Working-age people with disability and labour force participation: geographical variations in Australia

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Abstract

Purpose

To examine geographical variation in labour force participation rate (LFPR) of working-age people with disability in Australia and associated factors.

Method

This study uses Australian Census 2016 data at Statistical Area Level 2 (SA2) and engages multiple linear regression to explore the relationship between the dependent variable, LFPR of people with disability, and diverse independent variables that reflect collective characteristics of people with disability and their non-disabled peers within SA2s.

Results

While LFPRs for people with disability varied greatly by SA2s, people with disability had considerably lower LFPR than their non-disabled peers in all areas. The LFPRs tended to be higher in SA2s with higher percentages of people with disability who had completed year 12 or gained post-school education, with higher household income, and where a higher proportion of people with disability mainly spoke English at home.

Conclusions

Where people live matters. Geographic variation in LFPR for people with disability is associated with geographic variation in their educational attainment and other social and community characteristics of the areas in which they live. The study contributes towards gaining more sophisticated and nuanced understanding of the factors that influence LFPR of people with disability in relation to their local community environment.

Key words

Labour force participation, people with disability, Australia, Statistical Area Level 2, employment

Introduction

It is widely acknowledged that improving employment outcomes for people with disability benefits workplaces, the economy, the community, and individuals themselves (Australian Human Rights

Commission 2015; Steering Committee for the Review of Government Service Provision 2018 Box 15.9). One policy direction set out in the National Disability Strategy 2010–2020 is to ‘increase access to employment opportunities as a key to improving economic security and personal wellbeing for people with disability’ (DSS 2010: 42). However, despite government initiatives, substantial gaps persist in levels of labour force participation and employment for people with disability relative to the rest of the Australian population (ABS 2015; SCRGSP 2018 Tables 15A.72 and 15A.73; Green et al. 2018). Between 2001 and 2016, gaps between people with and without disability widened, both for economic opportunity and for employment-related factors such as having a vocational or higher education qualification (Emerson et al. 2018). Australia’s poor performance on employment of people with disability has been documented by the OECD (2010, 2017) and the Australian Human Rights Commission (2016).

This study aims to investigate geographic variation in levels of labour force participation for people with disability aged 15–64 years, the age range described as ‘working-age people’ by the Australian Bureau of Statistics (ABS). Many previous studies on disability and labour force and markets have noted geographic variations (McVicar 2006; Kidd et al. 2000; Brazenor 2002; Gannon & Nolan 2004). However, these studies have tended to examine variations among large geographical regions. This study takes a different approach. First, recognising the potential importance of area-level factors operating where people live, we focus on variation in labour force participation rates for people with disability at a smaller geographic scale. Second, in exploring factors expected to influence labour force participation rates within localities our aim is to reveal associations that might not be identified by analyses conducted at larger spatial scales. This more granular geographical approach not only improves our understanding of how spatial variation in key area-level factors influences labour force participation rates for people with disability, but is also valuable for informing locally-tailored policy responses.

Australian official labour statistics divide the working-age population into three mutually exclusive categories: employed, unemployed and not in the labour force, as illustrated in Figure 1 (ABS 2018b). The *labour force participation rate* (LFPR) is calculated as all people currently active in the labour force as a percentage of the working-age population ($= (b/a) \times 100$), and includes both employed and unemployed people. The *unemployment rate* is calculated as all people who are unemployed as a percentage of all those currently active in the labour force ($= (d/b) \times 100$). The *employment rate* (also called *employment to population ratio*) is calculated as all people who are employed as a percentage of the population aged 15–64 ($= (e/a) \times 100$). A person is considered in the labour force if they are currently employed or actively looking for work and available to start work.

In this analysis, we focus on LFPR because the gap in LFPR between people with disability and people without disability is much greater than the gap for unemployment or employment rates. This is due

to a relatively larger number of people with disability who are not actively searching for jobs, meaning that they are classified as not in the labour force. Between 1993 and 2015, the LFPR for people with disability was relatively stable. In 1993, the rate was 54.9%, and this was broadly similar in 2015 at 53.4%. Conversely, over the same period, the LFPR for people without disability increased from 76.9% in 1993 to 83.2% in 2015 (ABS 2015; ABS 2016a). A low LFPR means a large number of people who are NOT active in the job market (Figure 2).

Understanding the reasons why such a high proportion of people with disability are not active in the labour force is critical for informing policy action to improve employment outcomes for people with disability. In its 2016 Report 'Willing to work: National inquiry into employment discrimination against older Australians and Australians with disability', and related issues paper, the Australian Human Rights Commission conceptualises the barriers for people with disability from both individual and structural perspectives (2015: 12), and raises some key issues in relation to government programs and policies that impact on the workforce participation of Australians with disability (2016: 199). Our study sets out to examine the reasons from a third and geographic perspective.

In Australia, Vinson and Homel as early as 1975 observed that "many individuals and families living in depressed areas are restrained by a web of mutually reinforcing disadvantages from escaping to areas affording greater opportunities and life satisfactions" (1975: 21). They applied principal component analysis to select a set of indexes in an attempt to identify "high-risk" suburbs which suffered from an unusually high incidence of all, or most, of the problems targeted in their study. Since then, Vinson and colleagues (1999; 2004; 2007; 2015) have continued to improve and expand this area of research to demonstrate geographic concentration of persistent and entrenched disadvantage. 'Postcode discrimination' is a term used by commentators to describe the relationship between the life trajectory of residents and the location where they live (Bevan 2015; Parson 2016; Fernando 2018).

In 1986, the ABS developed a set of Socio-Economic Indexes for Areas (SEIFA) to measure the relative disadvantage of areas and has updated these indexes every five years. SEIFA has become valuable for governments, communities, businesses and researchers for determining areas needing additional funding and improved services, identifying potential business opportunities, and researching relationships between health and education outcomes and the socio-economic conditions of an area (ABS 2018d).

Thus, while generally not specific to disability, there exists a weight of evidence concerning the 'geography of opportunity'.¹ In other words, where people live matters for many aspects of their life such as education, employment and health. Focusing on people with disability, the geographic analyses in this study uses LFPR for people with disability as the dependent variable and explores

associations with a range of factors expected to influence labour force participation based on the findings of previous research.

Figure 1: Main concepts in Australian labour statistics

Source: adapted from ABS 2018b.

Figure 2: Labour force status of working-age population 2015

WAPwD = Working-age people with disability; WAPwoD = Working-age people without disability

Source: based on data presented in SCRGSP 2018 Table 15A.74

In this paper, we first describe the data source used, key concepts and measures, and analytical methods employed. After presenting the analysis and results, we discuss interpretation of the data, limitations of the study, and implications of the findings.

Method

This study uses data from the 2016 Australian Census of Population and Housing (hereafter referred to as ‘the Census’). The data were extracted from ABS TableBuilder.² The Australian Census is conducted five-yearly, and aims to connect with every person in Australia and collect information about each individual and the place they are staying (houses, apartments, hotels, caravans, hospitals, etc.) on Census night.³

Reporting Disability in 2016 Census data

The approach used for capturing information on disability in the Census is described in Box 1. This study uses Census data on people aged 15–64 years with ‘core activity need for assistance’ who reported that they always or sometimes needed help in at least one of the three core activities of self-care, mobility or communication because of a disability, long-term health problem (lasting 6 months or more) or old age. For ease of reference in this paper, we use the term people with disability to refer to this group of people.

Box 1: Reporting information on disability in the Australian Census

Recognising the complexity of disability (WHO 2001), the ABS has developed a two-dimensional approach to capturing information on disability:

- The first dimension determines that a person has a disability if they have a limitation, restriction or impairment, which has lasted, or is likely to last, for at least six months and restricts everyday activities (ABS 2013). The daily activities listed reflect the International Classification of Functioning Disability and Health (ICF) activities and participation domains (WHO 2001), and are divided into core activities – self-care, mobility, and communication – and non-core activities.
- The second dimension addresses how frequently – always or sometimes – a person needs assistance in any of these daily activities. People who have limitations in one or more of the three core activities and *always or sometimes* require assistance in these areas are classified as having profound or severe core activity limitation.

Starting with the 2006 Census, a “Need for assistance with core activities” module was introduced to implement this two-dimensional approach, which has been used in all subsequent Censuses.

The module comprises four disability-related questions, which ask:

- Whether the person ever (always or sometimes) needs someone to help with, or be with them for self-care, body movement and/or communication activities (Questions 20–22); and
- Whether the reasons for the need for assistance with these activities are (1) short-term health condition, (2) long-term health condition, (3) disability, (4) old or young age, (5) difficulty with English language, and/or (6) other cause (Question 23) (ABS 2006).

To date, the ABS has only released an aggregated variable “core activity need for assistance”, which is derived from these four questions. A person is recorded as having a “core activity need for assistance” if they reported always or sometimes needing help in at least one of the three core activities of self-care, mobility or communication because of a disability, long-term health problem (lasting 6 months or more) or old age.

The ABS notes that the disability population identified using the Census module should not be used to estimate the prevalence of disability in the Australian population – rather, data from the ABS Survey of Disability, Ageing and Carers should be used for this purpose (ABS 2010; 2018a). However, the population of people with disability identified by the Census is conceptually comparable to the population of people with severe or profound core activity limitation, which is the target population of specialist disability services in Australia (CSTDA 2003; Evidence Based Development Unit 2010; COAG 2009; ABS 2010).

Geographic unit of analysis

Statistical Area Level 2 (SA2) was used as the base geographical unit of analysis. SA2 is designed to reflect functional geographic areas that represent a community that interacts together socially and economically (ABS 2016b). It is the smallest area used in most ABS statistical releases, including the Estimated Resident Population (ERP), Health & Vitals and Building Approvals data. There were 2,310 SA2s across Australia in 2016, with an average of around 10,000 people per SA2 (Zhou et al. 2018).

Remoteness

The ABS remoteness structure divides all SA2s into 5 classes of remoteness, based on a measure of relative access to services (ABS 2018c). The five classes are Major cities, Inner regional, Outer regional, Remote and Very remote. Because the Australian population is spread unevenly across these 5 classes, and highly concentrated in major cities, for this analysis we produced a remoteness variable with just two categories: Major cities and Other regions. Major cities (58% of SA2s) are relatively densely populated areas where 72% of Australians live. The remaining 28% of Australians live in Inner, Outer, Remote and Very remote regions (42% of SA2s and 99% of land area) (Figure 3).

Figure 3: Australian population by remoteness, 2016

Source: Produced by authors following the ASGS structure (ABS 2016b)

Analysis of variables

In analysing the 2016 Census data, all variables were aggregated at SA2 level. Thus, the dependent variable was LFPR of people with disability within each SA2. Multiple linear regression was used to explore the relationship between the dependent variable and a range of independent variables selected based on the literature on employment and people with disability.⁴

We grouped independent variables into three clusters:

Cluster 1 – *Characteristics of people with disability* – attributes of people with disability, aggregated within each SA2.

Cluster 2 – *Characteristics of people without disability* – attributes of people without disability, aggregated within each SA2.

Cluster 3 – *Geographic area* – attributes of the SA2 geographic area and its population.

All variables constructed for initial investigation are presented in Appendix 1.

Some preliminary steps were undertaken to prepare the data for analysis.

- For all variables, any value calculated based on a count of fewer than 10 individuals within an SA2 was treated as missing.⁵ This was necessary because of the perturbation applied by the ABS (2017), which reduces the reliability of small counts to prevent identification of individual people. This step not only reduced the number of SA2s with data for each variable, but also reduced the number of variables for analysis. For example, the variable ‘percentage of Indigenous people with disability in the total Indigenous working-age population’ was dropped from the analysis because about two thirds of SA2s had a missing value due to small counts.
- We examined variable distributions and, where necessary, applied a data transformation. Log or power transformations were applied to many variables to ensure they conformed to the normality assumption.⁶ In the presentation of analysis results, below, the transformed variables are notated with a superscript ‘t’: ^(t).

After preliminary analysis and modelling using all 43 variables, we eliminated many variables because of collinearities. The following 20 independent variables were included in the analysis for selection for the base model (Model A).

- Cluster 1, *Characteristics of people with disability within SA2*, has 6 independent variables: (a) employment rate of people with disability^(t),⁷ (b) male to female sex ratio of people with disability^(t), (c) percentage of people with disability aged 15–64 completed year 12 school, (d) percentage of people with disability aged 15–64 with a post-school education, (e) percentage of people with disability aged 15–64 who have moved residence since 2011^(t), and (f) percentage of people with disability aged 15–64 who mainly speak English at home.
- Cluster 2, *Characteristics of people without disability within SA2*, has 3 independent variables: (a) LFPR of people without disability^(t), (b) percentage of people without disability aged 15–64 completed year 12 school, and (c) percentage of people without disability aged 15–64 with post-school education.
- Cluster 3, *Geographic area*, has 11 independent variables: (a) employment market index, (b) employment rate^(t), (c) male to female sex ratio of total population^(t), (d) median weekly household income^(t), (e) percentage of households in social housing, (f) percentage of households who own or are purchasing their home^(t), (g) percentage of people providing unpaid assistance to people with disability or aged people^(t), (h) percentage of people who do voluntary work^(t), (i) percentage of people using public transport to go to work, (j) percentage of people with disability, and (k) remoteness^(t).

We constructed a variable, employment market index, to capture labour market demand. Much of the research on employment of people with disability has focused on supply side factors. In an effort to fill this gap in the literature, the employment market index measures relative employment activity and opportunity. The index was derived as the standardised⁸ ratio between the number of

employees in an SA2 and the number of working-age residents in that SA2. The assumption is that a higher ratio implies greater employment activity and opportunity. For instance, in Central Business Districts of major cities employees generally outnumber working-age residents, giving a ratio greater than 1.

Models

Three stepwise regression models were performed.⁹ The first, Model A, is a base model that was derived from all 20 independent variables described above. Then the data set was split into two subsets (Major cities and Other regions) using the binary remoteness variable. The Model A regression syntax was applied to the subsets independently to generate two sets of outputs, Model B - Major cities, and Model C - Other regions. Summary statistics of these models are presented in Appendix 2.

Results

Variations in labour force participation rates

Table 1, and its visual representation in Figure 4, presents LFPR for people with disability and people without disability across SA2s. First of all, there is a clear relationship between LFPR of people with disability and LFPR of people without disability. The SA2s that have higher rates for people with disability also have higher rates for their non-disabled peers. For example, all 60 SA2s for which LFPR for people with disability is between 40% and 70% are among those SA2s with the highest LFPR rates for people without disability (i.e., 70-90%).

Table 1. Number of SA2s by LFPRs - people with disability and people without disability, 2016

		LFPR of people without disability (%)							Row Total (people with disability)	
		30 - <=40	40 - <=50	50 - <=60	60 - <=70	70 - <=80	80 - <=90	90 - <=100	Sum†	%
LFPR of people with disability (%)	0 - <=10	-	-	3	9	7	-	-	19	0.9
	10 - <=20	2	2	11	113	485	92	-	705	34.4
	20 - <=30	-	-	4	10	431	475	-	920	44.9
	30 - <=40	-	-	1	4	79	260	1	345	16.8
	40 - <=50	-	-	-	-	10	43	1	54	2.6
	50 - <=60	-	-	-	-	-	4	-	4	0.2
	60 - <=70	-	-	-	-	-	1	1	2	0.1
Column	Sum	2	2	19	136	1,012	875	3	2,049	

Total (people without disability)	(valid) [†] %									
		0.1	0.1	0.9	6.6	49.4	42.7	0.1		100.0

†: Invalid and excluded are SA2s with missing values.

Figure 4. SA2s – labour force participation rate (LFPR) of people with disability and people without disability, 2016

In the overwhelming majority of SA2s, LFPR for people with disability is between 10% and 40% (row total column, Table 1). There are 60 SA2s (3%) for which the LFPR of people with disability is between 40% and 70%.¹⁰ No single SA2 has a LFPR for people with disability that is above 70%. By contrast, LFPRs for people without disability in the majority of SA2s are between 70% and 90%.

Model A

Using forward stepwise regression, Model A selects 10 independent variables, from the original 20, (Table 2, column Model A) that have statistically significant associations ($p < 0.05$ or better) with the level of labour force participation of people with disability across SA2s. These 10 variables collectively explain 62% (adjusted R squared) of the variance in LFPR for people with disability across all SA2s.

Table 2. Selected ($p < .05$) independent variables under Models A, B and C

	Model A[†]		Model B: [†] Major cities		Model C: [†] Other regions	
Adjusted R square	0.618		0.620		0.547	
Selected independent variables	Unst. Coeff.	Stand. Coeff.	Unst. Coeff.	Stand. Coeff.	Unst. Coeff.	Stand. Coeff.
Cluster 1: Characteristics of people with disability						
% of people with disability aged 15–64 completed year 12 school	0.203	0.337	0.258	0.395		
% of people with disability aged 15–64 who mainly speak English at home ^(t)	0.001	0.128	0.002	0.160		
% of people with disability aged 15–64 with post-school education	0.088	0.104			0.138	0.171
Cluster 1: Characteristics of people without disability						
LFPR of people without disability	0.008	0.231	0.007	0.211	0.011	0.326
% of people without disability aged 15–64 with post-school education	-0.123	-0.155				
Cluster 3: Geographic area						
Median weekly household income ^(t)	0.149	0.258			0.231	0.412
Employment rate ^(t)	0.002	0.060				
Employment market index ^(t)	0.008	0.037				
Male to female sex ratio of total population	-0.036	-0.042			- 0.035	- 0.059
% of population with disability	-0.567	-0.165	-0.901	-0.248		
% of households who own or are purchasing their home			0.004	0.139	- 0.003	- 0.100
% of residents who do voluntary work			0.098	0.069		

[†]: Blank cells indicate that the independent variable for that row was not a significant predictor of the dependent variable for the stepwise regression analysis reported in that column.

Three independent variables in Cluster 1 were significantly associated with LFPR for people with disability. There were positive associations between LFPR for people with disability and the proportion of people with disability aged 15–64 who had completed year 12 school, the proportion who had a post-school qualification, and the proportion who mainly spoke English at home.

Two of the 3 independent variables in Cluster 2 were significant – LFPR for people with disability was positively associated with LFPR for people without disability, but negatively associated with the percentage of people without disability who had a post-school qualification.

Five variables in Cluster 3 were significant. Labour force participation for people with disability was positively associated with median weekly household income, overall employment rate, and employment market index (local employment opportunity), but negatively associated with percentage of the population with disability, and male to female ratio of residents (i.e., relatively more females was associated with higher LFPR for people with disability).

Models B and C

Results of Models B and C are also presented in Table 2. The variance accounted for was 62% for Major cities and 55% for Other regions.

The independent variables selected were different for the two Models. In Model B, Major cities, the 6 independent variables selected with a significant ($p < .05$ or better) positive association with LFPR for people with disability were: percentage of people with disability aged 15–64 who had completed year 12 schooling, percentage of people with disability aged 15–64 who mainly spoke English at home^(t), LFPR of people without disability, percentage of the population with disability, percentage of households who own or are purchasing their home, and percentage of residents who do voluntary work. As for Model A, the percentage of the population with disability was negatively associated with LFPR for people with disability (i.e., relatively higher disability prevalence was associated with lower LFPR for people with disability).

In Model C, Other regions, 5 independent variables were selected. The 3 variables with positive associations were: percentage of people with disability aged 15–64 who had post-school education, LFPR of people without disability, and median weekly household income^(t). Two variables had negative associations: male to female sex ratio, and percentage of households who own or are purchasing their home.

The percentage of households who own or are purchasing their home was positively associated with LFPR of people with disability across SA2s within Major cities, although this variable had a very small but negative association across SA2s in Other regions.

Discussion

Our findings shed light on the geographical variation in LFPR for people with disability in Australia and factors associated with this variation. Of all SA2s we analysed across Australia, there was not a single SA2 in which LFPR for people with disability equalled, let alone exceeded, LFPR for people

without disability. Even in the 6 SA2s with the highest LFPR for people with disability, the LFPR for people without disability was substantially higher (Table 1).

This paper adds to our understanding of this significantly lower LFPR for people with disability by examining spatial variations and factors associated with these variations. We found that LFPR is higher for people with disability in areas where the median weekly income is higher, where the LFPR and employment rates in the general population are higher, where the employment market is more active with greater opportunities, where there are relatively fewer people with disability, and where rates of educational attainment for people with disability are higher. Some of these factors, such as local disability prevalence, median income, and employment market opportunities, are not readily addressed by direct policy interventions. Importantly though, our findings highlight two factors which are clearly amenable to policy change. These are percentage of working-age people with disability who have post-school education and the year 12 school completion rate of people with disability. More specifically, these factors improve the prediction of the model A by 0.043 and 0.018 respectively.¹¹ In other words, people with disability living in SA2s in which a higher proportion of people with disability have completed year 12 or post-school education are more likely to participate in the labour force than those living in SA2s in which a lower proportion of people with disability have completed school or more advanced education.

It is widely recognised that people with disability often experience barriers to accessing school and post-school education, resulting in lower levels of education attainment (Hastings 1996; ABS 2016a). ABS statistics (ABS 2016a Table 7.1) show a considerable gap between people with disability aged 15 years and over and their non-disabled peers in 2015, with only 41% of people with disability having completed year 12, compared with 62% of their non-disabled peers. Only 26% of people with disability aged 15 years and over have an advanced diploma, diploma, or bachelor degree or above, compared with 40% of their non-disabled peers. A longitudinal analysis over a period of 16 years shows that, since 2001, the percentage of working-age people in Australia with a vocational or higher education qualification has risen for both those with and without disability. However, the rate of increase has been faster for people without disability, meaning that the post-school educational gap between the two groups widened between 2001 and 2016 (Emerson et al. 2018). In an employment environment where fewer and fewer unskilled jobs are available, post-school educational qualifications are becoming increasingly important for employment success (ABS 1997; O'Connell 2018; Australian Government 2018a).

“Education defines opportunity” (Australian Government 2018b Executive Summary). Education not only enriches the lives of individuals, but also gives people knowledge and skills, bolsters their confidence and enables them to participate in labour markets. Our findings suggest that policy action to improve education levels for people with disability, both in completing year 12 and post-

school educational attainment, could assist in increasing levels of labour force participation. Based on the size of the respective standardised coefficients in Model A (Table 2), it appears that the percentage of people with disability who have completed year 12 education in an area has a stronger effect than the percentage of people with disability who have obtained post-school qualifications on labour force participation rate for people with disability. In the general population, analyses looking at individual-level associations have found that rates of labour force participation and employment are greater for those with higher levels of education (Kennedy & Hedley 2003; Kennedy et al. 2009; OECD 2012). One way of harmonising these findings is to consider the competitive *disadvantage* of *not* completing year 12 in an educational environment where year 12 attainment is now overwhelmingly the norm (ABS 2016a Table 7.1), which is a disadvantage that disproportionately affects people with disability.

Our findings therefore suggest the need for more effective education policy to address equal access to education, and reasonable accommodations to ensure successful completion of high school and post-school education for people with disability within and across geographic regions. Our evidence also suggests that developing and implementing education policies that target school students in geographic areas where Year 12 attainment and post-school education is relatively low might be effective in improving labour force participation of people with disability.

In addition to this clear policy indication concerning educational attainment for people with disability, the study findings provide a number of insights that contribute to understanding the factors that affect LFPR for people with disability at SA2 level. As Models B and C demonstrate, there are some commonalities and differences between Major cities and Other regions. For example, regardless whether they live in Major cities or not, people with disability in SA2s with higher LFPR for people without disability tend also to have higher labour force participation. By contrast, the proportion of people with disability who mainly speak English at home is significantly associated with LFPR for people with disability only in Major cities but not in Other regions, while median weekly household income is significantly associated with LFPR for people with disability only in Other regions (see Models B and C in Table 2).

The modelling outcomes suggest that various labour market barriers may limit labour force participation for people with disability. Living in an area where a higher percentage of people with disability speak mainly English at home is associated with higher LFPR (Table 2), highlighting non-English-speaking background as a barrier to labour force participation. This association is significant in Major cities but not in regional areas, possibly reflecting the ethnic mix of the population, which is less diverse outside Australian metropolitan regions (Daley et al. 2017).¹² This finding is in line with Colic-Peisker (2011), who found “that the ethno-cultural minorities and especially those whose

native language is not English have poorer employment outcomes than either the native-born or those who originate in other English-speaking countries”.

It has been widely acknowledged that people with disability in Australia overall have lower social capital compared with their non-disabled peers (Department of Health 2011; Emerson et al. 2013; Mithen et al. 2015). The findings of our study suggest the possibility that geographical variations in social capital may impact LFPR for people with disability, via various mechanisms. Families and households with relatively more financial resources (higher income) may be better able to assist household members with disability to search for employment. Frequent interactions with people in families and neighbourhoods who are in the labour force may encourage and facilitate people with disability to seek work. In more affluent areas (with higher household income) businesses may be more willing to provide workplace modifications for employees with disability. Finally, the existence of a more active local employment market is likely to offer more opportunities to people with disability.

The strengths of this study are the use of Census data, which permits national coverage of small geographical areas, the diverse range of independent variables considered, and the robust statistical approach employed. In this study we included all SA2s, which is the smallest spatial unit for which it is possible to obtain reliable data to support this type of analysis. To our knowledge, no previous study of this type has been conducted (Llewellyn 2017). The diverse range of independent variables included in the initial investigation reflected characteristics of people with disability, people without disability, and characteristics of the local area and its population within each SA2. The 2016 Census is unique in its ability to provide such a rich range of information at such a small spatial scale. The stepwise regression modelling resulted in selection of those independent variables significantly associated with LFPR for people with disability at SA2 level.

This study contributes a new perspective to complement existing knowledge from national and international research showing that people with disability continue to have substantially lower levels of labour force participation than their non-disabled peers (ABS 2015; Australian Human Right Commission 2016; OECD, 2010, 2017). We have examined the spatial patterning of inequality in LFPR for people with disability, and associated factors, at a detailed geographic level. It is recognised that labour force outcomes for people with disability are influenced by a constellation of factors operating at different ecological levels, including individual, sociostructural and environmental levels (Lindsay et al. 2015). Ours is an ecological, rather than an individual-level study. In exploring causal relationships in any epidemiological investigation, ecological and individual levels of inquiry have valid and complementary contributions to make: “ecological variables are necessary to examine structural, contextual, and sociological effects on human behaviour” (Schwartz 1994: 823). The area-level factors found here to be associated with geographic variation in LFPR for people with disability

clearly warrant further investigation. This could include multi-level analyses, examining and comparing the effects of both area-level factors (e.g., SA2 educational attainment measures) and individual-level factors (e.g., individual educational attainment) on labour force status at individual level.

A limitation of this study is that, because of how people with disability are defined in the Census questions, analyses using Census data are currently limited to those people who have a 'core activity need for assistance', a group conceptually comparable to those with severe or profound core activity limitation as identified in the ABS Survey of Disability, Ageing and Carers. People with disability are a diverse, heterogeneous population and it is likely that level of disability severity and type of activity limitation influences labour force participation (Kavanagh et al. 2013; Kavanagh et al. 2015). Therefore caution is required in considering these results in the broader context of all people with disability. Finally, as we used cross-sectional data, our analyses can only identify associations, and do not demonstrate cause and effect.

Conclusion

This study examined spatial variation in LFPR of people with disability at a relatively detailed geographic level (SA2). We found considerable geographic variation, and identified several factors associated with this variation. The findings of this research contribute towards gaining a more sophisticated and nuanced understanding of the factors that influence labour force participation of people with disability in relation to their local community environment.

This study has laid a strong foundation for further research on geographic variation in labour force participation to inform more evidence-based, geographically targeted social policy to increase labour force participation for people with disability. Labour force participation is a pre-requisite for employment. Achieving higher LFPR for people with disability would bring Australia a step closer to addressing the current employment inequities experienced by people with disability.

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Endnotes

- ¹ The term 'geography of opportunity' is proposed by Galster & Killen (1995) to refer to the various ways in which geography influences individuals' opportunity and may even "modify the innate and acquired characteristics of participants (p.9) ... [and their] ability to plan and sacrifice for the future (p.12). Rosenbaum, Reynolds and DeLuca (2002) provided a vivid case study that proved that places people live affect individuals' sense of their own control over the events in their lives.
- ² The TableBuilder provides researchers easy access to micro data (ABS, 2014). However, statistics sourced from it are often slightly different from other ABS publications, primarily due to how TableBuilder deals with a small count.
- ³ The Census is the only data source that enables the examination of populations by demographic, social and economic characteristics at the level of SA2.
- ⁴ All statistics were generated using IBM SASS Statistics 24.
- ⁵ The precise number of SA2s excluded depends on the variables involved. By definition, however, these exclusions have very small impact on the results. For example, LFPRs for working-age people with disability could not be reliably computed for 5.2% of SA2s because of small counts. These SA2s only capture about 1% of the population in question. More information on these SA2s excluded due to small counts is available in Zhou, Llewellyn, Emerson, Stancliffe, and Badland (2018).
- ⁶ Validation tests confirm that the regression outcomes using the original and transformed variables differed very little in terms of variables selected to remain in the final regression equation.
- ⁷ Employment rate = $e/b \times 100$.

⁸ The standardisation is achieved by dividing the raw ratio by the average of all ratios.

⁹ The initial stepwise regression on all initial 43 variables listed in Appendix 1 was in the order as listed (enter stepwise regression). After that, when the final model that included the 20 variables was decided, forward stepwise regression was performed which yielded the same results as enter stepwise regressions.

¹⁰ The six SA2s with the highest LFPR for people with disability are Cook (ACT), Durack - Marlow Lagoon (NT), Kingston (ACT) (ACT), Newman (WA), Palmerston - South (NT), and Sorrento - Marmion (WA).

¹¹ Reflected in the R square changes.

¹² According to Census 2016, 34% of population in Major cities were born overseas. It is 13% for the rest of country.

Table 1. Number of SA2s by LFPRs - people with disability and people without disability, 2016

		LFPR of people without disability (%)							Row Total (people with disability)	
		30 - ≤40	40 - ≤50	50 - ≤60	60 - ≤70	70 - ≤80	80 - ≤90	90 - ≤100	Sum (valid)†	%
LFPR of people with disability (%)	0 - ≤10	-	-	3	9	7	-	-	19	0.9
	10 - ≤20	2	2	11	113	485	92	-	705	34.4
	20 - ≤30	-	-	4	10	431	475	-	920	44.9
	30 - ≤40	-	-	1	4	79	260	1	345	16.8
	40 - ≤50	-	-	-	-	10	43	1	54	2.6
	50 - ≤60	-	-	-	-	-	4	-	4	0.2
	60 - ≤70	-	-	-	-	-	1	1	2	0.1
Column Total (people without disability)	Sum (valid)†	2	2	19	136	1,012	875	3	2,049	
	%	0.1	0.1	0.9	6.6	49.4	42.7	0.1		100.0

†: Invalid and excluded are SA2s with missing values.

Table 2. Selected ($p < .05$) independent variables under Models A, B and C

	Model A†		Model B: † Major cities		Model C: † Other regions	
Adjusted R square	0.618		0.620		0.547	
Selected independent variables	Unst. Coeff.	Stand. Coeff.	Unst. Coeff.	Stand. Coeff.	Unst. Coeff.	Stand. Coeff.
Cluster 1: Characteristics of people with disability						
% of people with disability aged 15-64 completed year 12 school	0.203	0.337	0.258	0.395		
% of people with disability aged 15-64 who mainly speak English at home ^(t)	0.001	0.128	0.002	0.160		
% of people with disability aged 15-64 with post-school education	0.088	0.104			0.138	0.171
Cluster 1: Characteristics of people without disability						
	0.008	0.231	0.007	0.211	0.011	0.326

LFPR of people without disability						
% of people without disability aged 15-64 with post-school education	-0.123	-0.155				
Cluster 3: Geographic area						
Median weekly household income ^(t)	0.149	0.258			0.231	0.412
Employment rate ^(t)	0.002	0.060				
Employment market index ^(t)	0.008	0.037				
Male to female sex ratio of total population	-0.036	-0.042			-0.035	-0.059
% of population with disability	-0.567	-0.165	-0.901	-0.248		
% of households who own or are purchasing their home			0.004	0.139	-0.003	-0.100
% of residents who do voluntary work			0.098	0.069		

†: Blank cells indicate that the independent variable for that row was not a significant predictor of the dependent variable for the stepwise regression analysis reported in that column.

Figure 1: Main concepts in Australian labour statistics

Source: adapted from ABS (2018b).

Figure 2: Labour force status of working-age population 2015

Source: based on data presented in SCRGSP 2018 Table 15A.74

Figure 3: Australia population by remoteness, 2016

Source: Produced by authors following the ASGS structure (ABS 2016b)

Figure 4. SA2s – labour force participation rate (LFPR) of people with disability and people without disability, 2016

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