Applied Spatial Analysis and Policy (2023) 16:831–850
https://doi.org/10.1007/s12061-023-09505-2

Do Co-Ethnic Neighbourhoods Affect the Labour Market Outcomes of Immigrants? Longitudinal Evidence from Australia

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Received: 14 October 2021 / Accepted: 6 January 2023 / Published online: 31 January 2023

Abstract
Unlike the situation in other immigrant-receiving countries, the impact of co-ethnic neighbourhoods on immigrants' life outcomes has been understudied in Australia. In addition, because of reliance on cross-sectional and sample survey data, existing Australian studies have not taken advantage of recent methodological progress that addresses selection bias. In that context, this paper estimates the impact of the size of co-ethnic neighbourhoods on labour force participation, employment, hours worked and income of immigrants using microdata from the 2006–16 Australian Census Longitudinal Dataset that spans three censuses. Drawing on this unique dataset, the paper applies a series of OLS regression models that address issues of individual and location sorting by applying individual-fixed effects, controlling for residential mobility, duration of residence and using an exogenous measure of co-ethnic neighbourhood size. We find a small significant negative effect on labour participation and wage, particularly for the non-tertiary educated and immigrants with low English proficiency. However, when we control for residential mobility, residence in co-ethnic neighbourhoods is no longer statistically significant, which highlights the importance of stringent methodological choices that control for settlement trajectories, while revealing that movement toward smaller co-ethnic neighbourhoods is associated with increased labour force participation. Our findings suggest that efforts by the Australian government to settle immigrants in regional areas with a limited migrant population should not affect the labour market outcomes of immigrants given that ethnic enclaves do not facilitate labour market integration in Australia.

Keywords Longitudinal Census · Co-Ethnic Networks · Residential Segregation · Internal migration

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Introduction

With 30 per cent of its population born overseas (ABS, 2021a, 2021b), Australia ranks 3rd in the OECD after Luxembourg and Switzerland in terms of immigrant stock as a proportion of the total population (OECD, 2020). Australia experienced a migration boom in the mid-2000s, with the annual net migration intake averaging about 230,000 between 2006 and 2019 (ABS, 2020). The growth in international migration to Australia has been accompanied by a progressive diversification of origin countries since the 1980s, with immigrants from Asia accounting for a growing share of the overseas-born population (Wilson & Raymer, 2017). In 2014, China and India became the largest sending countries for the first time in recorded history (ABS, 2018). These shifts have raised questions about co-ethnic neighbourhoods and their potential impact on the labour market outcomes of immigrants (Wang et al., 2021).

In general, immigrants' residential settlement has been hypothesised in two ways. The first hypothesis, spatial assimilation, posits that immigrants initially migrate into cities or inner cities that have high levels of foreign-born and co-ethnic populations and then migrate to suburban neighbourhoods that are more ethnically diverse (Burgess, 1978; Massey, 1985). The move to more ethnically diverse and desirable neighbourhoods, or spatial assimilation, often occurs after long periods in the host country, typically as immigrants achieve greater levels of socioeconomic success and English proficiency (Massey, 1985). Implicit in this pathway is that co-ethnic neighbourhoods are viewed as undesirable locations that are associated with temporary accommodation and fewer socioeconomic opportunities (Logan et al., 2002; Zhou, 2009).

In contrast to the spatial assimilation pathway, a second hypothesis posits that co-ethnic neighbourhoods do not represent a stepping-stone but, rather, an endpoint in immigrants' migration history. The term 'co-ethnic neighbourhood' refers to a neighbourhood with a large population from the same ethnic background. In the economic literature, it is often referred to as co-ethnic networks (Edin et al., 2003), while the term co-ethnic communities (Lee, 2018) or ethnoburb (Li, 1998) is often preferred in the sociology literature. In this paper, we choose the term co-ethnic neighbourhood to avoid the pitfall of conceiving local populations as networks and communities, which are concepts that are difficult to operationalise empirically. According to this hypothesis, immigrants bypass inner cities and move directly into ethnic suburbs (Alba, 2009; Wei, 1998), which represent a voluntary residential choice for immigrants. This trend among new immigrants has been attributed to increasing levels of professional and skilled migration, wealthy immigrants, and immigrant networks that facilitate a direct move into ethnic suburbs (Zhou & Lee, 2013). In the American context, this residential pattern is evident among Asian immigrants, a notable example being the Chinese ethnoburbs of Los Angeles (Massey & Denton, 1988; Zhou, 2009). This may have relevance for the residential patterns of Australia's immigrants given the large share of Asian and skilled migration and the existence of some ethnoburbs in Australia (Stevens, 2018).

The relationship between co-ethnic neighbourhoods and immigrants' labour market outcomes has been investigated in several countries. However, existing research is mainly focused on the United States (Xie & Gough, 2011) and Scandinavian countries (Böhlmark & Willén, 2020; Damm, 2009; Edin et al., 2003) whose migration systems differ notably from that of Australia. Australia has recently experienced high levels of immigration and a diversification of origin countries and it manages its migration intake through a points-based system that favours highly skilled immigrants.

In addition, our understanding of the impact of co-ethnic neighbourhoods on immigrants' labour market outcomes in Australia remains limited because of reliance on cross-sectional data (Van Ham & Tammaru 2016). This is complicated by the fact that international migrants are particularly mobile in the first decade after arrival (Bell & Hugo, 2000; Laukova et al., 2022a; Raymer & Baffour, 2018) as they adjust their employment and housing needs (Laukova et al., 2022b). While growing efforts have been made in recent years to draw on longitudinal survey data that can track immigrants over time (Wang & Maani, 2021; Wang et al., 2021), studies on the impact of co-ethnic neighbourhoods on immigrant life outcomes in Australia and New Zealand have rarely factored in residential mobility (Damm, 2009; Edin et al., 2003). This is particularly relevant in the Australian context of high-skilled immigration and high rates of residential mobility, which may result in biased estimates.

Because the assimilation of immigrants into the labour market is a key component to their overall integration into the host society, understanding whether living in co-ethnic neighbourhoods affects the labour market outcomes of immigrants is essential for policymakers (Damm, 2009; Edin et al., 2003). It is particularly important in Australia where a small but growing proportion of immigrants have settled in rural and regional areas that have traditionally not received immigrant populations (McAreavey & Argent, 2018). This gradual shift is the result of successive policies that have sought to entice immigrants to regional areas by providing pathways to permanent residency (Hugo, 2008). However, an essential first step to the development of such policies is understanding the potential impact of residence in co-ethnic neighbourhoods (or lack of) on recently arrived immigrants.

In that context, this paper aims to improve our understanding of the impact of residential settlement and mobility decisions on a range of labour market outcomes over the life course of immigrants. Specifically, we estimate the impact of the size of co-ethnic neighbourhoods on the labour force participation, employment, hours worked and income of immigrants using longitudinal microdata from the 2006, 2011, and 2016 Australian censuses ABS (2019). Contrary to longitudinal surveys such as the Household, Income and Labour Dynamics in Australia (HILDA), the longitudinal census more accurately represents the immigrant population and its large sample size allows analysis to be restricted to recently arrived immigrants; in this case, those who settled in Australia between 2001 and 2006. By combining a range of descriptive statistics, the paper first examines the residential trajectory of immigrants by tracking changes in the ethnic profile of their neighbourhood of residence (SA2) over a 10-year period. The paper contributes to the body of work on co-ethnic neighbourhoods and labour market outcomes by mitigating issues of individual and location sorting. Specifically, this study (1) deploys a reduced-form

strategy that treats changes in co-ethnic neighbourhood size as an exogenous factor and (2) controls for residential mobility. The remainder of the paper is structured as follows. Section 2 provides a review of the literature. It shows that evidence on the impact of co-ethnic residence on labour market outcomes is mixed in part because of differences in the type of datasets available and methods applied. Section 3 introduces the Australian Census Longitudinal Dataset and describes the methods used in this study. Section 4 presents empirical results and shows that size of co-ethnic neighbourhoods has a small negative effect on wages and labour market participation, particularly for migrants with no tertiary qualifications and low English proficiency. Section 5 concludes by discussing the methodological, theoretical, and policy implications of our findings.

Are co-ethnic neighbourhoods beneficial? A review of the literature

Evidence on whether co-ethnic neighbourhoods have an effect on immigrants' labour market outcomes is mixed. Some studies suggest that living in co-ethnic neighbourhoods has a positive impact on immigrants' earnings (Portes, 1998; Portes & Zhou, 1992), particularly low-skilled immigrants (Edin et al., 2003). This association has been explained by the role of ethnic networks in disseminating information about labour market opportunities, which in turn facilitates access to employment, improves occupation-skill matching (Damm, 2009) and fosters self-employment (Andersson, 2021). Likewise, Portes and Bach (1985) found that living in co-ethnic neighbourhoods can provide job opportunities in co-ethnic businesses to immigrants who otherwise might be discriminated against in the primary labour market and act as a stepping-stone for immigrants' progression toward self-employment or managerial positions.

However, the strength of this relationship seems to be moderated by the educational profile of co-ethnic immigrants (Borjas, 1992, 1995; Bygren & Szulkin, 2010). This suggests that it is perhaps not about co-ethnic concentration per se but more so about the educational composition of co-ethnic neighbourhoods (Åslund et al., 2011; Edin et al., 2003). Overall, it suggests the importance of taking into account population composition, particularly education, which is often referred to in the economics literature as the 'quality of ethnic networks' (Edin et al., 2003). On the other hand, others have found a negative association between co-ethnic neighbourhood size and earnings (Warman, 2007), unemployment (Clark & Drinkwater, 2002), and the transition from unemployment to self-employment (Andersson, 2021). These findings have been explained mainly by the potential role of co-ethnic networks in impeding improvement in host country language proficiency (Danzer & Yaman, 2016; Laliberté, 2019) and subsequently limiting opportunities to interact with the host population (Danzer & Yaman, 2013). Co-ethnic neighbourhoods may also select those with fewer socioeconomic resources and residential options (Böhlmark & Willén, 2020), which reinforces the need to control for neighbourhood composition.

These mixed results, to some extent, stem from differences in the types of datasets and methods used. Many studies still draw on cross-sectional data, which limits

the ability to control for endogeneity and location sorting issues, a problem that plagued nearly all early studies. In general, most studies do not account for residential mobility and thus assume that immigrants stay in the same neighbourhood. This is an important limitation because immigrants are known to be more mobile than the general population, particularly in the early years post-settlement as they adjust their employment and housing conditions (Bartel, 1989). However, cross-sectional studies cannot adequately capture residential relocation and internal migration. Moreover, unobservable factors that are simultaneously associated with labour market outcomes and the choice of initial settlement cannot be controlled for either, which may result in biased estimations. Two exceptions are Damm (2009) and Edin et al. (2003) who controlled for residential mobility and used quasi-natural experimental data from Denmark and Sweden where governments distribute refugee populations across the country to limit co-ethnic residence. However, refugees tend to have different human capital profiles, pre-emigration characteristics, and labour market outcomes than immigrants arriving through employment and family pathways.

Similarly, understanding these processes in the Australian context has been hindered by data access. Early studies that drew on cross-section datasets (Chiswick & Miller, 1996) showed that residence in a co-ethnic neighbourhood was more prevalent among immigrants with low English fluency. The recent use of longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) survey has revealed a positive association between co-ethnic community living and earnings, especially for skilled immigrants (Wang et al., 2021). However, HILDA is not representative of the immigrant population (Breunig et al., 2017) and does not allow a detailed level of spatial disaggregation so we cannot observe neighbourhood characteristics (Summerfield et al., 2011). Rather, geographic areas in HILDA focus on the metropolitan area or capital city level, which is too large for measuring co-ethnic neighbourhoods. The recent release of the Australian Census Longitudinal Dataset provides, for the first time, an opportunity to effectively address these limitations.

Data and Methods

The Australian Census Longitudinal Dataset

To shed new light on the impact of co-ethnic neighbourhoods on labour market outcomes, we draw on microdata from the Australian Census Longitudinal Dataset (ACLD). Released for the first time in 2019, the ACLD links individual-level data from the 2006, 2011, and 2016 censuses, permitting individuals' residential and employment trajectories to be tracked over a 10-year period. The ACLD comprises a five per cent random sample of the Australian population, or over one million individuals, with key socio-demographic information on age, sex, country of birth, marital and parental status, labour force participation, educational attainment, place of usual residence, hours worked, and income. The data are made available to approved users via DataLab, an online secure platform managed by the Australian Bureau of Statistics.

We seek to estimate the impact of co-ethnic neighbourhoods on labour market outcomes from 2006 to 2016. The key outcome variables of interest are: (1) real total personal weekly income based on the midpoint of income bands, (2) unemployment, (3) labour force status, and (4) hours worked. Income is a categorical variable in the census, therefore we assign the mean value of the band to individuals. In addition, we deflated to annual CPI to calculate real weekly income. Unemployment is represented by a dummy variable taking the value of 1 if an individual is unemployed and 0 otherwise. The labour force status variable takes the value of 1 if an individual is not in the labour force and 0 otherwise. The hours worked variable measures the number of hours a worker worked in a week. We restrict the analysis to immigrants who arrived between 2001 and 2006 and to those aged from 25 to 59. Our final analytical sample comprises over 30,000 individuals.

Co-ethnic neighbourhoods are measured at the Statistical Areas Level 2 (SA2) level,[1] which corresponds to residential suburbs, or neighbourhoods, with the population of each of the 2,310 SA2s ranging between 3,000 and 25,000. This geographical choice is equivalent to the municipality areas used in Edin et al. (2003)'s seminal paper, which has a median population of 16,000. To construct co-ethnic neighbourhood's variables, we draw on data from full population censuses via TableBuilder Pro, which provides access to aggregate Census data. We match these newly constructed variables with our analytical sample using location-year identification. Because the Australian census does not collect information on ethnicity, we use country of birth as a proxy, and we capture the extent to which a neighbourhood can be considered as co-ethnic by measuring the size of a co-ethnic population according to the number of individuals residing in the same SA2 who were born in the same country expressed in a logarithmic form to facilitate interpretation as a percentage change.

Empirical Strategy

To examine the effect of co-ethnic neighbourhoods on the labour market outcomes of immigrants, we deploy a series of fixed-effect logistic regression models. We model separately each of the labour market outcomes of interest, namely real weekly income, unemployment, labour force status, and weekly hours worked. Following Edin et al. (2003) and Damm (2009), we adopt the following empirical baseline specification:

$$Y_{ijkt} = \beta \ln e_{jkt} + \alpha X_{it} + \delta_t + \vartheta_k + \gamma_i + \varepsilon_{ijkt} \quad (1)$$

[1] To ensure spatial consistency across the three censuses, we aggregate 2006 census data collected at the census collection district level to SA2, which appears at the 2011 census as part of the new Australian Statistical Geographic Standards (ASGS).

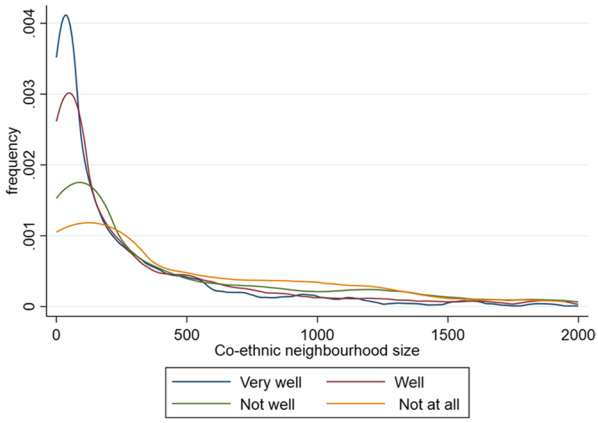

Fig. 1 Frequency distribution of immigrants by size of co-ethnic neighbourhood and level of English proficiency in 2006. Source: Authors' calculations based on the ALCD using spatially consistent SA2s based on the 2011 classification. Sample restricted to immigrants who arrived in Australia between 2001 and 2006

where Y is a labour market outcome variable and subscript i represents an individual, j country of birth, k SA2 of residence and t year (2006, 2011 and 2016). Year, SA2 and individual fixed effects are represented by δ_t, ϑ_k and γ_i. We include year fixed effects to control for short-term changes common to all neighbourhoods such as broader economic conditions. Similarly, adding SA2 fixed effects allows us to control for time-invariant factors such as a suburb's proximity to a capital city. The panel structure of the dataset also permits the inclusion of individual fixed effects to control for individual time-invariant observable factors, such as sex and unobserved heterogeneity that may influence labour market outcomes. X_{it} is a vector of individual time-varying characteristics, including age, marital status, educational attainment (tertiary or not), English proficiency (high or low) and parental status. The focal variable is $\ln e_{jkt}$, which is the log of the size of the neighbourhood formed by country of birth j in suburb k in year t, thereafter referred to as co-ethnic neighbourhood size.

To robustly quantify the effect of co-ethnic neighbourhoods on labour market outcomes, two potential issues need attention. The first issue relates to individual sorting, which occurs on arrival in Australia. The second problem is due to reversed causality caused by a feedback loop between immigration to Australia during the observation period, labour market outcomes and immigrants' change of suburbs of residence in Australia. Next, we elaborate on each of the issues in turn, explain how they may bias estimations, and outline our approach to it.

The first problem of individual sorting stems from the fact that immigrants' place of residence often depends on individual characteristics, which are correlated with labour market outcomes (Damm, 2009). This is the case in Australia as shown in Fig. 1, which displays the distribution of immigrants by the size of co-ethnic neighbourhoods and level of English proficiency at the 2006 census. It shows that the proportion of immigrants residing in neighbourhoods with larger co-ethnic populations decreases with the level of English proficiency. Because English proficiency improves over time, we mitigate this problem by restricting our analytical sample to recently-arrived immigrants who settled in Australia between 2001 to 2006. This approach also serves to create a more homogenous sample in light of migration

policy reforms before 2001 that led to an increase in the share of high-skilled migrants. This is further helped by the use of an individual-fixed effect that controls for invariant characteristics.

The second issue is the potential problem of endogeneity because changes in co-ethnic neighbourhood sizes may be the result of two intertwined processes that are not exogenous: (1) residential mobility of existing co-ethnic populations and (2) arrival of new immigrants during the observation period. We account for the second issue by using an alternative measurement of co-ethnic neighbourhood size, known in the literature as a "reduced-form" strategy (Card, 2001; Kerr & Lincoln, 2010). More specifically, we decompose the size of a co-ethnic neighbourhood in year t as the sum of the co-ethnic neighbourhood size in year 2006 plus immigration flows from country j to Australia in the next intercensal period and the share of co-ethnic population in the suburb in year t. In other words, we consider inflows from country j to Australia to be an exogenous factor. We improve this approach by considering not only the number of immigrants but also origin countries. We therefore define the share of a co-ethnic population in a neighbourhood as the ratio of the size of the co-ethnic population neighbourhood to the total size of this co-ethnic population in Australia. We can therefore express the size of a co-ethnic neighbourhood as follows:

$$\ln e_{jkt} = \ln(e_{jk2006} + share_{jk2006} * \Delta inflows_{jt}) + \varepsilon_{jkt} \tag{2}$$

where: $share_{jk2006} = \frac{Size_{jk2006}}{Size_{j2006}}$, and $\Delta inflows_{jt}$ denotes immigration flows from country j to Australia between 2006 and year t (t=2011, 2016). For simplicity, we refer to $\ln e_{jkt}$ as the reduced-form co-ethnic neighbourhood size (*RFCNS*). By inserting Eq. (2) into Eq. (1), we obtain our reduced-form empirical specification:

$$Y_{ijkt} = \beta RFCNS_{jkt} + \alpha X_{it} + \delta_t + \vartheta_k + \gamma_i + \varepsilon_{ijkt} \tag{3}$$

Finally, we need to control for immigrants' change of neighbourhood of residence. Residential mobility is likely to be endogenous because some unobserved factors may simultaneously influence labour market outcomes and residential behaviour. Researchers have sought to address this issue by drawing on quasi-natural experimental data in which immigrants are randomly distributed across neighbourhoods because of, for example, government interventions in resettling refugee populations in Scandinavian countries (Damm, 2009; Edin et al., 2003). An alternative solution is a tipping-point approach that identifies the threshold at which the size of ethnic co-neighbourhoods affects the labour market outcomes of immigrants and uses them as instruments for compositional changes in neighbourhoods (Böhlmark & Willén, 2020). While promising, this method is computationally intensive. A third method consists of capitalising on ethnic and geographic variations (Bertrand et al., 2000) by interacting residential mobility behaviour with co-ethnic neighbourhood sizes. We take advantage of the large sample size and the low level of spatial disaggregation offered by the ACLD to improve on this method and consider whether immigrants move to neighbourhoods with higher or lower co-ethnic population sizes. More specifically, we control for the direction of residential mobility to

neighbourhood with larger or smaller co-ethnic neighbourhood and then interact the size of co-ethnic neighbourhoods with these two measures of residential mobility that capture whether an individual moved to a suburb a larger or smaller co-ethnic population during an intercensal period. This allows us to obtain refined insights into interactions between residential mobility, co-ethnic neighbourhoods and labour market outcomes.

Results

Descriptive statistics

To provide some context for the results, Table 1 reports the degree of geographical concentration of immigrants who arrived in Australia between 2001 and 2006 for the top 10 arrival countries as expressed by the Index of Dissimilarity[2] (ID). The ID is a measure of residential segregation that can be interpreted as the proportion of an immigrant group that would have to move out of their SA2 of residence to mirror the spatial distribution of the Australia-born population. It ranges from 0 to 100, with 0 indicating complete spatial integration and 100 complete segregation (Hugo, 2011). Table 1 shows that all immigrant groups do not all follow the same pattern of settlement as the Australia-born population, although the degree of dissimilarity varies by origin country and is the highest among immigrants from South Korea, Malaysia, Indonesia and China (ID > 70) and the lowest among immigrants from the United Kingdom and New Zealand. However, it decreases after 5 years and then plateaus thereafter, which suggests that immigrants do adjust their place of residence in the first five years after arrival, but their spatial distribution does not converge to that of the Australia-born.

We now turn our attention to the labour market outcomes of interest at the beginning of the observation period in 2006 in Fig. 2 which reports the frequency distribution of immigrants by co-ethnic neighbourhood size and labour market outcome. It shows that unemployed immigrants are more likely to reside in a neighbourhood with a larger co-ethnic population than those who are employed. However, differences in settlement patterns by income level, hours worked and labour participation are minimal.

Main results

Table 2 presents the results of the regression model described in Eq. 3. All control variables display the expected sign. Wages increase with age, English

[2] Index of Dissimilarity (I_D).

$$I_D = 0.5 \sum_{i=1}^{n} |x_i - y_i|$$

n = number of spatial units.

x_i = proportion of a particular migrant group living in SA2 *i*.

y_i = proportion of the reference group (the Australian population here) in SA2 *i*.

Table 1 Index of dissimilarity by country of birth and census year for the top 10 countries of arrivals between 2001 and 2006, Australia

Country of birth	2006	2011	2016
UK	49.52	41.19	41.30
New Zealand	46.46	38.76	38.66
China (excludes SARs and Taiwan)	72.80	63.31	64.46
India	65.82	58.58	60.63
South Africa	52.65	46.68	44.96
Philippines	59.28	48.99	54.74
Malaysia	74.34	62.25	61.71
Korea, Republic of (South)	76.14	69.55	66.98
United States of America	56.29	39.06	41.85
Indonesia	75.23	62.87	62.73
Foreign-born	**41.87**	**38.20**	**36.90**

Source: Authors' calculations based on the ACLD using temporarily SA2s based on the 2011 classification. Sample restricted to immigrants who arrived in Australia between 2001 and 2006. Countries are ranked in decreasing immigration flow size between 2001 and 2006

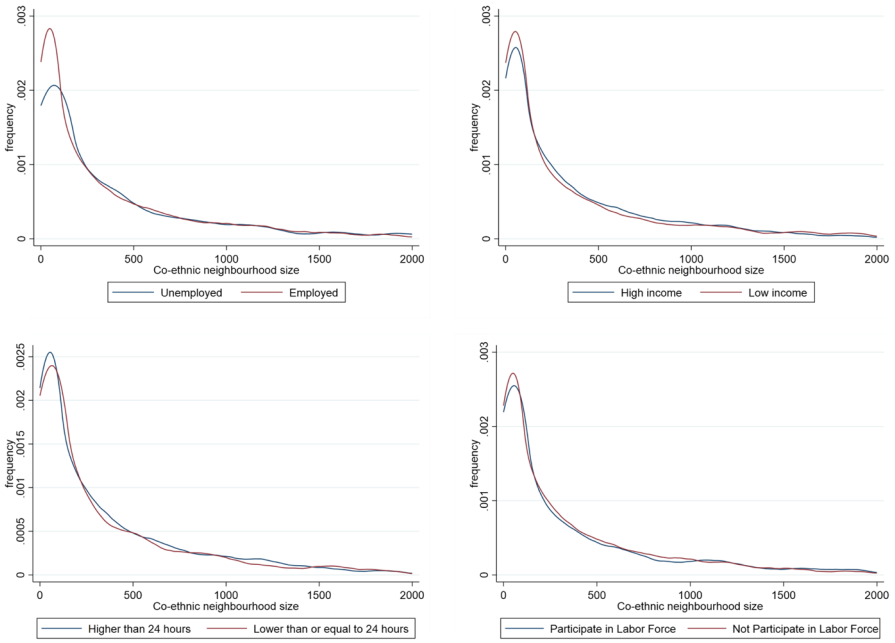

Fig. 2 Frequency distribution of immigrants by co-ethnic neighbourhood size and labour market outcome in 2006. Source: Authors' calculations based on the ACLD using spatially consistent SA2s based on the 2011 classification. Sample restricted to immigrants who arrive in Australia between 2001 and 2006

Table 2 Effects of co-ethnic neighborhood size on labour market outcomes of immigrants

	Real weekly income (log)	Hours worked	Unemployment	Not in the labour force
Co-ethnic neighbourhood size	-0.0359*	0.0000	-0.0015	0.0066*
	(0.0166)	(0.0000)	(0.0018)	(0.0027)
Tertiary education	0.2788**	0.0000	0.0113*	-0.0487**
	(0.0425)	(0.0001)	(0.0047)	(0.0070)
Age	0.0555*	0.0001	-0.0009	-0.0080+
	(0.0246)	(0.0001)	(0.0028)	(0.0042)
Being parent	-0.1274**	0.0000	-0.0052	0.0619**
	(0.0365)	(0.0001)	(0.0040)	(0.0060)
Married or in a de facto relationship	-0.2002**	-0.0002	-0.0006	0.0254**
	(0.0457)	(0.0001)	(0.0050)	(0.0075)
High English proficiency	0.1083*	-0.0000	-0.0006	-0.0430**
	(0.0500)	(0.0001)	(0.0055)	(0.0083)
2011 (ref cat. 2006)	0.3931**	-0.0004	-0.0136	-0.0241
	(0.1254)	(0.0003)	(0.0141)	(0.0214)
2016	0.2702	-0.0007	-0.0040	-0.0120
	(0.2473)	(0.0006)	(0.0279)	(0.0422)
N	35,334	8,624	35,088	35,088
R^2	0.079	0.16	0.028	0.055

Standard errors in parentheses $^{+}\ p<0.10$, $^{*}\ p<0.05$, $^{**}\ p<0.01$

Note: Authors' calculations based on the 2006–2016 ACLD sample. Analysis restricted to working age migrants (25–59) who arrived in Australia between 2001 and 2006. The number of observations changes depending on the outcome variable because of small differences in the number of missing values. All models include individual and SA2 fixed effects

proficiency, duration of residence in Australia and tertiary qualifications while having children exerts a negative effect. Concerning duration in Australia, it is worth noting the strong positive association with 2011, which corresponds to the peak of the mining boom, turning insignificant in 2016 as the labour market contracted. This suggests that wages increase with duration of residence mainly in buoyant labour market conditions. Labour force participation is shaped by the same variables. However, very few control variables display a significant association with the numbers of hours worked. Focusing on co-ethnic neighbourhood size, the results show that it has a negative effect on two labour market outcomes: wages and labour force participation. More specifically, every one per cent increase in co-ethnic neighbourhood size leads to a 3.6 per cent decline in the wages of immigrants and to a 0.66 per cent increase in the ratio of people who exit the labour market. The remainder of the paper focuses on wages and labour force participation.

To get a more nuanced understanding, Table 3 interacts the size of co-ethnic neighbourhoods with education. The regression coefficient is positive which

Table 3 Effects of co-ethnic neighborhood size on immigrants' labour market outcomes of immigrants with an interaction term between co-ethnic neighborhood size and education

	Real weekly income (log)	Not in the labour force
Co-ethnic neighbourhood size	-0.0671**	0.0112**
	(0.0226)	(0.0037)
Tertiary education	0.0858	-0.0204
	(0.1036)	(0.0173)
Co-ethnic neighbourhood size* Tertiary education	0.0392*	-0.0057+
	(0.0192)	(0.0032)
Age	0.0555*	-0.0080+
	(0.0246)	(0.0042)
Being parent	-0.1275**	0.0619**
	(0.0365)	(0.0060)
Married or in a de facto relationship	-0.2016**	0.0256**
	(0.0457)	(0.0075)
Proficient in English	0.1089*	-0.0430**
	(0.0500)	(0.0083)
2011 (ref cat. 2006)	0.3944**	-0.0244
	(0.1254)	(0.0214)
2016	0.2725	-0.0126
	(0.2473)	(0.0422)
N	35,334	35,088
R^2	0.079	0.055

Standard errors in parentheses $^{+}\ p<0.10$, $^{*}\ p<0.05$, $^{**}\ p<0.01$

Note: Authors' calculations based on the 2006–2016 ACLD sample. Analysis restricted to working age migrants (25–59) who arrived in Australia between 2001 and 2006. The number of observations changes depending on the outcome variable because of small differences in the number of missing values. All models include individual and SA2 fixed effects

indicates that tertiary-educated immigrants are less negatively affected by co-ethnic neighbourhoods, particularly for wages. To confirm this interpretation, we run two additional regressions for tertiary and non-tertiary educated immigrants separately. Results confirm that the negative impact of co-ethnic neighbourhoods is lower for tertiary-educated immigrants (β=-0.038, $p<0.05$) than immigrants with no tertiary qualifications (β=-1.242, $p<0.05$).[3] We next replicate the analysis by English proficiency which we interact with the size of co-ethnic neighbourhoods. Table 4 shows the same patterns of results: immigrants with high English proficiency are less negatively affected by co-ethnic neighbourhoods as indicated by a small but positive and statistically significant interaction term with wages.

We next extend the analysis by considering residential mobility. Table 5 shows that immigrants in Australia tend to be highly mobile, with close to 70 per cent changing SA2 of residence between 2006 and 2016, the majority doing so in the first

[3] Full regression results available upon request.

Table 4 Effects of co-ethnic neighborhood size on immigrants' labour market outcomes of immigrants with an interaction term between co-ethnic neighborhood size and English proficiency

	Real weekly income (log)	Not in the labour force
Co-ethnic neighbourhood size	-0.0590**	0.0057
	(0.0215)	(0.0036)
High English proficiency	-0.0441	-0.0490**
	(0.1032)	(0.0171)
Co-ethnic neighbourhood size * High English proficiency	0.0342+	0.0014
	(0.0203)	(0.0034)
Age	0.0556*	-0.0080+
	(0.0246)	(0.0042)
Being parent	-0.1272**	0.0619**
	(0.0365)	(0.0060)
Married or in a de facto relationship	-0.2002**	0.0254**
	(0.0457)	(0.0075)
Tertiary education	0.2790**	-0.0487**
	(0.0425)	(0.0070)
2011 (ref cat. 2006)	0.3926**	-0.0241
	(0.1254)	(0.0214)
2016	0.2688	-0.0120
	(0.2473)	(0.0422)
N	35,334	35,088
R^2	0.079041	0.054572

Standard errors in parentheses $^{+}$ $p<0.10$, * $p<0.05$, ** $p<0.01$

Note: Authors' calculations based on the 2006–2016 ACLD sample. Analysis restricted to working age migrants (25–59) who arrived in Australia between 2001 and 2006. The number of observations changes depending on the outcome variable because of small differences in the number of missing values. All models include individual and SA2 fixed effects

five years after arrival in the country. In both periods, 2006–2011 and 2011–2016, about 60 per cent of those who changed SA2 of residence moved to a suburb with a smaller co-ethnic population. In addition, immigrants with higher income and levels of educational attainment are more mobile, which might cause estimation biases. While these results may seem surprisingly high, they align with previous empirical studies. Australia has indeed one of the highest levels of residential mobility in the world (Bell et al., 2015), with over 15 per cent of its population changing address every year and close to 50 per cent moving every five years (Kalemba et al., 2021) and this level is higher among recently arrived immigrants (Bell & Hugo, 2000; Raymer & Baffour, 2018).

To mitigate the effects of location sorting after settlement, we extend our model by taking into account residential mobility, distinguishing between mobility to neighbourhoods with smaller or larger co-ethnic communities. Results in Table 6 show that the size of co-ethnic neighbourhoods does not affect the labour market outcomes of

Table 5 Immigrants' residential mobility

	2006–2011			2011–2016			2006–2016		
	% who changed address	% who moved to an SA2 with a larger co-ethnic population	% who moved to an SA2 with a smaller co-ethnic population	% who changed address	% who moved to an SA2 with a larger co-ethnic population	% who moved to an SA2 with a smaller co-ethnic population	% who changed address	% who moved to an SA2 d with a larger co-ethnic population	% who moved to an SA2 with a smaller co-ethnic population
Overall	52.8	22.2	32.6	41.3	16.5	24.8	69.6	25.7	43.9
By education group									
Bachelor	58.1	22.8	35.3	43.6	17.2	26.4	73.2	26.0	47.2
Diploma	52.9	22.7	30.2	39.3	16.3	23.0	66.0	25.3	40.7
High school	49.5	20.5	29.0	37.9	15.1	22.8	64.7	25.4	39.3
By income group									
Higher than median income	58.1	24.0	34.1	43.6	17.4	26.2	72.4	26.5	45.9
Lower than median income	51.0	20.1	30.9	37.8	15.2	22.6	65.1	24.4	40.7

Source: Author's calculations based on the 2006–2016 ACLD. Sample restricted to immigrants of working age (25 to 59) who arrived in Australia between 2001 and 2006. The statistics are based on spatially consistent SA2 based on the 2011 definition

Table 6 Effects of co-ethnic neighborhood size on immigrants' labour market outcomes of immigrants with an, interaction term between co-ethnic neighbourhood size and residential mobility

	Real weekly income (log)	Not in the labour force
Co-ethnic neighbourhood size	0.0095	-0.0034
	(0.0263)	(0.0043)
Moved to a larger co-ethnic neighbourhood	-0.0551	-0.0007
	(0.1564)	(0.0258)
Moved to a smaller co-ethnic neighbourhood	0.3171**	-0.0596**
	(0.1108)	(0.0183)
Co-ethnic neighbourhood size * moved to a larger co-ethnic neighbourhood	0.0245	0.0009
	(0.0257)	(0.0042)
Co-ethnic neighbourhood size * moved to a smaller co-ethnic neighbourhood	-0.0214	0.0087**
	(0.0187)	(0.0031)
Age	0.0557*	-0.0080+
	(0.0246)	(0.0042)
Being parent	-0.1365**	0.0625**
	(0.0366)	(0.0060)
Married or in a de facto relationship	-0.2049**	0.0251**
	(0.0457)	(0.0075)
High English proficiency	0.1071*	-0.0429**
	(0.0500)	(0.0083)
Tertiary education	0.2785**	-0.0484**
	(0.0425)	(0.0070)
2011 (ref cat. 2006)	0.3073*	-0.0177
	(0.1270)	(0.0216)
2016	0.1603	-0.0038
	(0.2486)	(0.0424)
N	35,334	35,088
R^2	0.079761	0.055046

Standard errors in parentheses $^{+}\ p<0.10$, $^{*}\ p<0.05$, $^{**}\ p<0.01$

Note: Authors' calculations based on the 2006–2016 ACLD sample. Analysis restricted to working age migrants (25–59) who arrived in Australia between 2001 and 2006. The number of observations changes depending on the outcome variable because of small differences in the number of missing values. All modes include individual and SA2 fixed effects. To obtain the net effects of moving to a smaller co-ethnic neighbourhood, one must add the coefficient of the interaction term to the coefficient of the variable. For example, for "Not in the labour force", the net effect of moving to a smaller co-ethnic neighbourhood is -0.0596 + 0.0087 = -0.0509. The coefficient of the interaction term is too small to make a meaningful difference. The finding is the same for wages

immigrants once residential mobility is factored in. However, the regression coefficients of the variable "*Moved to a smaller co-ethnic neighbourhood*" is statistically significant for labour force participation ((β=-0.060, $p<0.001$) and wages (β =0.317, $p<0.001$). This means that immigrants who moved to a smaller co-ethnic

neighbourhood are more likely to be in the labour market than those who remained in larger co-ethnic neighbourhoods and immigrants who moved to larger co-ethnic neighbourhoods, but the magnitude is very small. Similarly, the results show that moving to a smaller co-ethnic neighbourhood is advantageous from a wage perspective.

This result lends support to the spatial assimilation hypothesis according to which improved labour market outcomes are associated with residence away from co-ethnic neighbourhoods (Massey, 1985), which highlights the importance of controlling for residential mobility to robustly assess the impact of co-ethnic neighbourhoods. However, it is not possible to fully assess whether immigrants who perform well in the labour market have a preference for living in suburbs with a smaller number of co-ethnics or whether moving to a suburb with a smaller number of co-ethnics facilitates the acquisition of skills that are beneficial in the labour market. In any case, our results show that residence in a co-ethnic neighbourhood in Australia does not facilitate labour market integration but rather limits it albeit to a very limited extent.

Conclusion

While the level of ethnic residential segregation remains low in Australia by international standards, it has been increasing in recent years (ABS, 2017; Johnston et al., 2007). The growth in annual net overseas migration up to 2019, coupled with the growing diversity of origin countries, has raised questions about the role of co-ethnic neighbourhoods on immigrants' labour market outcomes (Wang et al., 2021). Using the Index of Dissimilarity, we have shown that immigrants have different settlement patterns than the Australian population and while, the degree of spatial segregation decreases over the first five years of arrival, their spatial distribution does not converge to that of the Australia-born within a decade.

Capitalising on the recent release of the Australian Census Longitudinal Dataset, we have deployed a robust analytical framework to estimate the impact of the size of co-ethnic neighbourhoods on income, hours worked, unemployment, and labour force participation. Our methodological contribution is twofold as we address both issues of individual and location sorting by applying individual-fixed effects, controlling for residential mobility and using an exogenous measure of co-ethnic neighbourhood size.

Our findings suggest that ethnic co-residence exerts a small negative effect on wages and labour force participation, particularly for immigrants with less than tertiary education or low English proficiency. This finding, which concurs with evidence from over countries (Danzer & Yaman 22,013, 2016), has been explained by the restrictive effect of ethnic enclaves on interactions with the native population, which in turn leads to a slower acquisition of language (Laliberté, 2019). Because our results control for English proficiency, they suggest that co-ethnic residence may limit the acquisition of host country-specific skills other than language or perhaps limit opportunities or need for upskilling. This idea is supported by the fact that, not only the effect of co-ethnic residence dissipates once we control for residential mobility, but more importantly movement toward smaller co-ethnic neighbourhoods is associated with increased labour market participation and higher wages.

This result highlights the importance of stringent methodological choices to robustly assess the impact of co-ethnic neighbourhoods and in particular the need to take a longitudinal approach to control for residential mobility. This is especially important in the early years post-settlement when immigrants are known to be highly mobile (Bell & Hugo, 2000; Raymer & Baffour, 2018). This is paramount in Australia, one of the most mobile countries in the world, where close to 30 per cent of its population changes SA2 of residence over a five-year period (ABS, 2017) and we have shown that it goes up to 53 per cent of recently-arrived immigrants. Our results have implications for studies in other national contexts because most empirical studies on the impact of co-ethnic neighbourhoods have been conducted in countries with high levels of residential mobility, including the United States, the United Kingdom and Scandinavian countries.

Capitalising on longitudinal data, our results control for duration of residence over a 15-year period. The very limited impact of co-ethnic residence is particularly relevant to efforts by the Australian Government to divert population growth and immigration away from metropolitan centres to regional areas with relatively few immigrants by providing pathways to permanent residency (Hugo, 2008). Relatively little research has been conducted on the impact of these regional visa programs, but our results suggest that immigrants who settle in regional areas should not be at a disadvantage in the labour market by not having access to co-ethnic neighbourhoods.

Substantive findings from this paper should be interpreted in the context of high-skilled immigration, which differentiates Australia from most other OECD countries, and suggest that high-skilled immigrants may have different residential preferences or needs than non-highly-skilled immigrants. However, skilled immigrants form a diverse group, differentiated depending on whether they stay in Australia permanently or temporarily. These differences are likely to interact with labour market outcomes in a way that might modulate the role of co-ethnic neighbourhoods. The recent establishment of the Multi-Agency Data Integration Project (MADIP) by the Australian Bureau of Statistics (ABS, 2021b), which longitudinally combines microdata from diverse administrative datasets, should permit exploration of the role of co-ethnic neighbourhoods by visa class. Such level of detail should provide a more nuanced understanding of co-ethnic neighbourhoods.

Another avenue for future research is the possible impact of co-ethnic neighbourhoods on non-economic outcomes, such as subjective well-being, which has been the focus of growing research attention in recent years. Evidence is emerging that ethnic composition may be affecting life satisfaction in the United Kingdom among both first and second-generation immigrants (Knies et al., 2016). While existing Australian datasets do not allow such an endeavour, efforts should be made to address this gap to provide a more holistic understanding of the effect of co-ethnic residence on life outcomes.

Funding Australian Research Council under the Discovery Project Scheme 2020–2022, DP200100760.

Data Availability Access to the data can be requested to the Australian Bureau of Statistics through DataLab.

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