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Income and employment equity of graduates with and without disabilities

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Abstract.
BACKGROUND: Among Organisation for Economic Co-operation and Development [OECD] countries, Australians with disabilities are most at risk of experiencing poverty. Employment equity is essential for wellbeing, health and social inclusion. Reported differences in income level between people with and without disabilities vary widely between 0 to 47% depending on productivity assumptions. Contradictory to these assumptions, empirical research has demonstrated that people with disabilities often have equivalent skills, superior loyalty and lower absentee rates.
OBJECTIVE: To investigate if there is a significant difference in the annual remuneration, hours worked and age-related career trajectory of graduates with and without disabilities.
METHODS: Descriptive statistics and regression analysis were used to identify employment equity between graduates with and without disabilities in the 2011 Australian Census.
RESULTS: Graduates with disabilities received a mean weekly income that was 53% of the income of graduates without disabilities and 85% of the mean hourly income. Female graduates with disabilities received the lowest mean income of all subgroups at 35% of the mean weekly income of male graduates without disabilities
CONCLUSION: This corroborates previous research that reports people with disabilities have difficulty obtaining employment, experience insecure employment and have fewer career and promotional opportunities. The income gaps were significantly greater than gaps previously reported.

Keywords: Social inclusion, wage disparity, gender, indigeneity

1. Introduction

The United Nations Convention on the Rights of Persons with Disabilities to which Australia became a party in 2008 defines disability discrimination as "any distinction, exclusion or restriction on the basis of disability which has the purpose or effect of impairing or nullifying the recognition, enjoyment or exercise, on an equal basis with others, of all human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field" [1].

People with disabilities experience almost eight times the poverty rate of people without disabilities [2, 3]. Employment equity is not only essential for closing the income/poverty gap, it is also important to a person's 'self-worth', wellbeing, health, social inclusion and engagement within the community [2–7].

In 2015, there were approximately 2.1 million working age Australians with a disability, of which just over one million were employed while another 114,900 were seeking employment [8]. Compared with member countries of the Organisation for Economic Co-operation and Development [OECD], Australians with disabilities are most at risk of experiencing poverty among the 27 surveyed countries [9, 10]. Australia is also among countries with the lowest employment rates for people with a disability at 55% [21/29] [9].

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Australia has ratified the Convention on the Rights of Persons with Disabilities and the Optional Protocol. Article 27 addresses work and employment for people with disabilities. This includes the right to apply for employment and to be recruited without discrimination and the opportunity to work alongside people without disabilities in fully inclusive employment settings. Subsection (a) explicitly prohibits discrimination based on disability in all area of employment, including recruitment, hiring, continuance of employment and career advancement. Subsection (b) stipulates that people with disabilities should receive equal working conditions and equal remuneration for equal work [1].

In addition, the Australian Disability Discrimination Act 1992 prohibits discrimination in the terms and conditions of employment, for example pay rate, hours per week and leave conditions [11].

Although Australia, the United States, and the United Kingdom have had disability discrimination legislation since the early 1990s, research suggests there has been little impact on employment rates and conditions for people with disabilities. People with disabilities may have been disadvantaged by disability discrimination legislation as employers attempt to avoid making accommodations and potential future litigation by not employing people with disabilities [2, 4, 6, 12].

1.1. Factors contributing to low employment and income rates

There are a number of misconceptions concerning people with disabilities that are used to explain reduced employment and income rates, including assumptions about lower levels of productivity, increased need for leave, mental health difficulties, the extent of adjustments that a person may require and lower expectations in relation to all aspects of employment [2, 6, 7, 13].

In Australia, people with disabilities also experience inequity in educational attainment and outcomes. Approximately 90% of students with a disability attended mainstream schools. Twenty- six per cent of students with disabilities did not continue their education past year 10 and 64% did not complete year 12, this is compared with 40% of students without disabilities who did not complete year 12. Thirteen percent of students with disabilities did not complete post- secondary education after commencement, compared to 2% of students without disabilities [14, 15]. Only 13% of students with a disability completed tertiary education, despite decades of policy supporting mainstream education for students with disabilities [10]. Graduates with disabilities also take 56.2% longer to achieve gainful employment [8]. People with disabilities may have fewer promotional opportunities as evidence suggests employers are reluctant to place people with disabilities in positions where they manage other employees [2].

1.2. The income gap for people with disabilities and perceived productivity gap

Quantitative analysis of disparities in economic remuneration is the most frequently employed measure for evaluating employment inequity. Inequity in economic remuneration also indirectly measures employment discrimination such as lack of access to employment and promotional opportunities [16].

Seven studies published between 2006–2015 were identified which investigated income inequity. All used regression analysis to investigate whether there was a statistically significant relationship between an income and disability status [3, 17–22]. A summary of the analysis of articles investigating income inequity are presented in Appendix A. All studies had adequately large sample sizes (7,666–520,409) and results consistently provided evidence of income inequity based on disability status. The differences in wage level varied. People with disabilities received between 10–47% lower wages prior to adjustment for productivity [3, 17–22]. This highlighted the systemic and pervasive nature of discrimination against people with disabilities worldwide, as income gaps are similar between countries including the United Kingdom, Ireland Canada and the United States. The largest differences between study findings regarding income disparity were due to different assumptions regarding the productivity differences between people with and without disabilities [3, 17–22]. There was also an assumption that there was no inequity in job recruitment. Several papers inferred that people with disabilities chose lower paying positions because it better suited their needs [3]. The strengths and limitations of each article are compiled in Appendix B.

1.3. Productivity

Lower productivity levels are a common assumption made about workers with disabilities, with little empirical evidence supporting this assumption. Pro-

ductivity differences that can be directly attributed to a person's disability are difficult to calculate. Isolating the limitations due to individual impairment versus work environment are complicated. With appropriate environmental adaptations "almost all jobs can be performed by somebody with a disability" and "most people with disabilities can be productive" [2, 4, 13].

The ongoing perpetuation of the assumed productivity gap contributes to the low employment, promotion and remuneration levels of people with disabilities and some employers continue to fear that a person with a disability is unproductive [2]. These assumptions also undermine confidence in the current reported levels of income and other forms of employment inequity, when statistical procedures have been used to account for presumed differences in productivity. Contradictory to these assumptions, empirical research has demonstrated that people with disabilities often have equivalent skills, superior loyalty and lower absentee rates and are potentially more profitable to employers [2, 4, 6, 7, 23].

There is also evidence that employing a person with a disability may contribute to productivity gains. People with disabilities may have experience with the use of assistive technology. Experience with technology may contribute to innovation in a workplace and improve productivity by up to 30%. The average cost of investing in assistive technology for an employee was under $500 and therefore potential productivity gains may be realized as a result of employing people with disabilities [4, 6, 13, 24].

1.4. Strategies employed to address employment inequity and discrimination

In order to address low levels of employment and the employment barriers experienced by people with disabilities, many countries have introduced penalties and incentives for employers. Laws, policies and regulations can be used as a punitive measure with the threat of prosecution or other legal action to deter discrimination. They can also be used as incentives, guidelines or targets such as affirmative action policies, reserved job positions, direct payments to employers and the use of employment quotas [2, 4].

However, there is little evidence of the benefit of quotas and incentives. The majority of countries who have implemented quotas have not met the specified level of employment [2]. It is also argued that incentive programs may confirm assumptions that people with disabilities are less productive. Incentive programs also perpetuate assumptions that employing a person with a disability involves additional costs for employers and, consequently exacerbate existing barriers to employment [2, 4]. Alternatively, first-hand experience of employing a person with a disability may change employer attitudes. US companies that already employed a person with a disability were significantly more likely to employ other people with disabilities, while employers with little experience of people with disabilities believed the disability was a safety concern (2,250). There is conflicting evidence regarding the disclosure of disabilities, particularly during the interview stage. With most research suggesting disclosure hinders employment opportunities, although specific autism spectrum disorder (ASD) research has highlighted a benefit in early disclosure [2, 4, 5, 25].

1.5. A framework for research on income inequity limiting the impact of productivity assumptions

There are consistent findings regarding the income inequity between people with and without disabilities and this is particularly prevalent in Australia [OECD, 2009; 2017]. However. The extent, interpretation and understanding of this inequity is currently compromised by poorly justified assumptions regarding the productivity of people with disabilities. Graduates who have completed recognized qualifications under the Australian Qualifications Framework have met specified qualification standards [27]. Although not an empirical measure of productivity, the investigation of income equity among graduates was identified as an independently verified mechanism for establishing an equivalence in the recognized employment capability of people with and without disability. Employment and income inequity is also well established based on gender and Indigeneity without recourse to discriminatory claims of productivity differences which were prevalent historically [16, 29]. Comparison of the patterns of income inequity on the basis of disability, gender and Indigeneity could also be informative. Patterns of change across different age levels would also provide a more complete picture of income inequity across years of experience [3]. This study set out to address the following research questions:

2. Research question

Is there a significant difference in the annual remuneration, hours worked, hourly rate of pay and age-related income changes of graduates with and without disabilities in Australia?

Is there a significant difference in age-related income changes of male and female graduates with and without disabilities?

Is there a significant difference in age-related income changes of Indigenous[1] and non Indigenous[1] male and female graduates with and without disabilities?

3. Method

3.1. Design

Descriptive statistics and regression analysis were used to identify employment inequities between graduates with and without disabilities. Data were drawn from all graduates who participated in the 2011 Australian Census. Descriptive statistics and regression analysis were used to identify employment inequities between graduates with and without disabilities

3.2. Participants

The 2011 Australian Census was utilised to analyse employment outcomes for graduates with disabilities working in Australia. After filtering, this resulted in 638,991 graduates without disabilities and 4,090 graduates with disabilities. This number consisted of 273,015 male graduates and 365,976 female graduates without disabilities and 1,423 male graduates and 2,667 female graduates with disabilities. 622,484 non-Indigenous graduates and 6,771 Indigenous graduates. 353,262 non-Indigenous female graduates without disabilities, 2,288 non-Indigenous female graduates with disabilities, 4,646 Indigenous female graduates without disabilities and 100 Indigenous female graduates with disabilities. People who did not disclose their Indigenous status were excluded from the calculations.

[1]Throughout this journal article the term "Indigenous" is used to refer to those Australians who have identified in the Australian census that they are of Aboriginal and Torres Strait Islander origin. We acknowledge that these terms do not adequately identify the diverse nations and language groups that are encompassed by this terminology and that the use of such terminology is a legacy of colonization.

3.3. Procedure

Ethical approval was obtained from the Southern Cross University Human Research Ethics Committee.

The 2011 Australian Census data was obtained through the Australian Bureau of Statistics Table Builder online tool. The Table Builder tool allowed for the development of raw data tables from the 2011 Census of Population and Housing. The fields used to create the raw data tables were age in single years, university or tertiary institution, total personal income, hours worked, need for assistance, gender and Indigenous status.. Disability status was obtained though aggregating people who answered yes to "Has need for assistance with core activities" and graduates were people who indicated their education level was "University or other Tertiary Institution".

Graduates between 21 and 65 years of age were included. As this is the current working age in Australia, additional filtering was required to remove the responses without numerical values, negative incomes, not stated incomes and not applicable incomes.

3.4. Data analysis

The mean income was calculated in Microsoft Excel for all ages in each subgroup. This was calculated by determining the percentage of people in each income bracket for each year. The population percentages were multiplied by the mean value of each income bracket and then summed to obtain a mean income for each age increment. In order to investigate the contribution of major sources of income inequity the mean incomes and mean hours worked per week were calculated in relation to each subgroup. Subgroups included graduates without disabilities, graduates with disabilities, male graduates without disabilities, male graduates with disabilities, female graduates without disabilities, female graduates with disabilities, male graduates, female graduates, Indigenous male graduates without disabilities, Indigenous male graduates with disabilities, Indigenous female graduates without disabilities and Indigenous female graduates with disabilities. The mean incomes for each age level for each subgroup mentioned above were then uploaded to SPSS for analysis.

The same statistical tools were used to calculate the income changes at each age level for each group for comparison purposes. All population groups included people ranging in age from 21 to 65 years of age,

as that is the current working age of graduates in Australia, except analysis involving Aboriginal and Torres Strait Islander graduates whose working age ranged from 21 to 55 years of age as defined by the Australian Bureau of Statistics [23]. Independent *t*-tests with an α of 0.01 were used to compare the mean incomes of graduates in each subgroup. Quadratic curve estimations were applied to analyse the relationships between income and age for graduates and fit to the model was analysed by evaluating R squared.

Career trajectories were analysed by comparing the rate of income change over age. As the models were non-linear the rate of income change was analysed at three specific age groups, 25, 35 and 45 years of age. The average rate of change in income over age was derived from the regression analysis. The slope of the tangent which was calculated as the derivative of the quadratic function, at specific age points equated to the rate of income change at that age level. This was used to indicate the income changes experienced at key points in the career trajectory of graduates for each subgroup.

4. Results

4.1. Overview of Australian graduates with and without disabilities

The sample included 638,991 graduates without disabilities and 4,090 graduates with disabilities. The mean weekly income for graduates without disabilities was $937Aud (SD = 238), while graduates with disabilities received a mean weekly income of $494Aud (SD = 103) which is 53% of the mean weekly income of people without disabilities. (Table 1 and Fig. 1). This was a highly significant difference ($t(88) = 11.49$, $P < 0.001$).

The quadratic regression for graduates without disabilities resulted in an adjusted R squared value of 0.961 indicating that 96% of the variability in income was accounted for by age (Fig. 2). The quadratic regression for graduates with disabilities resulted in an adjusted R squared value of 0.48. Indicating that 48% of the variability in income was accounted for by age. The results highlight that age-related changes in the income of graduates with a disability were more erratic and less predictable than the age related income changes of people without disabilities.

The quadratic equation describing the relationship between income and age for graduates without disabilities was Income = $-1.0793\text{Age}^2 + 105.29\text{Age}$ -

Table 1
Australian graduates with and without disabilities

	Without a Disability	With a Disability
Participants N	638,991	4,090
Mean Income	937	494
Std. Deviation	238	102
Quadratic Regression Adjusted R Square	0.960	0.611
Quadratic Regression Significance P	<0.001	<0.001

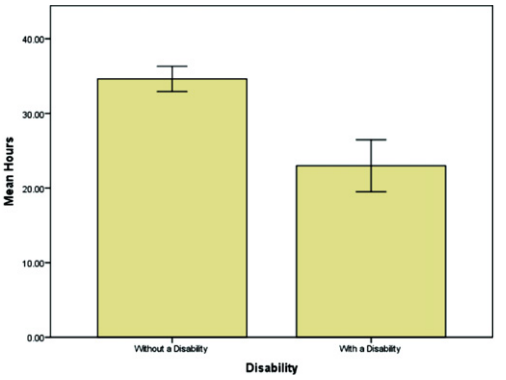

Fig. 1. Mean weekly incomes for graduates with and without disabilities.

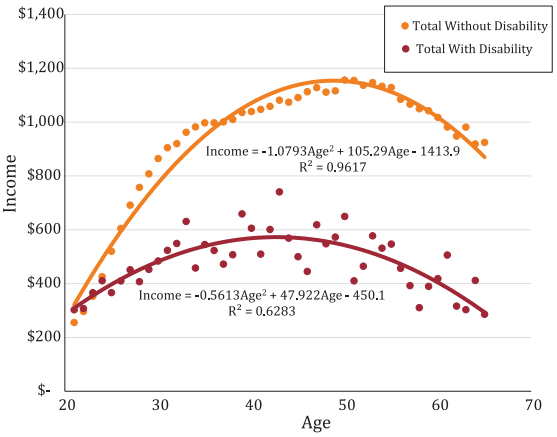

Fig. 2. Weekly incomes for graduates with and without disabilities.

Table 2
Comparison in rate of income change per year at age 25, 35 and 45 years for graduates with and without disabilities

Age	Graduates	
	Without Disabilities $ Aud	With Disabilities $ Aud
25	51.33	19.86
35	29.74	8.63
45	8.15	–2.60

1413.9 while the equation for graduates with disabilities was Income = –0.5613Age^2 + 47.922Age - 450.1. The income change for graduates without disabilities was $51Aud per year at 25 years of age, $30Aud per year at 35 years of age and $8Aud per year at 45 years of age. While income for graduates with disabilities was $20Aud per year at 25 years of age, $9Aud per year at 35 years of age and reduced by $3Aud per year at 45 years of age (Table 2). Therefore, graduates without disability average income increased 3.45 times faster or increased at approximately 345% the rate of graduates with disabilities.

Major sources of income inequity were identified in the literature. The identified potentially contributing factors to income inequity were hours worked per week, gender and Indigeneity. The effect of these potential variables was analysed for each subgroup population.

4.2. Hours worked per week

People with disabilities are legally entitled to equitable working conditions including hours per week. As research reported previously indicated, people with disabilities are finding it difficult to obtain full employment.

The sample included 418,392 graduates without disabilities and 1,232 graduates with disabilities. The mean weekly hours for graduates without disabilities was 31.2 hours (SD = 4.24), while graduates with disabilities worked a mean weekly hours of 20.6 (SD = 7.21) which is 66% of the mean weekly hours of people without disabilities. (Table 3). This was a highly significant difference (t(84) = 8.419, $P < 0.001$) (Table 3). This equated to a mean hourly income for graduates without disabilities of $29.35Aud (SD = 4.95), while graduates with disabilities received a mean hourly income of$24.89Aud (SD = 8.74) which is 85% of the mean hourly income of people without disabilities. (Table 3). This was a highly significant difference with a (t(83) = 2.934, $P < 0.001$) (Table 3).

Table 3
Australian graduate hours with and without disabilities

	Without a Disability	With a Disability
Participants N	418,392	1,232
Mean Hours	31.25	20.62
Std. Deviation	4.24	7.21
Mean Hourly Income	$29.35	$24.89
Std. Deviation	4.95	8.74

Table 4
Male and female Australian graduates

	Male	Female
Participants N	274,438	368,643
Mean Income	$1,106	$821
Std. Deviation	325.2	188.6
Quadratic Regression Adjusted R Square	0.977	0.922
Quadratic Regression Significance P	<0.001	<0.001
Mean Comparison Significance P	<0.001	

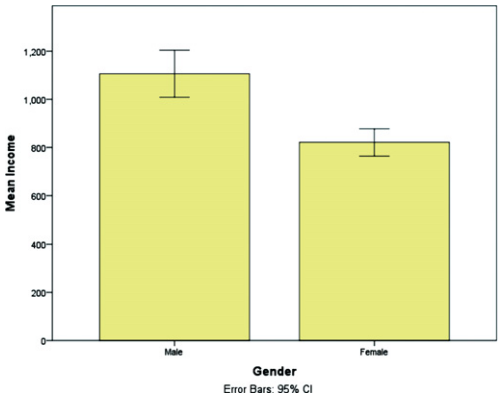

Fig. 3. Mean incomes for male and female graduates.

4.3. Gender

4.3.1. Total male and female graduates

The samples included 274,438 male and 368,643 female graduates. The mean weekly income for male graduates was $1,106Aud (SD = 325.2), while female graduates received a mean weekly income of $821Aud (SD = 188.6) which is 74% of the mean weekly income of male graduates (Table 4 and Fig. 3). This was a highly significant difference (t (88) = 5.089, $P < 0.001$).

The quadratic regression for male graduates resulted in an adjusted R squared value of 0.977 indicating that 98% of the variability in income was accounted for by age. The quadratic regression for female graduates resulted in an adjusted R squared value of 0.922. Indicating that 92% of the variability in income was accounted for by age (Fig. 4).

The quadratic equation describing the relationship between income and age for male graduates was Income = –1.6478Age^2 + 157.01Age - 2320.5 while the equation for female graduates was Income = –0.7947Age^2 + 78.627Age - 956.45. The income change for male graduates was $75Aud per year at 25 years of age, $42Aud and 35 years of age and $9Aud at 45 years of age. While female gradu-

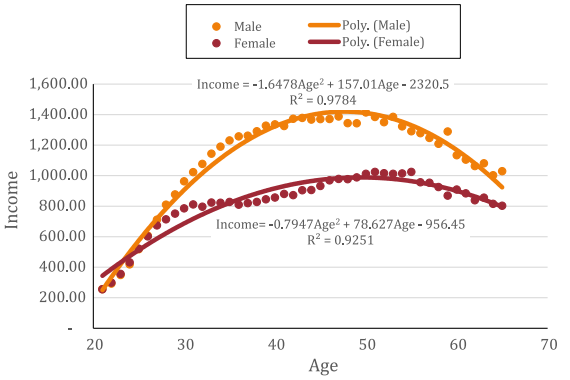

Fig. 4. Weekly incomes for male and female graduates.

Table 5
Comparison in rate of income change per year at age 25, 35 and 45 years for male and female graduates

Age	Male $ Aud	Female $ Aud
25	75	39
35	42	23
45	9	7

ate incomes changed by $39Aud at 25 years of age, $23Aud at 35 years of age and $7Aud at 45 years of age (Table 5). Therefore, male graduates average income increased 1.81 times faster or increased at approximately 181% the rate of female graduates.

4.4. *Male graduates with and without disabilities*

The sample included 273,015 male graduates without disabilities and 1,423 male graduates with disabilities ranging in age from 21 to 65 years working in Australia. The mean weekly income for male graduates without disabilities was $1,115Aud (SD = 328.5), while male graduates with disabilities received a mean weekly income of $491Aud (SD = 153.3) which is 44% of the mean weekly income of male graduates without disabilities. (Table 6 and Fig. 5). This was a highly significant difference (t (88) = 11.545, $P < 0.001$).

The quadratic regression for graduates without disabilities resulted in an adjusted R squared value of 0. 978 indicating that 98% of the variability in income was accounted for by age. The quadratic regression for graduates with disabilities resulted in an adjusted R squared value of 0. 381. Indicating that 38% of the variability in income was accounted for by age (Fig. 6). The results highlight that age related changes

Table 6
Australian male graduates with and without disabilities

	Without a Disability	With a Disability
Participants N	273,015	1,423
Mean Income	$1,115	$491
Std. Deviation	328.5	153.3
Quadratic Regression Adjusted R Square	0.978	0.381
Quadratic Regression Significance P	<0.001	<0.001

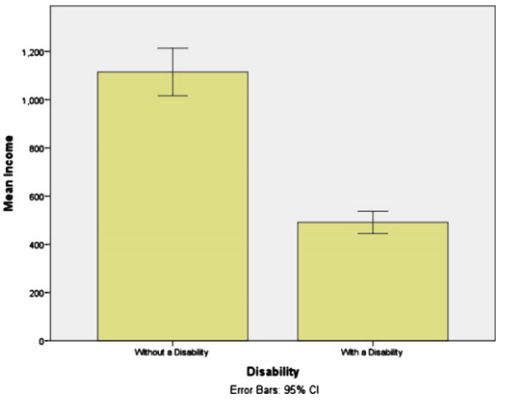

Fig. 5. Mean incomes for male graduates with and without a disability.

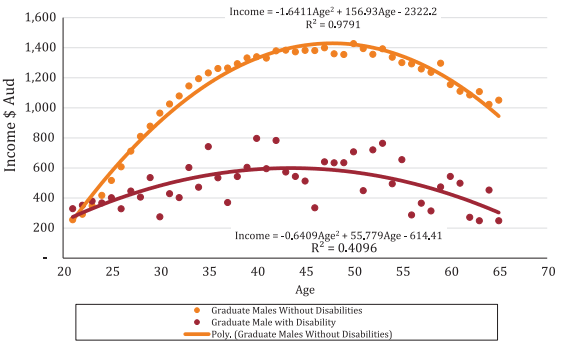

Fig. 6. Mean weekly incomes for male graduates with and without disabilities.

in the income of male graduates with a disability were more erratic and less predictable than the age related income changes of people without disabilities.

The quadratic equation describing the relationship between income and age for male graduates without disabilities was income = $-1.6411\text{Age}^2 + 156.93\text{Age} - 2322.2$ while the equation for male graduates with disabilities was Income = $-0.6409\text{Age}^2 + 55.779$ Age - 614.41. The income change for male graduates without disabilities were $75Aud per year at 25 years of

Table 7
Comparison in rate of income change per year at age 25, 35 and 45 years for male graduates with and without disabilities

Age	Without Disabilities $ Aud	With Disabilities $ Aud
25	75	24
35	42	11
45	9	–2

age, $42Aud per year at 35 years of age and $9Aud per year at 45 years of age. While income change for male graduates with disabilities were $24Aud per year at 25 years of age, $11Aud per year at 35 years of age and reduced by $2Aud per year at 45 years of age (Table 7). Therefore, male graduates without disability average income increased 3.85 times (385%) the rate of male graduates with disabilities.

4.5. *Female graduates with and without disabilities*

The sample included 365,976 female graduates without disabilities and 2,667 female graduates with disabilities. The mean weekly income for female graduates without disabilities was $827Aud (SD = 191.9), while female graduates with disabilities received a mean weekly income of $391Aud (SD = 98.8) which is 47% of the mean weekly income of female graduates without disabilities. (Table 8 and Fig. 7). This was a highly significant difference ($t(88) = 13.555$, $P < 0.001$).

Quadratic curve estimations were applied to analyse the relationships between income and age for female graduates without and with disabilities. The quadratic regression for female graduates without disabilities resulted in an adjusted R squared value of 0. 961 indicating that 96% of the variability in income was accounted for by age. The quadratic regression for female graduates with disabilities resulted in an adjusted R squared value of 0.459. Indicating that 46% of the variability in income was accounted for by age (Fig. 8). The results highlight that age-related

Table 8
Australian female graduates with and without disabilities

	Without a Disability	With a Disability
Participants N	365,976	2,667
Mean Income	$827	$391
Std. Deviation	191.9	98.2
Quadratic Regression Adjusted R Square	0.961	0.459
Quadratic Regression Significance P	<0.001	<0.001

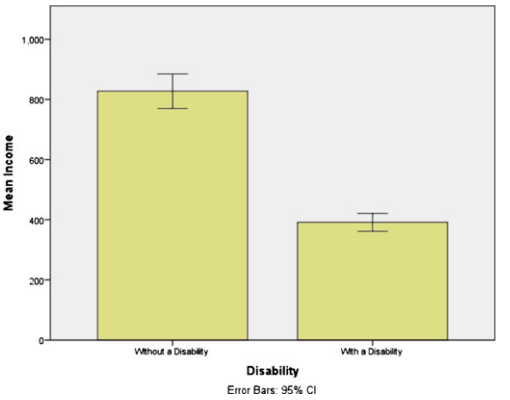

Fig. 7. Mean incomes for female graduates with and without a disability.

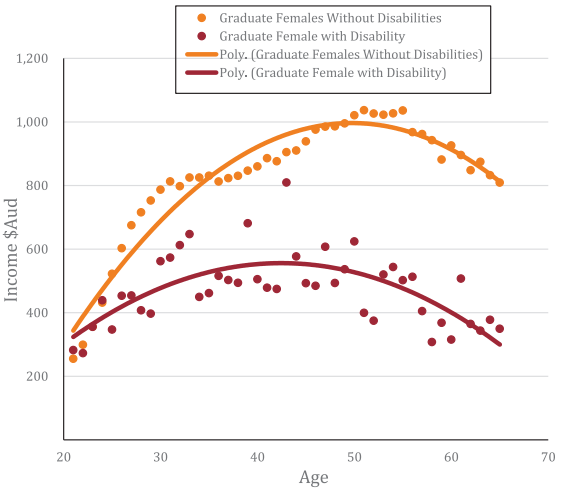

Fig. 8. Mean weekly incomes for female graduates with and without disabilities.

changes in the income of female graduates with a disability were more erratic and less predictable than the age related income changes of people without disabilities.

The quadratic equation describing the relationship between income and age for female graduates without disabilities was $y = –0.7907x^2 + 78.646x - 959.2$ while the equation for female graduates with disabilities was $y = –0.5041x^2 + 42.809x - 352.95$. The income change for female graduates without disabilities was $38Aud per year at 25 years of age, $23Aud per year at 35 years of age and $7Aud per year at 45 years of age. While the income change for female graduates with disabilities was $18Aud per year at 25 years of age, $8Aud per year at 35 years of age and reduced by $3Aud per year at 45 years of age

Table 9
Comparison in rate of income change per year at age 25, 35 and 45 years for female graduates with and without disabilities

Age	Without Disabilities $ Aud	With Disabilities $ Aud
25	39	18
35	23	8
45	7	–3

(Table 9). Therefore, female graduates without disability average income increased 3.10 times faster or increased at approximately 310% the rate of female graduates with disabilities.

4.6. *Aboriginal and Torres Strait Islander graduates*

Mean weekly income was calculated for Aboriginal and Torres Strait Islander graduates and non-Indigenous graduates to investigate Indigeneity as another source of income inequity. The sample included 622,484 non-Indigenous graduates and 6,771 Indigenous graduates. The mean weekly income for non-Indigenous graduates was $915Aud (SD = 263.7), while Indigenous graduates received a mean weekly income of $816Aud (SD = 172.3) which is 89% of the mean weekly income of non-Indigenous graduates (Table 10 and Fig. 9). There was no statistically significant difference ($t(68) = 1.843$, $P < 0.07$) between the mean weekly income of Indigenous and non-Indigenous graduates.

The quadratic regression for nonindigenous graduates resulted in an adjusted R squared value of 0. 964 indicating that 96% of the variability in income was accounted for by age. The quadratic regression for Indigenous graduates resulted in an adjusted R squared value of 0. 825. Indicating that 83% of the variability in income was accounted for by age (Fig. 10).

Table 10
Australian non-Indigenous and Indigenous graduates

	non-Indigenous	Indigenous
Participants N	622,484	6,771
Mean Income	$915	$816
Std. Deviation	263.7	172.3
Quadratic Regression Adjusted R Square	0.964	0.825
Quadratic Regression Significance P	<0.001	<0.001
Mean Comparison Significance P	0.070	

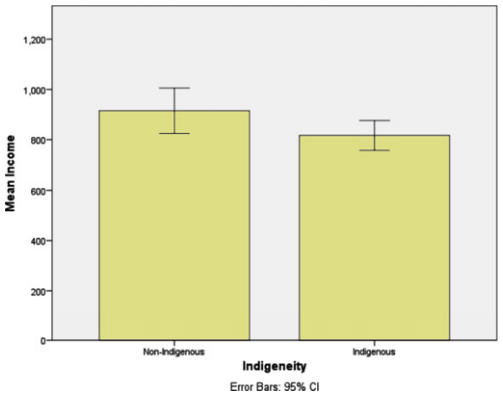

Fig. 9. Mean incomes for non-Indigenous and Indigenous graduates.

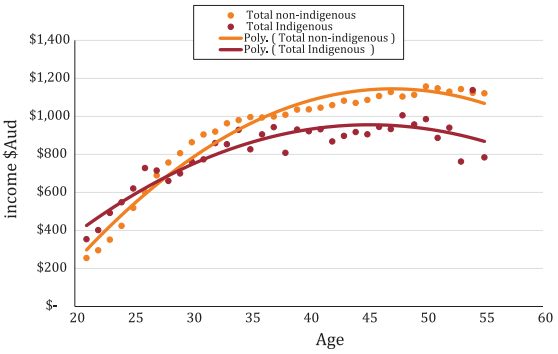

Fig. 10. Mean incomes for non-Indigenous and Indigenous graduates.

The quadratic equation describing the relationship between income and age for nonindigenous graduates was Income = $-1.2416Age^2 + 117.04Age - 1612.9$ while the equation for Indigenous graduates was Income = $-0.9067Age^2 + 81.929Age - 894.72$. The income change for nonindigenous graduates was $55Aud per year 25 years of age, $30Aud per year 35 years of age and $5Aud per year 45 years of age. While income change for Indigenous graduates was $37Aud per year at 25 years of age, $18Aud per year at 35 years of age and $0Aud per year at 45 years of age (Table 11). Therefore, non- Indigenous graduates average income increased 1.63 times faster or increased at approximately 163% the rate of Indigenous graduates.

There was insufficient data in the 2011 Australian Census to analyse the income and income changes of male Aboriginal and Torres Strait Islander graduates with disabilities.

Table 11
Comparison in rate of income change per year at age 25, 35 and 45 years for NonIndigenous and Indigenous graduates

Age	NonIndigenous $ Aud	Indigenous $ Aud
25	55	37
35	30	18
45	5	0

Table 12
Indigenous female graduates with and without disabilities

	Without Disabilities	With Disabilities
Participants N	4,646	100
Mean Income	$707	$713
Std. Deviation	231.1	235.1
Quadratic Regression Adjusted R Square	0.531	0.542
Quadratic Regression Significance P	<0.001	<0.001
Mean Comparison Significance P	0.905	

4.7. *Indigeneity and disability among female graduates*

The sample included 4,646 Indigenous female graduates without disabilities and 100 Indigenous female graduates with disabilities. The mean income for Aboriginal and Torres Strait Islander females graduates without a disability was $707Aud (SD = 231.1) while Aboriginal and Torres Strait Islander female graduates with a disability had a mean income of $713Aud (SD = 235.1), which is 101% of the mean graduate income of female Aboriginal and Torres Strait Islander female graduates without a disability (Table 12 and Fig. 11). There was not a statistically significant difference (t (86) = –120, $P < 0.905$) between the mean income of Indigenous female graduates with and without disability.

The quadratic regression for nonindigenous graduates resulted in an adjusted R squared value of 0. 531 indicating that 53% of the variability in income was accounted for by age. The quadratic regression for Indigenous graduates resulted in an adjusted R squared value of 0. 542. Indicating that 54% of the variability in income was accounted for by age (Fig. 12).

The quadratic equation describing the relationship between income and age for non-Indigenous female graduates was Income = $-0.7205Age^2 + 66.174Age - 628.06$ while the equation for Indigenous graduates was Income = $-0.7072Age^2 + 65.934Age - 631.88$. The income change for female nonindigenous graduates was $48Aud per year at 25 years of age, $41Aud per year at 35 years of age and $34Aud per year at 45 years of age. While income change for female Indigenous graduates was $48Aud per year at 25 years of age, $41Aud per year at 35 years of age and $34Aud per year at 45 years of age (Table 13). Therefore, non- Indigenous female graduates average income increased at the same rate as female Indigenous graduates.

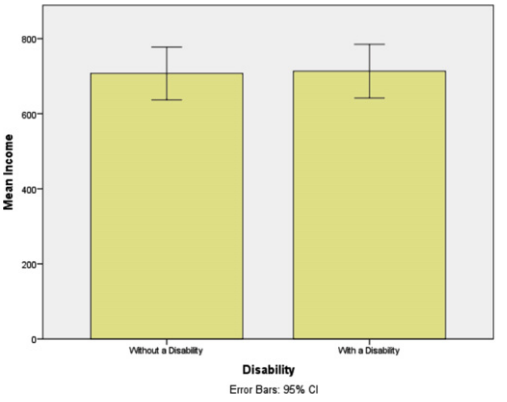

Fig. 11. Indigenous female graduates with and without disabilities.

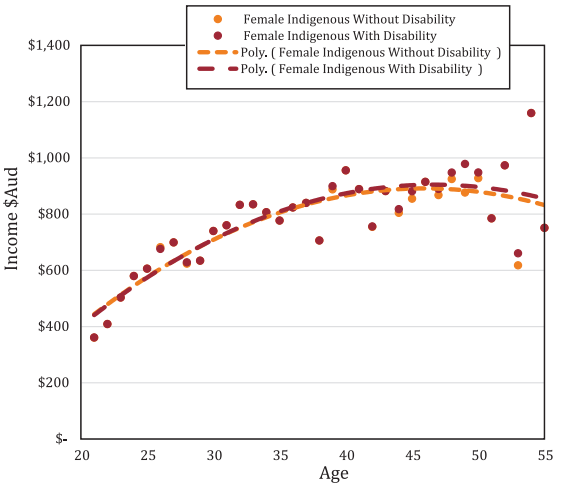

Fig. 12. Indigenous female graduates with and without disabilities.

4.8. *Overview of graduate women*

As there was insufficient data to analyse Indigenous male graduates with disabilities only female graduates were divided into subgroups and analysed separately.

The sample included 353,262 non-Indigenous female graduates without disabilities, 2,288 non-

Table 13
Comparison in rate of income change per year at age 25, 35 and 45 years for Indigenous female graduates

Age	Nonindigenous $ Aud	Indigenous $ Aud
25	30	31
35	16	16
45	1	2

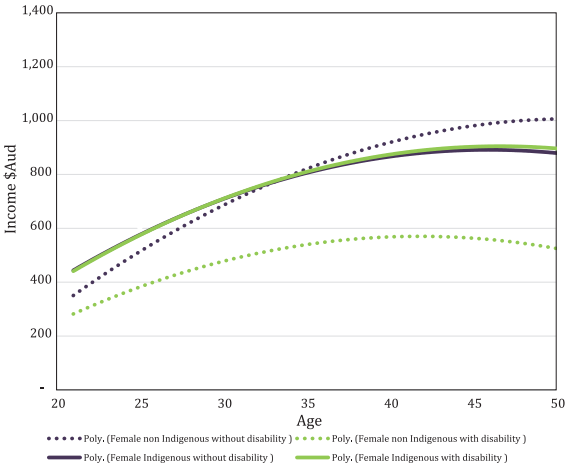

Fig. 13. Aboriginal and Torres Strait Islander female graduates with and without disabilities and Non Indigenous female graduates with and without disabilities.

Indigenous female graduates with disabilities, 4,646 Indigenous female graduates without disabilities and 100 Indigenous female graduates with disabilities.

As mentioned above there is no statistical difference between three of the four female subgroups analysed. Only non- Indigenous female graduates with disabilities had significantly lower incomes in comparison to other women graduates (Fig. 13). However, the income of all women graduate subgroups was significantly below male non-disabled graduate incomes.

4.9. The compounding effect of gender and disability discrimination

The results indicate a compounding effect resulting from gender inequity and disability inequity on the income level of graduates. Female graduates with disabilities received significantly lower mean weekly incomes than male graduates without disabilities. The mean weekly income for male graduates without disabilities was $1,115Aud (SD = 328.5), while female graduates with disabilities received a mean weekly income of $391Aud (SD = 98.2) which is 35% of the mean weekly income of male graduates without disabilities. The derivatives for male graduates without disabilities were $75Aud at 25 years of age, $42Aud and 35 years of age and $9Aud at 45 years of age. While female graduates with disabilities derivatives resulted $18 at 25 years of age, $Aud 8 at 35 years of age and reduced by$3Aud at 45 years of age. Therefore, male graduates without disability average income increased 5.54 times faster or increased at approximately 554% the rate of female graduates with disabilities. This was the largest income inequity between the subgroups investigated in this inquiry (Fig. 14).

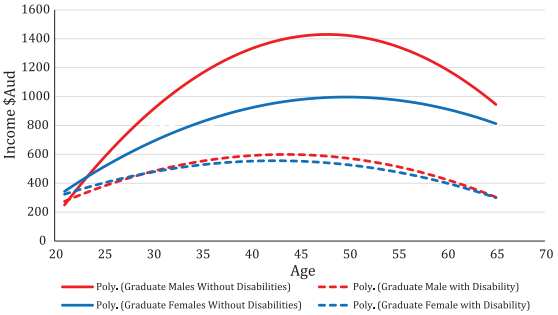

Fig. 14. Mean weekly incomes for male and female graduates with and without disabilities.

5. Discussion

Productivity of any individual is difficult to measure as productivity fluctuates daily depending on circumstances. To reduce the influence of any assumptions that might be made about differential levels of productivity between people with a without disabilities as somehow accounting for the differences in income levels identified above, the research was conducted on graduates only. The work of graduates, as knowledge workers, is less likely to be questioned regarding the level of productivity attained. Graduates have reached achievement standards such as those determined by the Australian Qualifications Framework and various professional credentialing bodies in order to attain certification [27]. It is no longer acceptable to account for income differences between employees by making assumptions about productivity differences based on gender or race. Productivity was historically used as a ratio-

nale for gender and race based income inequity [16, 29]. It should also not be acceptable to assume there are productivity differences between graduates with and without disabilities in the absence of substantial and reliable empirical evidence. Qualifying the substantial income gap demonstrated in the findings between graduates with and without disabilities with reference to unsubstantiated productivity assumptions may also be evidence of discrimination [31, 32], particularly when evidence suggests that people with disabilities may be more loyal, take fewer sick days and be more productive.

As at the 2011 Australian census, graduates with disabilities had significantly lower mean incomes, and significantly flatter and more erratic age-related income changes over the age trajectory. This corroborates previous research that reports people with disabilities have difficulty obtaining employment, experience insecure employment and have fewer career and promotional opportunities [1]. The income gaps found in the 2011 Australian census were significantly greater than gaps previously reported [3, 17–22]. The reviewed literature estimated the income gap as falling between 0% and 47% while the census findings indicate that the average income gap for graduates was 47% which equates to an average income gap of $443Aud per week.

The income gap for women with disabilities demonstrated the greatest level of inequity of all subgroups examined, with gender and disability appearing to be co-contributing factors. It appears that disability exacerbated the already well established and well researched income inequality experienced by women, with female graduates with disabilities receiving the lowest mean income of $391Aud a week which is 35% of the mean weekly income of male graduates without a disability. Disability and gender discrimination compound income inequality for female graduates with disabilities.

Graduates with disabilities worked significantly fewer hours per week. This supports the findings of previous research that graduates with disabilities experience difficulty finding full-time employment [8, 30]. Previous research has argued that the income inequity experienced by people with disabilities is due to the fewer number of hours that people work in a week with the implication that this is either the personal choice of the person with a disability or a necessity associated with the experience of disability [3, 19–21]. That appears to be an incorrect assumption, as the hourly rate of pay was also significantly lower for graduates with disabilities than graduates without disabilities. It should also be noted that the hourly rate of pay for people with disabilities estimated in this study based on the census may be artificially inflated by people with a disability who may have received significant compensation payments to support lifetime care needs and their investment income may have artificially inflated the hourly income calculated in the findings.

Indigeneity was the final major source of income inequality investigated as Indigenous peoples have historically worldwide and in Australia been marginalised and excluded from the labour market through systematic discrimination [31]. Indigeneity was examined as a separate contributing factor to income inequality between graduates. During the filtering process it became apparent that there would be insufficient data to analyse Indigenous male graduates with a disability. Only female Indigenous graduates with a disability were included in the analysis. There was no significant difference between the mean incomes of Indigenous female graduates compared to non-Indigenous female graduates. Indigeneity was not a significant co-contributor to income inequity for female graduates. Indigenous female graduates with and without disabilities received almost identical mean weekly incomes and income changes with age level. There was no significant difference between non-Indigenous women without disabilities and Indigenous women with and without disabilities. Therefore, Indigeneity was associated with income equity between women graduates with and without disabilities. Non-Indigenous women with disabilities had a significantly lower mean income in comparison to all other groups. These findings should be interpreted with caution. We note that only 26% of Indigenous Australians had completed tertiary qualifications in the 2011 census compared with 49% of non-Indigenous Australians and all women had significantly lower incomes than males without disabilities indicating other forms of inequity are still prevalent.

There was an interesting pattern associated with the age-related income trajectory suggesting that the early to middle career period is crucial for maximising income and that lower rates of income change during this period are reflected in income level in later years. This highlights the career long impact of the flattened trajectory of income changes for people with disabilities and the challenges people experience in securing employment and opportunities for career advancement [1].

5.1. Strengths and limitations

Utilising a government census permitted population sampling and supported the identification of highly significant and highly correlated results. It also allowed for the data to be divided into subcategories for the analysis of additional variables that may have influenced these findings. The subcategories were used not only to separate subgroups but also to compare subgroups and investigate contributing and mitigating factors that may influence income equity.

The research was limited by the restrictive definition of disability used by the Census and the accuracy of Census data collection. This is most likely to have an impact on the accuracy of data collection for people with disability and also people of Indigenous background. It is unknown what effect this may have had on the findings. There were insufficient Indigenous men with disabilities who have a graduate degree identified in the Census, for any analysis to be completed involving this sub group. Additional limitations occurred when exploring hours worked per week with approximately 2 out of 3 graduates with disabilities and 1 out of 3 of graduates without disabilities not responding to the hours worked per week with a numerical value. Those graduates were not included in the analysis involving hours per week. In addition, these findings investigated the income equity among graduates and it is important to note that only 42% of people with a disability have completed graduate qualifications in comparison to 72% in the general population. This investigation was confined to one aspect of income and employment inequity experienced by people with a disability.

6. Conclusion

The research findings confirmed previous studies that have demonstrated income inequity for people with disabilities, although this analysis of the 2011 census of graduates found a substantially larger income gap than in previous studies. These research findings provide a clearer foundation regarding the extent of inequity for graduates and will inform further investigation and the development of strategies to address inequity, particularly research into the lived employment experiences of graduates with disabilities.

The research findings also identified important patterns in the comparison between different sources of inequity. The income gap was even greater for non-Indigenous women with disabilities. There was insufficient information in this research to explain why Indigeneity was a mitigating factor against income inequity. This could be informed by future investigation into employment programs whereby the employment strengths of graduates of Indigenous background are specifically targeted as a promising model for promoting the employment equity of graduates with a disability. For example, the recruitment targets for Indigenous staff in Australian Universities specified in current University funding arrangements [34]. The findings of this study and the future investigation of effective strategies, differences in industry sectors and under different support and funding arrangements would inform the achievement of employment productivity targets and employment policies of current disability reform programs including the National Disability Insurance Scheme. Although beyond the scope of this inquiry, additional research into income changes over the career trajectory would involve tracking change over multiple census or following age cohorts over a period of time and comparing differences in the patterns of income equity in different industries to further inform strategies and programs designed to address income inequity and its many implication for social inclusion, health and well-being [2, 3].

Conflict of interest

None to report.

Supplementary material

The Appendices are available in the electronic version of this article: https://dx.doi.org/10.3233/WOR-203109.

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