrs 25-34 years)	0.1421*	0.0849*	0.1461*	0.1158*	0.2271*	0.1331*	0.1717*	0.1359*
Public (vrs private)	0.1694*	0.1849*	0.1956*	0.1644*	0.2130*	0.1690*	0.1328*	0.1606*
Full-time (vrs part-time)	0.1360*	0.0896*	0.1459*	0.1186*	0.2088*	0.1113*	0.1353*	0.0859*
Professional (vrs not)	0.1498*	0.2320*	0.1874*	0.2842*	0.2536*	0.3466*	0.2507*	0.3027*
Work in Belfast ^{II} (vrs rest of NI)	0.0326	0.0159	0.1003*	0.0317*	0.0260	0.0396*	0.0545	0.0327*
Married (vrs non-married)	0.0658	0.0277*	0.0850*	0.0322*	0.1169	0.0236	0.1040*	0.0307*
One child dependent (vrs none)	-0.0444	0.0084	-0.1058	0.0126	0.0378	-0.0025	-0.0718	0.0069
Two or more child dependents (vrs none)	0.0246	0.0397*	0.0507	0.0376	0.0817	0.0229	0.0204	0.0220
Degree-qualified (vrs not)	0.1053	0.2198*	0.2737*	0.3314*	0.4409*	0.3258*	0.2931*	0.2693*
Voluntary work (vrs not)	-0.0014	0.0481*	-0.0162	0.0366	-0.1015	0.0582*	-0.0255	0.0621*
Owner-occupant (vrs not)	0.0375	0.0340*	-0.0320	0.0483*	-0.0674	0.0497	-0.0090	0.0390*
House value >150k (vrs <= £150k)	-0.0416	0.0335*	-0.0181	0.0745*	-0.0712	0.1309*	-0.0742	0.0954*
>= Two cars (vrs no cars/one car)	0.0581	0.0285*	0.0728	0.0477*	0.1006	0.0633*	0.1269*	0.0478*
Constant	1.5463*	1.6174*	1.6192*	1.6681*	1.6434*	1.8053*	1.6264*	1.7120*
R ²	0.2508	0.2552	0.2918	0.3129	0.3437	0.3354	0.4633	0.4491
Number of observations	265	3,818	265	3,818	265	3,818	265	3,818

Note * p<0.05

^{II} Greater Belfast is a geographical area encompassing Belfast, Antrim & Newtownabbey and Lisburn & Castlereagh Local Government Districts.

Table 8 Modelling results for ‘Adjusted’ disability pay gaps (dpg) with 95% confidence intervals at the (i) 25th percentile (ii) 50th percentile and (iii) 75th percentile

(i) 25th percentile				
↓ Characteristics	Raw^{JJ} disability pay gap	Model 1 + age + sex + degree	Model 2 + age + sex + degree + job-related	Model 3 + age + sex + degree + job-related + household ‘Adjusted’ dpg
	‘Unadjusted’ dpg’			
Disability (vrs no disability)	11.1	9.3 (2.3,15.8)	7.4 (3.4,11.2)	6.2 (2.2,10.1)
Male (vrs females)		12.2 (8.4,16.1)	11.3 (8.7,13.9)	11.6 (9,14.2)
35-44 years (vrs 25-34 years)		16.2 (12.1,20.3)	11.3 (8.7,14.0)	11.1 (7.3,15.1)
45+ years (vrs 25-34 years)		18.8 (17.2,20.5)	12.0 (9.3,14.8)	11.0 (7.6,14.6)
Degree-qualified (vrs not)		55.6 (49.8,61.7)	26.1 (21.8,30.6)	25.4 (20.6,30.5)
Public (vrs private)			21.5 (18.8,24.2)	21.4 (18.9,24.0)
Full-time (vrs part-time)			8.8 (7.0,10.5)	8.8 (5.7,11.9)
Professional (vrs not)			29.9 (25.6,34.1)	27.4 (22.8,32.1)
Home owner (vrs not)				3.3 (0.8,5.9)
House value >150k (vrs <= £150k)				4.0 (1.1,7.0)
>= Two cars (vrs no cars/one car)				3.3 (1.1,5.7)
Constant		1.7918	1.6729	1.6350
R ²		0.1148	0.2523	0.2572
Number of observations	4,584	4,299	4,299	4,299
(ii) 50th percentile				
Disability (vrs no disability)	17.6	10.8 (5.0,16.3)	9.2 (4.6,13.6)	7.0 (3.0,10.8)
Male (vrs females)		11.9 (7.6,16.4)	16.5 (12.5,20.6)	16.5 (13.8,19.2)
35-44 years (vrs 25-34 years)		20.8 (15.4,26.4)	15.6 (12.0,19.3)	15.3 (12.4,18.3)
45+ years (vrs 25-34 years)		23.8 (19.9,27.8)	15.9 (11.7,20.3)	14.4 (11.8,17.0)
Degree-qualified (vrs not)		82.5 (76.3,88.9)	38.8 (32.9,44.9)	34.9 (30.1,40.0)
Public (vrs private)			19.5 (17.0,22.1)	18.9 (16.3,21.5)
Full-time (vrs part-time)			12.2 (8.6,15.9)	12.2 (9.9,14.5)
Professional (vrs not)			40.4 (35.1,46.0)	39.0 (35.9,42.1)
Home owner (vrs not)				4.1 (2.1,6.2)
House value >150k (vrs <= £150k)				7.9 (4.2,11.7)
>= Two cars (vrs no cars/one car)				6.6 (4.0,9.4)
Constant		1.9821	1.7423	1.6818
R ²		0.1919	0.3090	0.3199
Number of observations	4,584	4,299	4,299	4,299

^{JJ} For comparability with the overall pay gap (e.g. 12.1% for employees aged 17 years and over), the unadjusted pay gap was calculated for all available records (n=4,584) for those employees aged 25 and over. The modeling results are based on a reduced number of records (n=4,299) which have complete data for all characteristics included in the final model (Model 3).

(iii) 75th percentile

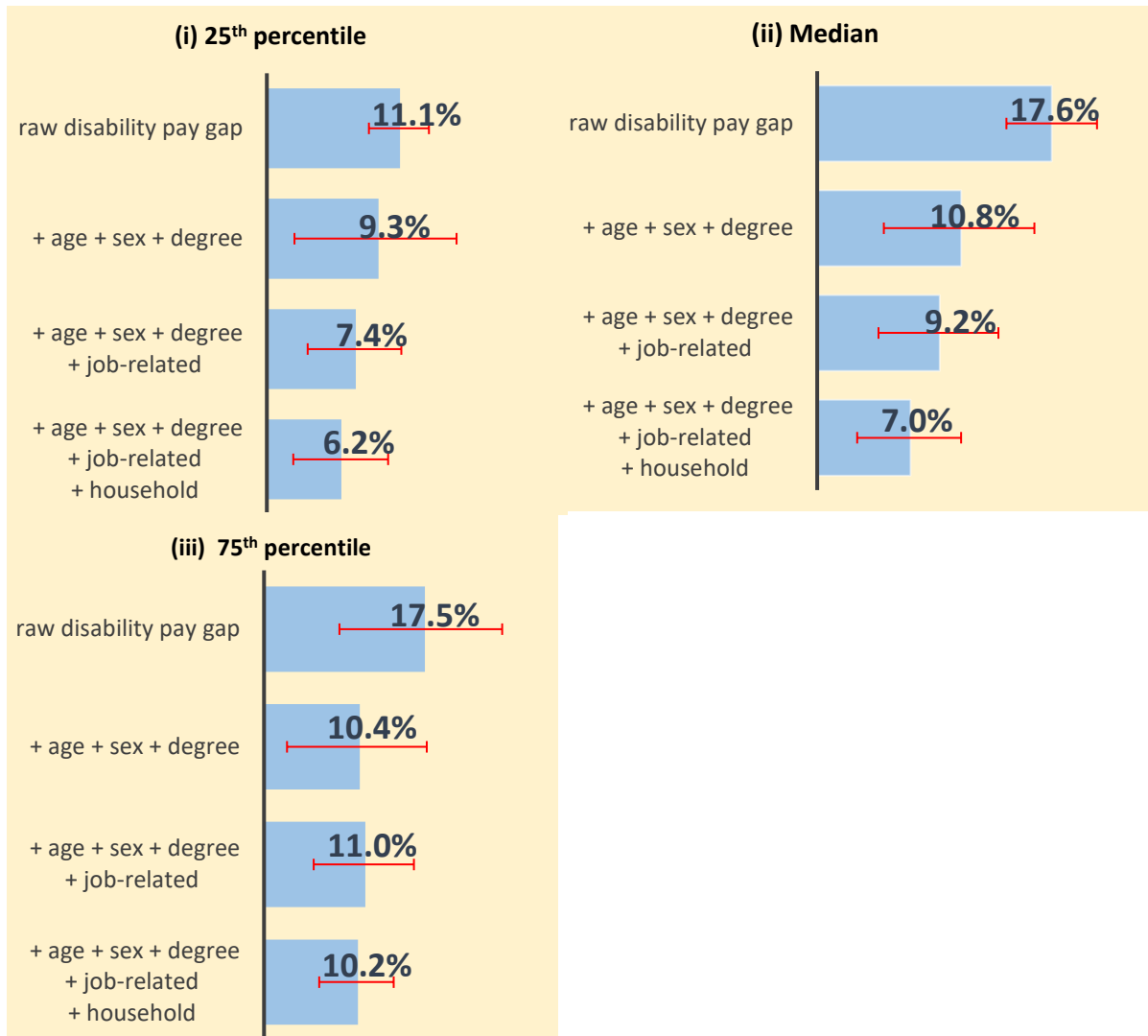
	Raw^{KK} disability pay gap	Model 1 + age + sex + degree	Model 2 + age + sex + degree + job-related	Model 3 + age + sex + degree + job-related + household 'adjusted' dpg
↓ Characteristics				
Disability (vrs no disability)	17.5	10.4 (2.5,17.7)	11.0 (5.4,16.3)	10.2 (6.0,14.1)
Male (vrs females)		16.4 (13.4,19.5)	24.3 (19.5,29.2)	22.2 (17.4,27.2)
35-44 years (vrs 25-34 years)		22.7 (17.7,27.9)	20.7 (16.6,24.9)	17.0 (12.5,21.6)
45+ years (vrs 25-34 years)		31.5 (27.7,35.3)	22.7 (19.4,26.0)	17.4 (13.4,21.7)
Degree-qualified (vrs not)		89.9 (83.3,96.7)	43.7 (36.8,50.8)	38.6 (30.9,46.6)
Public (vrs private)			16.4 (12.8,20.0)	18.1 (13.6,22.8)
Full-time (vrs part-time)			11.3 (7.3,15.5)	11.3 (7.3,15.6)
Professional (vrs not)			51.3 (47.2,55.5)	44.5 (39.9,49.3)
Owner-occupant (vrs not)				4.5 (1.4,7.7)
House value >150k (vrs <= £150k)				13.3 (8.6,18.3)
>= Two cars (vrs no cars/one car)				6.8 (2.7,11.1)
Constant		2.1837	1.8753	1.8227
R ²		0.2254	0.3247	0.3394
Number of observations	4,584	4,299	4,299	4,299

Note: As the dependent variable in the regression model is log transformed, the original coefficients from the model reflected the effects on the log-scale of the variable. Modelling coefficients on the log scale were converted to a disability pay gap by exponentiating the coefficients using the formula

$$\text{Exp}((\log \text{ scale coefficient}) - 1) * 100 = \text{disability pay gap}$$

^{KK} For comparability with the overall pay gap (e.g. 12.1% for employees aged 17 years and over), the unadjusted pay gap was calculated for all available records (n=4,584) for those employees aged 25 and over. The modeling results are based on a reduced number of records (n=4,299) which have complete data for all characteristics included in the final model (Model 3).

Figure 8: ‘Adjusted^{LL}’ disability pay gaps at the (i) 25th percentile (ii) median and (iii) 75th percentile employees aged 25 years and above



Note: As the dependent variable in the regression model is log transformed, the original coefficients from the model reflected the effects on the log-scale of the variable. Modelling coefficients on the log scale were converted to a disability pay gap by exponentiating the coefficients using the formula

$$\text{Exp}(\log \text{ scale coefficient}) - 1) * 100 = \text{disability pay gap}$$

^{LL} For comparability with the overall pay gap (e.g. 12.1% for employees aged 17 years and over), the raw or ‘unadjusted’ pay gap was calculated for all available records (n=4,584) for those employees aged 25 and over. The modeling results for the adjusted pay gaps are based on a reduced number of records (n=4,299) which have complete data for all characteristics included in the modelling.