Investigating the dynamics of migration and health in Australia: A Longitudinal study

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# Does healthy immigrant effect vary between immigrant subgroups in Australia: A longitudinal investigation?

# **Background:**

Immigrant health and their access to and use of health care services is a key policy issue in Australia which has one of the highest proportions of immigrant population in the world: an estimated 24% of the total population of 4.96 million people is born overseas, and net overseas migration is the major contribution to population growth in Australia (Australian Bureau of Statistics 2007; Australian Bureau of Statistics 2008). Immigrants play a major role in satisfying the Australian demand for labour. As such, good health is essential in guaranteeing their continuing social and economic contribution to the nation and in maximising the benefit of immigration program. Moreover, in a country where one person in five is born overseas, the national health profile and consequent cost to the health system is significantly determined by the health and health service utilisation of its immigrants.

It is therefore surprising that comparatively little attention has been paid to immigrant health and health care utilisation both domestically and internationally. This may be due, in part, to the complexities of the relationships involved, but also results from a lack of reliable data linking health outcomes to migration status, and the background and experiences of migrants. Immigrants were either excluded from most health research conducted in Western societies or were too few, both in number and as a proportion of study samples, to yield reliable estimates of their health status and health needs (Friis, Yngue et al. 1998). Much of the recent international literature on immigrant health has focused on identifying the presence and possible magnitude of a "healthy immigrant effect". Typically these studies used cross-sectional data or a series of cross-sectional data which only provide a snapshot in time of differences in the outcome between migrants and non-migrants. Not only does this ignore time, which is valuable as an indicator of integration, but also potential biases from between-individual (and other endogeneous) effects.

# Aims:

Using multiple rounds of panel data from the Household Income and Labour Dynamics in Australia (HILDA), this study determines the existence and temporal dynamics of the healthy immigrant effect. The key question is to identify whether differences in the various health outcomes (as measured by SF-36 with subscales mental health, general health, physical functioning; and psychological stress (K-10)) exist between the native –born (NB) and foreign-born (FB) and among the different migrant groups and if there is a difference, whether it remains over time adjusting for various covariates. Specifically this study addresses the following specific questions:

• Do immigrants have a health advantage relative to the NB? If existent, is this relative health advantage (between FB and NB) different for different migrant subgroups (e.g. English speaking countries, Asians and "other countries")?

• If FB have a health advantage, does it decline as duration of residence increases and for all FB groups? If yes, what factors contribute to the changes in health status?

#### **Methods:**

#### Data

The Household, Income and Labour Dynamics in Australia (HILDA) is a longitudinal survey of Australian people occupying private dwellings. The survey provides longitudinal data on the lives of Australians, with a particular attention paid to household formation, health, income and work. The Survey was commenced in 2001 with a large national probability sample of 7682 households with at least one eligible person aged 15 years and above. All the members of these households aged 15 years and over form the basis of the panel to be interviewed in all the subsequent waves. One of the salient features of HILDA is that the sample was gradually extended to include all those persons from these households, interviewed in wave 1. In wave 1 a total of 19, 914 individuals are interviewed. Of these, 3,556 were FB, with 1,525 from the main ES countries (10.9% of the total sample), and 2,031 (14.5% of the sample) born in non-English-speaking countries (Headey and Warren 2008). Both the longitudinal and cross-sectional weights were provided with the data to make inferences about the population.

Variables and measures: Two health measures are used in this study: SF-36 (which can have three subscales-mental health, general health and physical functioning), and Kessler 10 (psychological stress). The SF-36 is comprised of 36 questions that fall into eight health domains: general health perceptions (GH - 5 items), physical functioning (PF - 10), role limitations due to physical functioning (RP - 4), bodily pain (BP - 2), general mental health (MH - 5), role limitations due to emotional problems (RE - 3), vitality (VT - 4), and social functioning (SF - 2). Each is scored from 0 (worst score) to 100 (best score). A score of 100 in the PF, RP, BP, SF, RE, GH, VT, and MH domains indicate an absence of problems in those areas. The maximum score on these scales indicates not just the absence of disability, but also the presence of a positive health state. For example, a score of 100 in physical functioning indicates an ability to perform all activities without limitations due to health; whereas a score of 100 in mental health indicates an ability to function without personal or emotional problems. A score of 100 in the mental health domain indicates that the respondent feels peaceful and happy and is calm all the time. The SF-36 also yields two psychometrically-based physical and mental health summary measures the Physical Component Summary (PCS) and the Mental Component Summary (MCS).

SF-36 also includes information on self-Rated Health (SRH). This SRH varies between 1 (poor health) and 5 (excellent health). Those reported fair or poor health were considered as reporting 'poor health', and others who reported good or very good or excellent were considered as reporting as 'good health', in this study.

In waves 7 and 9, HILDA collected information on the psychological distress levels of individuals by administering K-10 questionnaire. The Kessler-10 consists of ten questions about non-specific psychological distress and seeks to measure the level of current anxiety and depressive symptoms based on questions about negative emotional states a person may have experienced in the four weeks prior to interview(Kessler, Andrews, Colpe, Hiripi, Mroczek, Normand et al., 2002; Kessler, Barker, Colpe, Epstein, Gfroerer, & Hiripi, 2003). For each item there is a five-level response scale based on the amount of time the respondent reports experiencing the particular problem. Generally, each item is scored from 1 for 'none of the time' to 5 for 'all of the time'. Scores for the ten items are then summed, yielding a minimum possible score of 10 and a maximum possible score of 50, with low scores indicating low levels of psychological distress and high scores indicating high levels of psychological distress.

The main exposure/explanatory variable will be nativity status, i.e., FB or NB. FB is further sub grouped into Asia, English Speaking (ES) countries, and "other countries". Duration of residence is used as a proxy measure to investigate how exposure to the social, cultural and physical environment of the host population might be associated with the health of migrant population. In addition, age, sex, marital status, education, employment status, household income, region of residence, time, health behaviour (drinking, smoking) are used as controls in all multivariate analyses as they are associated with both migration and health.

We used random effects linear regression models to understand the joint effect of immigrant status and the duration of residence in Australia on various health aspects such PH (with PCS as the dependant variable in the regression model), MEH (with MCS being the dependant variable in the regression model) and PSD (with PSD as the dependent variable in the regression model). Random effects logistic regression models were used to understand the role of immigrant status and the length of stay in Australia on SRH. SRH status which takes values 0 (representing 'poor health') and 1 (representing 'good health') was the dependant variable in the logistic regression. Probability of being in good health, given the various covariates, has been modelled in the logistic regression.

Before the regression analysis, basic characteristics of all the FB and the NB respondents were provided and trends in mean levels of PH, MEH and PSD were studied. We also studied trends in proportion of people reported 'poor health', across all the waves of HILDA.

#### **Results and conclusions**

Table 1 shows socio-economic and demographic characteristics of all these FB and NB Australians, in wave 1. Trends in PH, MEH, PSD and proportion reporting poor health (proportion reporting poor/fair SRH) are shown in Figures 1(A), 1(B), 1(C) and 1(D) respectively, by immigrant status. Figures 1(E), 1(F), 1(G) and 1(H), on the other hand, shows trends in the above mentioned health aspects by cohort of arrival of FB groups.

In general, the PH, MEH and SRH levels are better for FB groups who arrived Australia after 1991 and are found decreasing with their duration of stay in Australia (Figures 1(E), 1(F) and 1(H)). This indicated the existence of "healthy immigrant effect". Results show a clear declining trend in PH and increasing trend in the proportion of people reporting poor health, over different waves of HILDA. On the other hand, MEH levels are relatively stable over different waves, with the exception of FB people from "other countries". On the whole, the levels of PH, MEH, PSD and SRH are poorer for FB people, in comparison to the NB people. However, the health of FB groups vary considerably from one another and some of the FB groups have clear health advantage over the NB people, with respect to various health outcomes. For instance, the PH of Asians is better than the NB Australians. Apart from that, there is no clear sign of decline in physical health among Asians while the decline is clearly pronounced in the NB Australians. However, the differentials observed in levels and trends of health outcomes found in these figures may also be due to the influence of other confounders that have association with immigrant status, length of stay in Australia and various health outcomes. Hence, we ran random effect logistic regression models.

Table 2 shows results of regression analysis for PH and MEH, and Table 3 shows regression results analysis for PSD and SRH. These regression results confirm the existence of healthy immigrant effect. However, the healthy immigrant effect varied according to the measure of health and immigrant group under consideration (Table 2 and Table 3). For example, controlling for all other confounding factor, the mean level of PH for people from Asians, ES speaking countries and from "other countries", with less than 10 years of duration in Australia is 22.3, 16.3 and 11.1 points respectively above the PH level of NB Australians. And all these differences are statistically significant, except the difference in physical health levels of FB people from "other countries". While the PH level of all FB groups declines with increase in the duration of residence but it still remains above the NB Australians except for people from "other countries". For example, the PH level of people from Asians and ES speaking countries with 11-20 years of duration of residence in Australia is 2.8 and 15.4 points respectively above the level of NB Australians, while the level of PH for people from "other countries" with 11-20 years of duration of stay in Australia is 4.5 points lower than NB Australians. However, all these difference are statistically insignificant except for people from ES speaking countries. Further reduction in health is observed for all FB groups who lived in Australia for more than 20 years with only statistically different for people from ES speaking countries. In short, people from Asia start being the healthiest but declining health rapidly and then health decline slowdowns

while people from ES speaking countries sustaining their health relatively longer period and then their health levels drop rapidly. The PH of FB people from "other countries" drop continuously and more rapidly than the remaining FB groups.

FB people from Asia and "other countries" with less than 10 years of stay in Australia have slightly MEH advantage over NB Australians, although the advantage is not statistically significant. The MEH levels of people from "other countries" with 11-20 years and with more than 21 years of stay in Australia are lesser to MEH levels of NB Australians by 22 points and 15 points respectively and these differences are statistically highly significant. The level of MEH for Asians is also found to be declining with increase in their duration of residence in Australia. However, the MEH levels Asians with 11-20 years and more than 21 years are not statistically different from the NB Australians. The MEH of FB people from ES countries has also changed with their duration of stay in Australia. But, the changes are not statistically significant.

Interestingly, psychological distress levels decreases for people from ES countries and increases for Asians and for people from "other countries", as their duration of stay increases in Australia. While decrease in PSD for people from ES countries is statistically insignificant, but the increase in PSD for Asians and "other countries" is statistically significant. Unlike PH and MEH, even the Asians and people from "other countries" with less than 10 years stay in Australia have more PSD than the NB Australians, although they are statistically not different from the PSD level of NB Australians. Asians and people from "other countries" with 11-20 years of stay in Australia are having 1.3 and 2.0 points of additional PSD levels respectively than the NB Australians and these differences are statistically significant.

Analysis of self-rated health also showed differential 'healthy immigrant effect'. For example, the odds of reporting good health is 1.8 times more likely for Asians with less than 10 years of stay in Australia, in comparison to the odds of reporting good health by the NB Australians. And the difference is statistically significant. However, the self-reported health of Asians is at the same level as of NB Australians after more than 21 years of stay in Australia. The odds of reporting good health by FB people from ES countries is not statistically different from the NB ones, irrespective of their duration of residence in Australia. The odds of reporting good health changed from 2.1 to 0.65 in between FB people from "other countries" whose duration of stay is less than 10 years and more than 21 years respectively, in comparison to the odds of reporting good health by the NB Australians. And both these differences are statistically significant.

		Country of birth					
		Australia		FB			
Factor	Category	1	ES	Asia	others	All FB	
Sex	Male	45.07	49.33	41.28	47.01	46.97	
	Female	54.93	50.67	58.72	52.99	53.03	
	15-24	13.37	3.79	12.50	5.58	6.13	
Age group	25-54	62.45	61.66	73.26	53.19	61.50	
	55+ years	24.18	34.55	14.24	41.24	32.37	
	New South Wales	29.73	28.57	40.70	25.50	30.15	
	Victoria	24.54	18.32	31.98	32.27	25.35	
	Queensland	21.85	20.63	6.98	12.55	15.38	
State	South Australia	9.80	10.50	3.49	13.35	9.91	
	Western Australia	8.66	16.24	10.76	12.55	13.99	
	Tasmania	3.38	2.56	0.87	1.00	1.74	
	Northern Territory	0.55	0.85	2.03	0.40	0.96	
	Australian Capital Territory	1.48	2.32	3.20	2.39	2.52	
	<=12 years of schooling	52.32	43.47	45.64	51.79	46.43	
Level of	Bachelor or diploma	40.38	45.30	41.86	39.24	42.76	
education	Graduation and above	7.30	11.23	12.50	8.96	10.81	
Type of	Major Urban	56.41	69.48	87.21	78.88	75.98	
Place of	Other Urban	25.63	15.87	9.59	11.16	13.15	
residence	Rural Balance	17.96	14.65	3.20	9.96	10.87	
Marital status*	Married	65.68	75.70	74.71	74.10	75.02	
	Separated/Widowed	13.31	14.04	9.30	16.53	13.81	
	Never married	21.02	10.26	15.99	9.36	11.17	
Type of employment	Full time employ	44.37	45.79	40.12	34.86	41.32	
	Part time employ	21.10	17.34	18.90	15.74	17.18	
	Un employed	3.16	2.44	4.36	3.78	3.24	
	Not in labour force	31.37	34.43	36.63	45.62	38.26	
How well can	Proficient	98.10	98.17	28.20	46.22	68.05	
speak English	Good	1.90	1.83	60.47	47.81	27.81	
	Not good	0.00	0.00	11.34	5.98	4.14	
	Not known		5.25	7.27	6.57	6.07	
Year of arrival	<1960		16.61	4.07	34.26	19.34	
to Australia	1961-1980		46.52	18.31	29.08	35.44	
	1981-1990		20.76	30.81	15.14	21.14	
	>= 1991		10.87	39.53	14.94	18.02	
	<=20,000	14.69	13.80	13.08	24.50	16.88	
Household	(20,000-40,000]	20.21	21.37	23.84	20.72	21.68	
income	(40,000-60,000]	19.47	18.32	21.51	18.53	19.04	
	>60,000	45.64	46.52	41.57	36.26	42.40	
Total sample size (un weighted)		5795	819	344	502	1665	
Total sample size (weighted)		5553	782	522	623	1907	

Table 1: Unweighted wave 1 characteristics (per cent with a particular characteristic) of present study respondents



### Figure 1: Observed trends in health by country of birth and year of arrival

Factor	Categories (if any)			PH		MEH	MEH
		PH	PH std	signific	MEH	std	significan
		estimate	error	ance	estimate	error	ce
	Intercept	304.78	5.5141	<.0001	299.38	5.3415	<.0001
	ES countries < 10 years	16.3213	7.5204	0.0300	1.7213	6.4643	0.7900
	ES countries 11 to 20	15.3903	5.6697	0.0066	4.4849	4.8707	0.3572
	ES countries > 20	-8.3783	3.1448	0.0077	-0.01568	2.7052	0.9954
	Asia <10	22.3017	6.7931	0.0010	7.9101	5.8890	0.1792
Country of birth	Asia 11 to 20	2.8225	6.3967	0.6590	-4.1982	5.5348	0.4482
and duration of	Asia >20	-5.5282	7.8552	0.4816	-12.0444	6.7669	0.0751
residence in	Other countries <10	11.7185	8.8097	0.1835	0.7578	7.6037	0.9206
Australia	Other countries 11 to 20	-4.5466	7.7890	0.5594	-21.7650	6.7206	0.0012
	Other countries > 20	-24.0465	4.0996	<.0001	-15.7836	3.5469	<.0001
	Australia	0			0		-
Sex	Female	-3.6149	1.6470	0.0282	-7.8698	1.4212	<.0001
	Male	0			0		
	15-24 years	9.6993	1.6889	<.0001	-4.5714	1.6724	0.0063
Age group	25-54 years	11.2008	0.9518	<.0001	-3.4535	0.9316	0.0002
	55+ years	0			0		
	Australian Capital Territory	-0.5985	4.1050	0.8841	-0.1256	3.8946	0.9743
	New South Wales	-3.9533	2.4367	0.1047	-4.3215	2.2137	0.0509
	Northern Territory	0.4853	4.8442	0.9202	-8.4757	4.7148	0.0722
State	Queensland	-4.2181	2.4978	0.0913	-4.4381	2.2784	0.0514
	South Australia	-5.5686	3.0504	0.0679	-4.9282	2.7555	0.0737
	TAS	-15.5790	4.0372	0.0001	-6.8972	3.7178	0.0636
	Victoria	-1.1999	2.5444	0.6372	-1.4594	2.3010	0.5259
	Western Australia	0			0		
	<=12 years of schooling	-12.9470	2.0443	<.0001	-6.5755	1.9169	0.0006
Level of education	Bachelor or diploma	-5.1405	1.8925	0.0066	-2.9881	1.7909	0.0952
	Graduation and above	0			0		
	Married	-3.0876	1.2244	0.0117	8.1691	1.2089	<.0001
Current marital	Separated/widowed	-7.0772	1.6137	<.0001	-6.2563	1.5810	<.0001
status	Never married	0			0		
	Full time employ	10.4096	0.6469	<.0001	6.7100	0.6547	<.0001
Current	Part time employ	9.2098	0.6979	<.0001	7.2158	0.7083	<.0001
employment status	Un employed	1.2551	1.5266	0.4110	-7.6271	1.5548	<.0001
	Not in labour force	0			0		
	Proficient	13.2174	4.2796	0.0020	8.7092	4.2422	0.0401
How well can	Good	10.4132	4.0569	0.0103	7.3852	4.0268	0.0667
speak English	Not good	0			0		-
Household income level	<=20,000	-7.7014	1.0081	<.0001	-7.1359	1.0138	<.0001
	(20,000-40,000]	-5.8203	0.7795	<.0001	-5.2918	0.7858	<.0001
	(40,000-60,000]	-3.6534	0.6601	<.0001	-3.0974	0.6698	<.0001
	>60,000	0	-		0		
Drink alcohol	Never drink	-13.1598	1.3805	<.0001	-9.0558	1.3631	<.0001
	Left drink	-14.6519	1.1714	<.0001	-10.6626	1.1779	<.0001
	<= 2 times a week	-0.6915	0.5441	0.2037	-0.2181	0.5498	0.6916
	>= 3 times a week	0			0		
	Never smoke	5.6599	1.2373	<.0001	10.1518	1.1888	<.0001
Smoke	Left smoking	-0.1984	0.9538	0.8353	5.5650	0.9506	<.0001
	Smoke	0			0		
Time	Time	-2.1226	0.07281	<.0001	-0.6794	0.07370	<.0001

Table 2: Effect various factors on physical and mental health

estimate         error         signific ance         error         signific ance         error         signific ance           Intercept         18:5056         0.7669         <0001         1.9431         0.2386         <0001         6.98045           ES countries 11 to 20         0.2389         0.5763         0.1376         0.2380         0.5763         0.1305         0.6932         0.5763         0.1305         0.6932         0.5783         0.2387         0.6932         0.5783         0.2383         0.6932         0.5783         0.2383         0.0232         0.1383         0.0232         0.1383         0.0232         0.1383         0.0213         0.2133         0.0332         0.118         1.02920           Asia 20         1.2626         0.5204         0.0133         0.2323         0.2371         0.3374         1.02920           Australia         0         -         -         0         -         0.0302         2.2171           Male         0         -         0.3322         0.0131         0.0313         0.0313         0.0321         0.0196         0.0214         0.0390         0.022         0.0104         0.05447         <0.001         1.40044           Astratalia         0         -	Factor	Categories (if any)	PSD	PSD std	PSD	SRH	SRH std	SRH	Odds
Intercept         Is 5056         0.7969         0.001         19.431         0.2826         -0.001         6.9811           ES countries 11 to 20         -0.2398         0.4291         0.5763         0.3508         0.2136         0.1030         0.6931         1.2034           Country of birth and duration of residence in other countries - 20         -0.1773         0.2387         0.4577         -0.04298         0.1030         0.6937         1.2032         0.5978         0.2333         0.0233         1.2371         1.2020         0.135         0.2133         0.2333         0.0233         1.2371         1.2020         0.135         0.2133         0.2333         0.02317         1.2371         1.2020         0.135         0.2137         0.1310         0.015         0.2137         0.1310         0.0238         0.2790         0.181         1.02920         0.1313         0.0154         -0.4771         0.1430         0.0000         0.0221         1.00000           Sex         Female         0.4217         0.133         0.013         0.1313         0.0101         3.4141         0.05447         -0.011         1.40004           Age group         25.54 years         1.5678         0.3202         0.0010         3.4141         0.05447         0.01140			estimate	error	signific	estimate	error	signific	ratios
Intercept         18,5056         0.7969         <0001					ance			ance	
		Intercept	18.5056	0.7969	<.0001	1.9431	0.2826	<.0001	6.98045
ES         countries > 20         -0.2398         0.4291         0.5763         0.3508         0.2136         0.1000         0.1005         1.42024           Country of birth and duration of residence in Australia         Asia -10         0.3432         0.5597         0.3398         0.5978         0.2633         0.0232         1.8181           Australia         1         1.2020         0.1263         0.2153         0.2338         0.3574         1.24025           Australia         0         1.2629         0.6136         0.0366         0.02878         0.2799         0.9181         1.0290           Other countries 1         1.0         0         0         0         1.00000         0.0221         1.01000           Sex         Female         0.4217         0.1313         0.0010         0.4314         0.05969         0.0022         1.2014           Mate         0         -         -         0         1.00000         1.44984           Age group         25.54 years         1.5678         0.3020         0.0034         0.2230         0.1022         0.0125         0.0301         0.4244         0.001         1.44094           State         Sustralia         0.6702         0.318         0.0364 <td></td> <td>ES countries &lt; 10 years</td> <td>0.5812</td> <td>0.5746</td> <td>0.3119</td> <td>0.1736</td> <td>0.2801</td> <td>0.5353</td> <td>1.18963</td>		ES countries < 10 years	0.5812	0.5746	0.3119	0.1736	0.2801	0.5353	1.18963
ES         countries         20         -0.1773         0.2387         0.4577         -0.04299         0.1000         0.6932         0.0578           Country of birth and duration of residence in Asia >20         Asia 11 to 20         1.2626         0.5204         0.0133         0.2153         0.0237         0.138118           Other countries <10         0.1858         0.6000         0.7871         0.3461         0.0302         2.11729           Australia         Other countries <10         0.0858         0.6007         0.0131         0.0302         2.11729           Outer countries >20         0.8079         0.0331         0.0302         2.1070         0.0000         0.62269           Australia         0         -         0         -         .100000           Sex         Female         0.4217         0.1313         0.0013         0.1832         0.0022         1.2010           Age group         25-54 years         1.5678         0.3020         <0011         0.4047         <0001         1.40694           State         0         -         0         -         .100000         .00256         0.6632         .00344         0.02441         0.3171         0.7660         0.6725         0.58265		ES countries 11 to 20	-0.2398	0.4291	0.5763	0.3508	0.2136	0.1005	1.42024
Asia ~10         0.3432         0.5597         0.2303         0.0223         1.24025           and duration of residence in Australia         Asia >20         1.2629         0.6136         0.0396         0.02878         0.2799         0.9181         1.02020           Australia         Other countries 11 to 20         0.0010         0.03131         0.2709         0.9181         1.02020           Other countries 11 to 20         0.0054         0.0670         0.0101         0.43131         0.2705         0.2047         0.70955           Other countries 11 to 20         0.0054         0.0677         0.1430         0.0000         0.221         1.20104           Australia         0         0         0         1.00000         0.222         1.20104           Sex         Female         0.4217         0.1313         0.0013         0.1832         0.05969         0.0022         1.20104           Age group         15.24 years         1.6508         0.1410         <0001		ES countries > 20	-0.1773	0.2387	0.4577	-0.04299	0.1090	0.6932	0.95792
Country of birth Asia 11 to 20 1.2626 0.5204 0.0153 0.2153 0.2339 0.3574 1.24025 Australia 20 1.2620 0.6136 0.0396 0.02878 0.2799 0.9181 1.02920 Australia 0.016r countries <10 0.1858 0.6900 0.7877 0.7501 0.3461 0.0302 2.11729 Other countries >20 0.8073 0.3332 0.0154 0.4737 0.1430 0.0009 0.62269 Australia 0.0 0.0154 0.4737 0.1430 0.0009 0.62269 Australia 0.0 0.0154 0.4737 0.1430 0.0009 0.62269 Australia 0.0 0.0154 0.4737 0.1430 0.0009 0.62269 Australia 0.04217 0.1313 0.0013 0.1832 0.05969 0.0022 1.20104 Male 0.0.0.001 0.4977 0.1005 <0001 1.64498 Age group 25-54 years 1.5678 0.3020 <0001 0.4977 0.0105 <0001 1.64498 55+ years 0.0 0.010 0.01341 0.05447 <0001 1.440694 55+ years 0.0 0.001 0.4977 0.0105 <0001 1.64498 Age grout Wates 0.4604 0.2231 0.0391 0.02120 0.0295 0.80014 New South Wates 0.4604 0.2231 0.0391 0.02120 0.0295 0.80014 New South Wates 0.4604 0.2231 0.0391 0.02130 0.1021 0.0295 0.80014 New South Wates 0.4604 0.2231 0.0391 0.02130 0.1021 0.0295 0.80014 New South Wates 0.4604 0.2726 0.0155 0.3589 0.1235 0.0038 0.69843 TAS 0.5270 0.3904 0.1771 0.6559 0.1693 0.0001 0.51898 Level of education -212 years of schooling 0.1613 0.2135 0.0449 0.0011 0.41630 0.0011 0.51894 Victoria 0.3671 0.2279 0.1073 0.00273 0.1035 0.0001 0.5189 Current marital Separated vidowed -0.01071 0.02550 0.0048 0.2910 0.99843 TAS 0.5270 0.3904 0.1771 0.0559 0.10633 0.0001 0.5189 Current marital Separated vidowed -0.010710 0.02510 0.0021 0.1055 Current marital Separated vidowed -0.3034 0.2257 0.1790 0.09556 0.09048 0.2910 0.90886 status Never maried 0 0 .0 .0 .0.0001 0.5189 Current Partime employ -0.12043 0.1475 <0001 0.5112 0.0054 0.9543 Not in abour force 0 0 .000744 0.07474 0.5259 1.04699 Separated vidowed -0.3034 0.2257 0.1790 0.09556 0.09048 <0.2910 0.90886 status Never maried 0 0 .000774 0.02131 0.0011 1.66776 peak English Not good 0 0 .00077 0.5237 0.04684 <0001 1.66819 Part time employ -0.12049 0.0317 0.02230 0.0023 0.1426 0.0001 0.5123 Separated vidowed -0.3034 0.2257 0.1790 0.09556 0.09048 <0.2910 0.90886 status Never maried 0 0		Asia <10	0.3432	0.5597	0.5398	0.5978	0.2633	0.0232	1.81818
and duration of residence in residence in Australia Other countries 20 0.8073 0.332 0.0154 0.4737 0.1245 0.0302 2.11729 0.9181 1.02920 0.07877 0.7501 0.3461 0.0302 2.11729 0.0302 0.21729 0.0417 0.70955 0.0417 0.70955 0.0417 0.70955 0.0417 0.70955 0.0417 0.70955 0.0417 0.70955 0.0417 0.70955 0.0417 0.70955 0.0417 0.70959 0.022 1.20104 Materia 0 0 0 100000 0.62269 0.022 1.20104 Materia 0 0 0 0 0.0000 0.62269 0.022 1.20104 Materia 0.04217 0.1313 0.013 0.1832 0.05969 0.022 1.20104 Materia 0 0 0 0 100000 0.02260 0.0256 0.0447 0.0011 1.64498 0.55 + years 1.6568 0.3020 <0011 0.4977 0.1095 <0001 1.64498 0.55 + years 0 0 0 0 100000 0.02240 0.0295 0.00241 7.00011 4.4064 0.55 + years 0 0 0 0 100000 0.0226 0.0295 0.80014 Northern Territory 0.05596 0.4677 0.9048 0.03640 0.2214 0.018447 <0011 4.40664 0.2313 0.0391 -0.2230 0.1022 0.0295 0.80014 Northern Territory -0.5213 0.6532 0.4249 0.00441 0.3171 0.7660 1.09901 0.0021 0.0228 0.0328 0.1035 0.0138 0.10038 0.0022 0.0295 0.80014 Northern Territory -0.5213 0.6532 0.4249 0.00441 0.3171 0.7660 1.09901 0.0001 0.54776 0.3058 0.10235 0.0038 0.69843 TAS 0.5270 0.3904 0.1771 -0.6559 0.1063 0.0031 0.0278 0.1057 0.9793 1.00274 Victoria 0.3671 0.2279 0.1073 0.002738 0.1057 0.9793 1.00274 Victoria 0.03671 0.2279 0.1073 0.002738 0.1057 0.9793 1.00274 Victoria 0.0365 0.2045 0.0014 <0.0157 0.9793 1.00274 Victoria 0.0361 0.2279 0.1073 0.0055 0.09048 0.2519 1.00500 0.0001 0.54716 0.0055 0.09048 0.2519 0.10603 0.0010 0.54716 0.0000 0.54716 0.0555 0.04644 0.0317 0.0000 0.71100 Graduation and above 0 0 0 0 0. 0. 0. 0. 0. 0. 0. 0.0000 0.7110 Victoria 0.0355 0.0245 0.0774 0.0555 0.09048 0.2210 0.90088 0.7100 0.05756 0.09048 0.2210 0.90088 0.7110 0.00775 0.00038 0.0001 0.54716 0.0055 0.09048 0.2210 0.9003 0.7110 0.00775 0.00038 0.0001 0.54716 0.0055 0.09048 0.0210 0.90886 0.0011 0.66736 0.0001 0.54717 0.00555 0.09048 0.0210 0.90886 0.2150 0.0044 0.05115 0.2094 0.0148 0.66734 0.005116 0.0004 1.22739 0.0357 0.02320 0.04644 0.00148 0.66	Country of birth	Asia 11 to 20	1.2626	0.5204	0.0153	0.2153	0.2339	0.3574	1.24025
Presidence in Australia         Other countries <10         0.1858         0.6900         0.7877         0.7501         0.3461         0.3022         2.11729           Australia         Other countries > 20         0.8073         0.3332         0.0154         -0.4737         0.1430         0.0009         0.62269           Australia         0         .         0         .         1.00000         1.00000           Sex         Female         0.4217         0.1313         0.0013         0.059         0.0021         1.00000           Age group         15-24 years         1.6308         0.1410         <0.01	and duration of	Asia >20	1.2629	0.6136	0.0396	0.02878	0.2799	0.9181	1.02920
Australia         Other countries > 10         2.0054         0.6079         0.0010         -0.3431         0.2705         0.2407         0.7025           Sex         Female         0.4217         0.1332         0.0154         -0.4737         0.1430         0.0009         0.62289           Australia         0         .         0         .         0         .         1.00000           Sex         Female         0.4217         0.1313         0.0013         0.1832         0.05969         0.0221         1.20104           Male         0         .         0         .         0         .         1.00000           25-54 years         1.6678         0.3020         <0001	residence in	Other countries <10	0.1858	0.6900	0.7877	0.7501	0.3461	0.0302	2.11729
Other countries > 20         0.8073         0.3332         0.0154         -0.4737         0.1430         0.0009         0.62269           Sex         Female         0.4217         0.1313         0.0013         0.1832         0.05969         0.0022         1.20104           Male         0         .         0         .         0         .         1.00000           Age group         15-24 years         1.6308         0.1410         <0001	Australia	Other countries 11 to 20	2.0054	0.6079	0.0010	-0.3431	0.2705	0.2047	0.70955
Australia         0         .         0         .         1.00000           Sex         Fenale         0.4217         0.1313         0.0013         0.1832         0.05969         0.0022         1.201000           Age group         15-24 years         1.5678         0.3020         0.0011         0.4977         0.1095        0001         1.40694           25-54 years         0         .         0         .         0         .         1.00000           Age group         25-54 years         0         .         0         .         0         .         1.00000           Australian Capital Territory         0.05596         0.4677         0.9048         -0.2146         0.0896         0.69428           New South Wales         0.46040         0.2210         0.0031         -0.1220         0.0125         0.8034           Queensland         0.6702         0.218         0.038         -0.1060         0.0161         0.0275         0.82626           State         South Australia         0.6601         0.2276         0.1073         0.0057         0.9793         1.0274           Western Australia         0.5270         0.3904         0.1771         -0.6539         0.1693		Other countries > 20	0.8073	0.3332	0.0154	-0.4737	0.1430	0.0009	0.62269
Sex         Female         0.4217         0.1313         0.0013         0.1832         0.05969         0.0022         1.20104           Age group         25-54 years         1.5678         0.3020         <0001		Australia	0			0			1.00000
Male         0         .         0         .         1         .         0         .         1         .         1         .         0         .         .         1         .         1         .         0         .         .         1         .         1         .         0         .         0         .         1         .         0         1         .         1         0         1         .         1         0         1         .         0         1         .         1         0         1         .         1         0         1         .         1         0         1         0         1         .         0         .         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         0         1         0         1         0         0         1         0         0         1         0         0	Sex	Female	0.4217	0.1313	0.0013	0.1832	0.05969	0.0022	1.20104
Age group         15-24 years         1.5678         0.3020 $<0001$ 0.4977         0.1095 $<0001$ 1.44694           St=years         0         0         0         0         0         1.40694           Australian Capital Territory         0.05596         0.4677         0.9048         0.3649         0.2146         0.0896         0.69428           New South Wales         0.4604         0.2231         0.0391         -0.2230         0.1020         0.0295         0.80014           Northern Territory         -0.5213         0.6332         0.4249         0.09441         0.3171         0.7660         1.09901           Queensland         0.6702         0.2318         0.0038         0.1061         0.775         0.83263           State         South Australia         0.6610         0.2726         0.0155         -0.3589         0.1235         0.0038         0.69843           TAS         0.5270         0.3094         0.1771         -0.6559         0.1693         0.0001         0.51898           Level of education         1.29ears of schooling         0.1613         0.2135         0.4099         -0.603         0.1001         0.54716           Bachelor or diploma		Male	0			0			1.00000
Age group         25-54 years         1.6308         0.1410         <0001         0.3414         0.05447         <0001         1.40694           Australian Capital Territory         0.05596         0.4677         0.9048         -0.3649         0.2146         0.0892         0.80428           New South Wales         0.4604         0.2231         0.0391         -0.2230         0.1012         0.0295         0.80014           Northern Territory         -0.5213         0.6532         0.4249         0.09441         0.3171         0.7660         1.09901           Queensland         0.6702         0.2318         0.0038         -0.1908         0.1061         0.0725         0.82626           State         South Australia         0.6601         0.2726         0.0155         -0.3589         0.1235         0.0038         0.69843           TAS         0.5270         0.3904         0.1771         -0.6559         0.1661         0.2135         0.002738         0.1057         0.9793         1.00204           Level of education         <-1		15-24 years	1.5678	0.3020	<.0001	0.4977	0.1095	<.0001	1.64498
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Age group	25-54 years	1.6308	0.1410	<.0001	0.3414	0.05447	<.0001	1.40694
Australian Capital Territory $0.05996$ $0.4677$ $0.9048$ $-0.3649$ $0.2146$ $0.0896$ $0.69428$ New South Wales $0.4604$ $0.2231$ $0.0391$ $-0.2230$ $0.1022$ $0.0295$ $0.80014$ Northern Territory $-0.5213$ $0.6332$ $0.2449$ $0.9441$ $0.3171$ $0.7660$ $1.09901$ Queensland $0.6702$ $0.2318$ $0.0038$ $-0.1908$ $0.1061$ $0.0725$ $0.82636$ State         South Australia $0.6702$ $0.2318$ $0.0038$ $0.69843$ TAS $0.5270$ $0.3904$ $0.1771$ $-0.65890$ $0.0001$ $0.51898$ Victoria $0.3671$ $0.2279$ $0.1073$ $0.002738$ $0.1051$ $0.0001$ $0.51898$ Victoria $0.3671$ $0.2279$ $0.1073$ $0.002178$ $0.1051$ $0.0001$ $0.51898$ Victoria $0.3671$ $0.2175$ $0.3071$ $0.3071$ $0.3017$ $0.00141$ $0.0001$ $0.5127$		55+ years	0			0			1.00000
New South Wales         0.4604         0.2231         0.0391         -0.2230         0.1022         0.0225         0.80014           Northerm Territory         -0.5213         0.6532         0.4249         0.09441         0.3171         0.7660         1.09901           Queensland         0.6702         0.2318         0.0038         -0.1998         0.1061         0.0725         0.82625           State         South Australia         0.6601         0.2726         0.0155         -0.3589         0.1235         0.0038         0.699843           TAS         0.5270         0.3904         0.1771         -0.6559         0.1603         0.0001         0.51898           Victoria         0.3671         0.2279         0.1073         0.002738         0.1057         0.9793         1.00274           Western Australia         0         .         0         .         1.00000         .         1.00000         0.1017         0.008         0.7110           Graduation and above         0         .         0         .         1.00000         .         1.00000           Married         -1.1312         0.1855         <0001		Australian Capital Territory	0.05596	0.4677	0.9048	-0.3649	0.2146	0.0896	0.69428
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		New South Wales	0.4604	0.2231	0.0391	-0.2230	0.1022	0.0295	0.80014
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Northern Territory	-0.5213	0.6532	0.4249	0.09441	0.3171	0.7660	1.09901
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Queensland	0.6702	0.2318	0.0038	-0.1908	0.1061	0.0725	0.82626
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	State	South Australia	0.6601	0.2726	0.0155	-0.3589	0.1235	0.0038	0.69843
Victoria         0.3671         0.2279         0.1073         0.002738         0.1057         0.9793         1.00270           Level of education         <12 years of schooling		TAS	0.5270	0.3904	0.1771	-0.6559	0.1693	0.0001	0.51898
Western Australia         0         .         0         .         1.00000           Level of education $\leq =12$ years of schooling         0.1613         0.2135         0.4499         -0.6300         0.1041         <0001		Victoria	0.3671	0.2279	0.1073	0.002738	0.1057	0.9793	1.00274
Level of education $\leq =12$ years of schooling         0.1613         0.2135         0.4499 $-0.6030$ 0.1041 $<0001$ 0.54716           Bachelor or diploma $-0.05855$ 0.2045         0.7747 $-0.3411$ 0.1017         0.0008         0.71100           Graduation and above         0         .         0         .         100000           Married $-1.1312$ 0.1855         <0001		Western Australia	0			0			1.00000
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Level of education	<=12 years of schooling	0.1613	0.2135	0.4499	-0.6030	0.1041	<.0001	0.54716
Graduation and above         0         .         0         .         1.00000           Married         -1.1312         0.1855         <0001		Bachelor or diploma	-0.05855	0.2045	0.7747	-0.3411	0.1017	0.0008	0.71100
Married         -1.1312         0.1855         < 0001         0.04744         0.07478         0.5259         1.04859           Current marital status         Separated/widowed         -0.3034         0.2257         0.1790         -0.09556         0.09048         0.2910         0.90886           Current         Full time employ         -1.2963         0.1473         <.001		Graduation and above	0			0			1.00000
Current marital status         Separated/widowed $-0.3034$ $0.2257$ $0.1790$ $-0.09556$ $0.09048$ $0.2910$ $0.90886$ Never married         0         .         0         .         1.00000           Full time employ $-1.2963$ $0.1473$ $<0001$ $0.5237$ $0.04684$ $<0001$ $1.68819$ Part time employ $-0.9154$ $0.1475$ $<0001$ $0.5112$ $0.005119$ $<0001$ $1.66736$ employment status         Un employed $0.6435$ $0.3079$ $0.0367$ $-0.04664$ $0.09542$ $0.6250$ $0.95443$ Not in labour force         0         .         0         .         1.00000           Proficient $-2.4773$ $0.6671$ $0.0002$ $0.7676$ $0.2242$ $0.0007$ $2.15470$ How well can         Good $-2.3489$ $0.6371$ $0.0002$ $0.7676$ $0.2242$ $0.0007$ $2.15470$ How sehold income         (20,000-40,000] $0.8023$ $0.1482$ $<0001$ $-0.6302$ $0.06368$ $<0001$		Married	-1.1312	0.1855	<.0001	0.04744	0.07478	0.5259	1.04859
status         Never married         0         .         0         .         1.00000           Full time employ         -1.2963         0.1473         <.0001	Current marital	Separated/widowed	-0.3034	0.2257	0.1790	-0.09556	0.09048	0.2910	0.90886
Full time employ $-1.2965$ $0.1473$ $<0001$ $0.5237$ $0.04084$ $<0001$ $1.08819$ Part time employ $-0.9154$ $0.1475$ $<0001$ $0.5112$ $0.05119$ $<0001$ $1.66736$ employment status         Un employed $0.6435$ $0.3079$ $0.0367$ $-0.04664$ $0.09542$ $0.6250$ $0.95443$ Not in labour force         0         .         0         .         1.00000           Proficient $-2.4773$ $0.6671$ $0.0002$ $0.7676$ $0.2242$ $0.0007$ $2.15470$ How well can         Good $-2.4773$ $0.6671$ $0.0002$ $0.7676$ $0.2242$ $0.0007$ $2.15470$ How self income         Good $0.3791$ $0.0002$ $0.5115$ $0.2048$ $1.66774$ Household income         (20,000-40,000] $0.8023$ $0.1482$ $<0001$ $-0.6302$ $0.06368$ $<0011$ $0.53249$ Household income         (20,000-40,000] $0.3795$ $0.1305$ $0.0037$ $-0.2350$	status	Never married	0			0			1.00000
Current         Part time employ $-0.9154$ $0.14/5$ $<0001$ $0.5112$ $0.05119$ $<0001$ $1.06736$ employment status         Un employed $0.6435$ $0.3079$ $0.0367$ $-0.04664$ $0.09542$ $0.6250$ $0.95443$ Not in labour force         0         .         0         .         0         .         1.00000           Proficient $-2.4773$ $0.6671$ $0.0002$ $0.7676$ $0.2242$ $0.007$ $2.15470$ speak English         Not good         0         .         0         .         1.00000 $=20,000$ $1.0418$ $0.8844$ $<001$ $-0.6302$ $0.06368$ $<001$ $0.53249$ Household income $(20,000-40,000]$ $0.8023$ $0.1482$ $<001$ $-0.6302$ $0.06368$ $<001$ $0.5145$ $<001$ $0.5145$ $<001$ $0.5145$ $<001$ $0.53249$ Household income $(20,000-40,000]$ $0.8023$ $0.1482$ $<0001$ $-0.6302$ $0.06368$ $<0011$ $0.53249$	Current employment status	Full time employ	-1.2903	0.14/3	<.0001	0.5237	0.04684	<.0001	1.08819
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		Part time employ	-0.9154	0.1475	<.0001	0.5112	0.05119	<.0001	1.00/30
Not in labour force         0         .         0         .         1.00000           Proficient         -2.4773         0.6671         0.0002         0.7676         0.2242         0.0007         2.15470           How well can speak English         Not good         -2.3489         0.6371         0.0002         0.5115         0.2094         0.0148         1.66774           speak English         Not good         0         .         0         .         1.00000           <=20,000		Un employed	0.0435	0.3079	0.0307	-0.04004	0.09542	0.6250	0.95443
Proficient $-2.4773$ $0.0071$ $0.0002$ $0.7676$ $0.2242$ $0.0077$ $2.15470$ How well can speak English         Good $-2.3489$ $0.6371$ $0.0002$ $0.7676$ $0.2242$ $0.0007$ $2.15470$ speak English         Not good         0         .         0         .         0         .         1.00000 $< = 20,000$ $1.0418$ $0.1884$ $<0001$ $-0.6302$ $0.06368$ $<0001$ $0.53249$ Household income         ( $20,000-40,000$ ] $0.8023$ $0.1482$ $<0001$ $-0.6302$ $0.06368$ $<0001$ $0.53249$ Household income         ( $20,000-40,000$ ] $0.8023$ $0.1482$ $<0001$ $-0.6302$ $0.06368$ $<001$ $0.53249$ Household income         ( $20,000-40,000$ ] $0.8023$ $0.1482$ $<0001$ $-0.6302$ $0.06368$ $<0001$ $0.54146$ Ievel         ( $20,000-60,000$ ] $0.3795$ $0.1305$ $0.0037$ $-0.2350$ $0.04764$ $<0001$ $0.7954$ Dri		Not in labour force	0 4772	0.6671		0 7676	0.0040		1.00000
How well can         Good $-2.3489$ $0.0371$ $0.0002$ $0.3115$ $0.2094$ $0.0148$ $1.06774$ speak English         Not good         0         .         0         .         1.00000 $< = 20,000$ 1.0418         0.1884         <.0001	TT11	Proticient	-2.4/75	0.00/1	0.0002	0.7070	0.2242	0.0007	2.15470
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	now well call	Good Net and	-2.5469	0.0571	0.0002	0.5115	0.2094	0.0148	1.00774
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	speak English Household income level	Not good	1 0419	0.1004	< 0001	0.6202	0.06269	< 0001	1.00000
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		<=20,000	0.9002	0.1664	<.0001	-0.0302	0.00308	<.0001	0.55249
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		(20,000-40,000]	0.8023	0.1462	0.0037	0.2350	0.03143	< 0001	0.04140
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		<u></u>	0.3793	0.1303	0.0037	-0.2330	0.04704	<.0001	1.00000
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Drink alcohol	News drink	0.6969	0.0150	0.0014	0 7911	. 0.07770	< 0001	0.45701
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Left drink	1 1 9 7 6	0.2150	< 00014	-0./811	0.07062	<.0001	0.45791
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		<= 2 times a week	0.1070	0.2049	0.3479	-0.0018	0.03065	< 0001	0.50575
Never smoke         -1.8163         0.1600         <001         0.5450         0.06445         <0001         1.72465           Smoke         Left smoking         -1.4789         0.1550         <0001		>= 3 times a week	0.1079	0.1149	0.5478	-0.1050	0.03903	<.0001	1 00000
Smoke         0         0.1000         0.0011         0.17400         0.00449         0.00449         0.00449         0.00449         1.172405           Smoke         0         .         .         0         .         1.0000         1.0000         1.0000         1.0000         1.0000         1.00000         0.00010         1.00000         0.00010         1.00000         0.00010         0.00010         0.00010         0.00010         0.00010         1.000000         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         1.000000         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010         0.00010 <t< td=""><td rowspan="3">Smoke</td><td>Never smoke</td><td>-1 8163</td><td>0.1600</td><td>&lt; 0001</td><td>0 5450</td><td>0.06445</td><td>&lt; 0001</td><td>1.00000</td></t<>	Smoke	Never smoke	-1 8163	0.1600	< 0001	0 5450	0.06445	< 0001	1.00000
International         Introp 0.1330         0.001         0.2043         0.004         1.22139           Smoke         0         .         0         .         0         .         1.00000           Time         -0.02250         0.02983         0.4506         -0.07677         0.05228         <0001		Left smoking	-1.0103	0.1550	< 0001	0.2040	0.05811	0.0004	1.72405
Time -0.02250 0.02983 0.4506 -0.07677 0.005228 < 0.001 0.92610		Smoke	-1.4709	0.1550	~.0001	0.2049	0.05011	0.0004	1.00000
With a start with	Time	Time	-0.02250	0.02983	0.4506	-0 07677	0.005228	< 0001	0.92610

Table 3: Effect various factors on psychological distress and self-rated health

# Conclusion

Unlike many previous studies that examine healthy immigrant effect based on crosssectional data ignoring period and cohort effect, our study using 10 waves of longitudinal data brings out the dynamic nature of the association between migration and health in the Australian setting. This study confirms the existence of healthy immigrant effect. However, the healthy immigrant effect varied according to the measure of health and immigrant group under consideration.

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