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# Mental Health Assimilation of Australian Immigrants

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Laura M. Janisch[1]

# Mental Health Assimilation of Australian Immigrants

## Abstract

*Mental diseases are a widespread phenomenon and trigger massive direct and indirect costs. Using Australian household survey data this study analyzes assimilation of immigrants' mental health over time. Therefore, this study contributes to the literature since previous literature has focused primarily on the assimilation of immigrants' physical health status. We find that the probability of suffering from poor mental health increases with time since migration. In addition, female immigrants display a 4 percentage points lower risk of suffering from poor mental health when entering the country. Furthermore, immigrants with English as mother tongue have a lower likelihood of suffering from poor mental health when compared to their counterparts with non-English mother tongues.*

*JEL Classification: I14, J15, O15*

*Keywords: Immigration; mental health; assimilation*

*December 2017*

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# 1 Introduction

Worldwide almost every fifth adult suffers from a mental disease such as depression or anxiety disorder. Furthermore, mental diseases represent the most prevalent disease for working age population in rich countries (Layard, 2016). Mental health impairments are extremely costly not only to the individuals that suffer from them but also to society as a whole. For example a study from the UK finds that if Britons with mental health impairments worked as if they were healthy, total employment would be 4 percent higher boosting production and tax revenues (Layard, 2016). The global costs of mental disorders, which include direct and indirect costs, amount to impressive 4 percent of GDP (Mnookin, 2016).

Direct economic costs of mental health impairments include not only health care costs such as inpatient and outpatient care as well as medication but also disability payments, and provision of support services (Bubonya et al., 2017). Indirect costs include suicide related costs, negative externalities for families as well as workplace related costs such as reduced productivity due to absenteeism. Bubonya et al. (2017) find that workers who self-report poor mental health are significantly more likely to be absent from work.

Recently, immigrants' health status has gained attention both in the public health literature as well as among policy makers since a good health status is a key prerequisite for immigrants' participation in the labor market and, as a consequence, for the generation of tax revenues. In fact, a large strand of the literature discusses the assimilation of immigrants' health over time. However, existing literature focuses primarily on immigrants' assimilation in physical health. For example, it is found that Hispanic immigrants arriving in the US have a lower Body Mass Index (BMI) than the native population but this advantage diminishes with years since migration and their BMIs assimilate to unhealthy American levels (Antecol and Bedard, 2006; Giuntella and Stella, 2017). Similar findings for the incidence of chronic diseases (Biddle et al., 2007; McDonald and Kennedy, 2004; Perez, 2002) or self-rated overall

health (Hamilton et al., 2015) come from Australia, Canada and the US, respectively.

This phenomenon that immigrants are often healthier than the native-born population upon arrival and show a declining health the longer they are in the host country is called the *healthy immigrant effect*. To our knowledge there is only one paper that studies the healthy immigrant effect with respect to mental health. A study from Canada finds that immigrants' mental health status assimilates to that of the native Canadian population over time (Lou and Beaujot, 2005). However, the Canadian study does not account for heterogeneities among the immigrants e.g. different language background or region of origin. This paper contributes to the literature as it is the first paper that analyzes the assimilation of immigrants' mental health status accounting for heterogeneous effects for different groups of immigrants.

Using Australian household survey data, this paper answers three research questions. First, it analyzes whether immigrants to Australia have a better mental health status upon arrival when compared to the native population. Second, it discusses how immigrants' mental health status develops over time and whether it assimilates to the level of natives. Finally, this study examines heterogeneous effects for different groups of immigrants according to language and region of birth.

We find that the mental health status of female immigrants exceeds mental health of natives upon arrival. However, mental health of female and male immigrants deteriorates over time. Furthermore, mother tongue and region of birth seem to play a decisive role with respect to mental health status. Immigrants from New Zealand in particular and those with English as mother tongue in general are less likely to suffer from poor mental health.

The remainder of this article is organized as follows. Section 2 discusses the composition of Australia's immigrant population and provides information on the Australian Mental Health Strategy. Section 3 introduces the data, shows summary statistics and presents the empirical approach. The fourth section discusses results and section 5 concludes.

## 2 Institutional Settings

With almost one third of the residing population born abroad, Australia counts as one of the world's major immigration nations (Phillips and Simon-Davies, 2016). Figure 1 illustrates that the share of Australia's population that is born abroad has increased tremendously over the last three decades. Second, it suggests a large change in the composition of visas granted between 1984 and 2015. In recent years, Australia's migration policy started to target especially the recruitment of skilled immigrants. As a consequence, the number of immigrants on skilled visa as compared to immigrants on family or humanitarian visa has risen. Since the visa composition has changed over time and we assume that visa categories are related to (mental) health status of applicants, it is very important to account for different migration cohorts (Biddle et al., 2007; Hamilton et al., 2015).

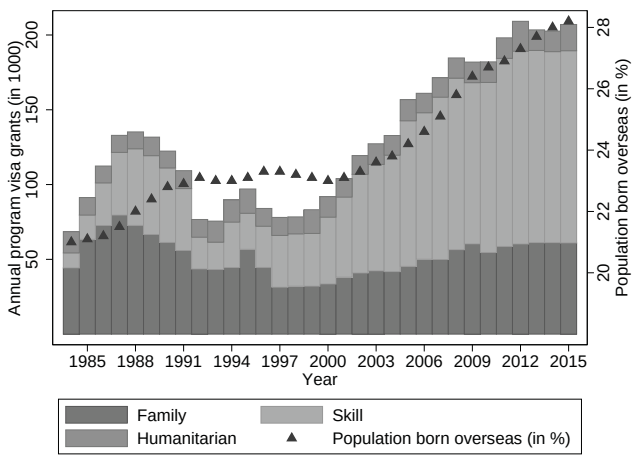



Figure 1: Migration patterns in Australia

*Source* Numbers on program visa grants: Phillips and Simon-Davies (2016); Immigrant Share: Australian Bureau of Statistics. *Note:* The number for visa grants in year 1984 refers to visas granted from July 1984 through June 1985. Same holds for following years.

In 1993, Australia endorsed a National Mental Health Strategy. It provided an overarching policy framework that fostered mental health reforms in Australia for the last two decades (Department of Health and Ageing, 2013). Results from the latest Survey on Mental Health and Wellbeing of the Australian adult population in 2007 suggest that every fifth Australian adult dealt with a mental disorder in the past 12 months (Australian Bureau of Statistics, 2007). National expenditures on mental health services have increased very steeply over the last decade from 1.9 billion AUD in 1992-1993 to 8.5 billion AUD in 2014/2015[1]. To target these vast amount of spendings more effectively, it is crucial for policy makers to know which parts of the population are affected most by mental health impairments. This study focuses in particular on immigrants.

# 3 Data and Empirical Strategy

The following empirical analysis employs the HILDA Survey Release 15 (years 2001-2015), which is a nationally representative household panel survey. Mental health is measured using data on the health module from the Self-Completion Questionnaire (SCQ) which is distributed to all survey participants who are 15 years and older. The response rate of the self-completed questionnaire is very high as it ranges around 90 percent (Watson and Wooden, 2015). To compare a more homogenous sample, we restrict the sample to 20-65 year old Australians[2]. In addition, we drop around 10 percent of the sample as they have not completed the SCQ. Finally we exclude another 9 percent of the sample that have missing observations for our variables of interest and end up with 145,077 observations from 22,549 respondents.

[1]Australian Institute of health and Welfare 2017. Health expenditure data cubes. http://www.aihw.gov.au/expenditure-data/

[2]Mental health status varies with age. For example, retirement can have positive as well as negative effects on mental health due to lower stress levels on the one side or loss of self-esteem, for people that strongly identified with their jobs, on the other side.

The SCQ includes the Medical Outcomes Study Short Form (SF-36), which represents a self-completion measure of health status that is extensively used in the health economics literature and reflects health status from the patient's perspective[3]. The Mental Health Inventory (MHI-5) is a subscale of the SF-36. It combines five different items that check for symptoms of depression and anxiety in the preceding four weeks. In particular the following questions are asked: 'How much of the time during the last month have you: (i) been a very nervous person?; (ii) felt so down in the dumps that nothing could cheer you up?; (iii) felt calm and peaceful?; (iv) felt down?; and (v) been a happy person?'. Answers range from 'All of the time' (1) to 'None of the time' (6). To construct the MHI-5, response scores of each item are summed up and standardized to range from 0-100. Higher scores refer to better mental health.

As common in the literature, we construct a dichotomous variable indicating whether someone suffers from poor mental health or not. We use a threshold of the MHI-5 score (cut-off: 52 points) proposed by the psychiatric literature and proved to be a reliable measure for psychological distress such as for example severe depressive symptoms (Bültmann et al., 2006; European Commission, 2004; Yamazaki et al., 2005). Following this definition, 14 percent of our sample suffer from poor mental health. According to the National Survey of Mental Health and Wellbeing from 2007, around 20 percent of the Australian population aged 16-85 years suffered from common mental disorders within the last twelve months (Australian Bureau of Statistics, 2007). Given that we refer to a different age group (20-65 year old) and collect information on mental well-being only on the past four weeks rather than for the preceding year, the share of our sample defined to be at risk seems to be reasonably high.

We include two sets of control variables into our regression. To begin with, various socioeconomic factors that might affect mental health are included. In contrast to physical health

[3]Ware et al. (1993) provide a detailed manual on how to use the SF-36 measure. Butterworth and Crosier (2004) discusses the validity for the SF-36 measure for Australia.

that deteriorates with increasing age, existing evidence suggests that mental health improves with age. Australian studies found that mental disorders often occur in young adulthood (Butterworth et al., 2004; Australian Bureau of Statistics, 2007). Effects of employment status on mental health can be positive or negative. Unemployment might cause financial turbulence, lower investments into health and decreased self-esteem. On the other side, employment might lead to more stress and less time to spend on health enhancing activities (Hamilton et al., 1997). Assuming health care to be a normal good, the consumption of it should increase with household income. Indeed, literature finds a positive effect of increased household income on mental health e.g. by an exogenous income shock caused by a lottery win (Apouey and Clark, 2015; Gardner and Oswald, 2007; Ettner, 1996).

Immigrants are defined as foreign-born individuals. We account for various migration related characteristics. Years since migration and migration cohorts provide information on the length of stay in the host country. Region of birth accounts for sending country heterogeneities. Language skills are important and HILDA data provides three different variables: country of birth, self-reported language skills and self-reported first language that was learned as a child (mother tongue). We decide to use the third measure for several reasons. First, country of birth is only a good proxy for language skills if a country has only one official language. However, many countries have more than one official language which makes it difficult to assess the skill level in a particular language. Second, self-reported language skills are potentially endogenous since some people might be more motivated to learn the language and thus integrate faster than others. In contrast, the first language that is learned as a child is determined by the parents and therefore less likely to be affected by self-reporting bias. In order to account for the age at migration, which relates to language proficiency and health adaption, an indicator variable that takes the value one if someone migrated before the age of 15 is included.

Table 1: Summary statistics

| | Women | | Men | | Difference | |
|---|---|---|---|---|---|---|
| | Native | Immigrant | Native | Immigrant | Women | Men |
| | (1) | (2) | (3) | (4) | (1)-(2) | (3)-(4) |
| Health | | | | | | |
| Mental Health Score (0-100) | 72.86 | 72.43 | 75.05 | 74.42 | 0.429*** | 0.630*** |
| Physical Health Score (0-100) | 85.91 | 83.27 | 87.94 | 85.81 | 2.641*** | 2.125*** |
| Poor Mental Health (Score≤52) | 0.15 | 0.15 | 0.12 | 0.13 | -0.006* | -0.006* |
| Socioeconomics | | | | | | |
| 20-29 | 0.24 | 0.13 | 0.24 | 0.13 | 0.110*** | 0.111*** |
| 30-39 | 0.23 | 0.21 | 0.23 | 0.20 | 0.017*** | 0.024*** |
| 40-49 | 0.24 | 0.27 | 0.24 | 0.26 | -0.027*** | -0.021*** |
| 50-59 | 0.20 | 0.26 | 0.20 | 0.26 | -0.061*** | -0.062*** |
| 60-65 | 0.09 | 0.13 | 0.09 | 0.14 | -0.039*** | -0.052*** |
| Education | | | | | | |
| Low | 0.30 | 0.23 | 0.23 | 0.17 | 0.078*** | 0.065*** |
| Medium | 0.33 | 0.31 | 0.46 | 0.39 | 0.018*** | 0.070*** |
| High | 0.37 | 0.46 | 0.31 | 0.45 | -0.097*** | -0.135*** |
| Marital status | | | | | | |
| Married | 0.68 | 0.75 | 0.70 | 0.77 | -0.062*** | -0.077*** |
| Labor market status | | | | | | |
| Employed | 0.70 | 0.64 | 0.84 | 0.81 | 0.063*** | 0.023*** |
| Unemployed | 0.03 | 0.03 | 0.04 | 0.04 | -0.002 | -0.002 |
| Not in the Labor Force | 0.27 | 0.33 | 0.13 | 0.15 | -0.061*** | -0.022*** |
| Annual gross household income | | | | | | |
| 0-14,999 AUD | 0.20 | 0.22 | 0.16 | 0.17 | -0.021*** | -0.012*** |
| 15,000-39,999 AUD | 0.13 | 0.13 | 0.12 | 0.12 | 0.007** | 0.005* |
| 40,000-69,999 AUD | 0.19 | 0.18 | 0.20 | 0.20 | 0.010*** | 0.007* |
| 70,000-99,999 AUD | 0.17 | 0.16 | 0.19 | 0.17 | 0.011*** | 0.013*** |
| 100,000 AUD and more | 0.30 | 0.31 | 0.33 | 0.34 | -0.007* | -0.014*** |
| N(ind.) | 8,995 | 2,657 | 8,436 | 2,461 | | |
| N(obs.) | 60,634 | 16,533 | 53,213 | 14,697 | | |

*Source:* Own calculation based on HILDA survey Wave 15.
*Note:* Mental and physical health scores are standardized to range from 0-100 with higher scores indicating better health. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 1 presents the summary statistics. Since mental and physical health differs according to gender, we conduct separate analysis for women and men. Immigrants in our sample are on average older and better educated than their native counterparts. To account for these differences, we add all covariates listed in Table 1 as controls to the subsequent regressions. Further, the majority of our sample is married, employed and roughly one third of the sample possesses a gross annual household income lower than 40,000 AUD.

Table 2: Summary statistics (immigrant sample)

| Variable | Women | Men | Variable | Women | Men |
|---|---|---|---|---|---|
| Mother tongue | | | Immigration Cohort | | |
| English | 0.48 | 0.58 | 2000-2015 | 0.15 | 0.14 |
| Non-English | 0.51 | 0.42 | 1985-1999 | 0.36 | 0.36 |
| Region of origin | | | 1970-1984 | 0.27 | 0.28 |
| Europe | 0.44 | 0.47 | Before 1970 | 0.22 | 0.22 |
| Asia | 0.28 | 0.21 | Years since migration | | |
| New Zealand | 0.10 | 0.13 | 0-5 years | 0.08 | 0.07 |
| Africa | 0.05 | 0.06 | 6-10 years | 0.10 | 0.09 |
| MENA | 0.03 | 0.04 | 11-15 years | 0.11 | 0.11 |
| Oceania/Antartica | 0.03 | 0.04 | More than 15 years | 0.70 | 0.72 |
| North America | 0.03 | 0.03 | | | |
| Americas | 0.03 | 0.03 | | | |
| N(ind.) | 2,657 | 2,461 | | 2,657 | 2,461 |
| N(obs.) | 16,533 | 14,697 | | 16,533 | 14,697 |

*Source:* Own calculation based on HILDA survey Wave 15. Immigrant sample only.

Table 2 provides information on the migration history of the sub sample of immigrants. Almost 50 percent of females and 60 percent of males state that their mother tongue is English[4] (henceforth referred as "English"). The majority of English immigrants comes from the UK, New Zealand, South Africa, the US or Ireland. The remaining 50 percent of females (40 percent of males) that state that their first language is not English (henceforth referred as "Non English") come mainly from Asian countries such as the Philippines, China, India or Vietnam but also from European countries such as Germany and Italy. The largest immigrant group comes from Europe followed by Asia and New Zealand. The immigrant sample spreads quite evenly among the different migration cohorts. About 70 percent of the immigrant sample migrated to Australia at least 15 years ago.

In our empirical approach we follow the seminal work on assimilation of immigrant wages over time by Chiswick (1978) and Borjas (1985). We use a linear probability model where the dependent variable $y_{it}$ refers to the probability that individual i suffers from poor mental health at time t. Since we use panel data and have more than one observation per individual,

[4]The HILDA questionnaire includes the question "Was English the first language that you learned as a child?" Everyone that answered it with "yes" is defined as an *English* immigrant.

we cluster standard errors on the individual level.

We use the following estimation equation:

$$y_{it} = X'_{it}\delta + \beta_1 age_{it} + \beta_2 age^2_{it} + \beta_3 ysm_{it} + \beta_4 ysm^2_{it} + \beta_5 MIG_{it} + \lambda_t + u_{it} \quad (1)$$

where the covariate vector $X_{it}$ controls for educational attainment, family status, employment status, household income and state of residence of individual i at time t. To account for possibly nonlinear effects of age and years since migration on mental health we also include the squared term of these variables. $MIG_{it}$ refers to different migration related variables such as mother tongue, migration cohort, region of origin and a child immigrant indicator variable. Migration related variables are set to zero for natives. Year dummies $\lambda_t$ capture year-specific effects and $u_{it}$ refers to the error component.

# 4 Results

Table 3 shows that female immigrants have a 4 percentage points lower risk of suffering from poor mental health at the time of immigration than their native counterparts after controlling for relevant observable characteristics such as age, education and household income. In combination with a positive and significant years since migration (ysm) coefficient, this suggests a so-called *healthy immigrant effect* indicating that female immigrants are healthier in terms of mental health than natives at their arrival (ysm=0) but this advantage shrinks with time since migration[5]. For men, the health advantage in mental health at arrival is smaller and insignificant. As a consequence, female immigrants in our sample seem to be selected more positively than their male counterparts. Irrespective of gender the incidence of suffering from poor mental health decreases for individuals who are better educated,

[5]The squared functional form of one of the most important explaining variable *years since migration* (ysm) is tested in Table A1. The estimation includes indicator variables for different years since migration categories and supports the assumption of an quadratic functional form of the ysm variable.

Table 3: Linear probability model - base

| Dep. variable: | Women | Men |
|---|---|---|
| Poor mental health | (1) | (2) |
| Immigrant | -0.041*** | -0.005 |
| | (0.013) | (0.014) |
| Years since mig. | 0.005*** | 0.002* |
| | (0.001) | (0.001) |
| Years since mig. sq. | -0.00009*** | -0.00003* |
| | (0.00001) | (0.00002) |
| Age | 0.012*** | 0.012*** |
| | (0.001) | (0.001) |
| Age sq. | -0.0002*** | -0.0002*** |
| | (0.00002) | (0.00002) |
| High education | -0.051*** | -0.043*** |
| | (0.007) | (0.007) |
| Medium education | -0.027*** | -0.035*** |
| | (0.007) | (0.007) |
| Married | -0.071*** | -0.054*** |
| | (0.006) | (0.006) |
| Employed | -0.097*** | -0.153*** |
| | (0.005) | (0.008) |
| Household income (in 1000 AUD) | -0.003*** | -0.003*** |
| | (0.0003) | (0.0003) |
| Child immigrant | -0.003 | -0.005 |
| | (0.015) | (0.013) |
| State dummies included | Yes | Yes |
| N(ind.) | 11,652 | 10,897 |
| N(obs.) | 77,167 | 67,910 |

*Source:* Own calculation based on HILDA survey Wave 15. *Note:* Base groups: Immigration Status - Natives; Education - Low. Year fixed effects are included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on individual level.

married, employed or have a higher household income. The indicator variable controlling for immigrants who arrived before the age of 15 years (child immigrant) is insignificant suggesting that childhood arrival is not a key driver of immigrant's mental health. These results are in line with findings from existing literature.

Table 4 disentangles results for heterogeneous groups of immigrants using a linear probability model[6]. Female English and non-English immigrants face a significantly lower proba-

[6]Using a continuous rather than a binary outcome variable (Table A2) or estimating a probit model support our main findings (Table A3).

Table 4: Linear probability model - heterogenous effects

| Dep. variable: | Language | | Cohort | | Region | |
|---|---|---|---|---|---|---|
| Poor mental health | Women | Men | Women | Men | Women | Men |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Non-English | -0.035*** | 0.008 | | | | |
| | (0.013) | (0.014) | | | | |
| English | -0.061*** | -0.025 | | | | |
| | (0.015) | (0.016) | | | | |
| Cohort Pre1970 | | | 0.023 | -0.040 | | |
| | | | (0.039) | (0.036) | | |
| Cohort 1970-1984 | | | 0.031 | -0.007 | | |
| | | | (0.031) | (0.031) | | |
| Cohort 1985-1999 | | | 0.013 | 0.007 | | |
| | | | (0.021) | (0.022) | | |
| Cohort 2000-2015 | | | -0.043*** | -0.011 | | |
| | | | (0.013) | (0.015) | | |
| New Zealand | | | | | -0.065*** | -0.041** |
| | | | | | (0.020) | (0.017) |
| Europe | | | | | -0.032** | 0.002 |
| | | | | | (0.015) | (0.017) |
| Asia | | | | | -0.047*** | -0.004 |
| | | | | | (0.014) | (0.015) |
| Africa | | | | | -0.043* | -0.024 |
| | | | | | (0.024) | (0.021) |
| MENA | | | | | 0.026 | 0.060* |
| | | | | | (0.037) | (0.034) |
| Oceania | | | | | -0.053* | -0.032 |
| | | | | | (0.031) | (0.025) |
| North America | | | | | -0.053* | 0.016 |
| | | | | | (0.028) | (0.047) |
| Americas | | | | | 0.007 | 0.049 |
| | | | | | (0.036) | (0.038) |
| Years since mig. | 0.005*** | 0.002** | 0.001 | 0.001 | 0.005*** | 0.002* |
| | (0.001) | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) |
| Years since mig. sq. | -0.00009*** | -0.00004* | -0.00004 | -0.000007 | -0.00009*** | -0.00004* |
| | (0.00002) | (0.00002) | (0.00003) | (0.00003) | (0.00002) | (0.00002) |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |
| N(ind.) | 11,652 | 10,897 | 11,652 | 10,897 | 11,652 | 10,897 |
| N(obs.) | 77,167 | 67,910 | 77,167 | 67,910 | 77,167 | 67,910 |

*Source:* Own calculation based on HILDA survey Wave 15. *Note:* Base group: Australian-born natives. The following covariates are included in the analysis: Age, age squared, education, marital status, household income, state of residence and child immigrant dummy. Year fixed effects are included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on individual level.

bility of being subject to poor mental health than the native population. The same holds true for women who recently migrated to Australia (from cohort 2000-2015). The annual number of granted skill visa relative to family visa increased enormously within the past decade (Fig-

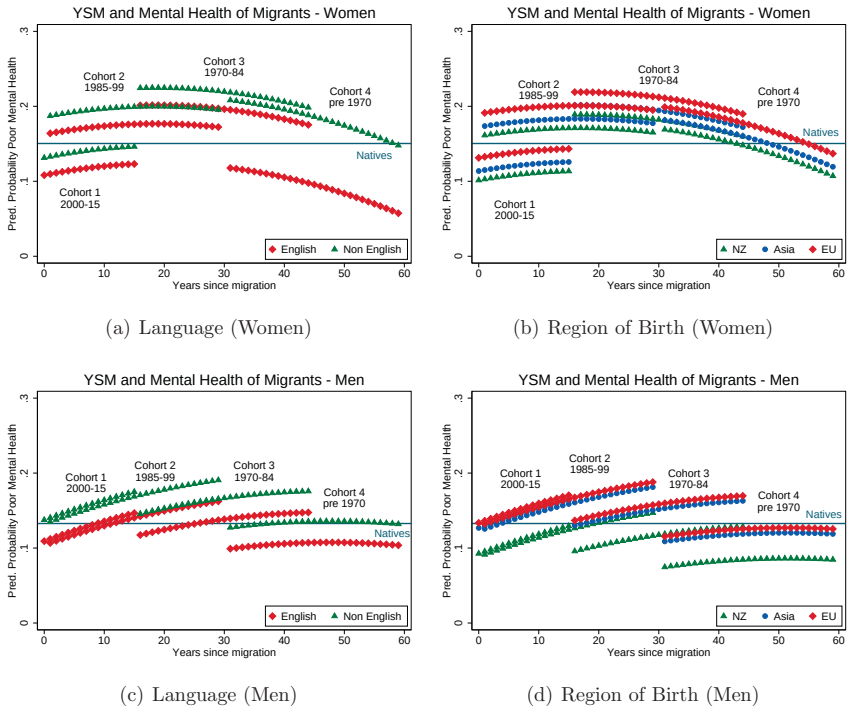
ure 1). Assuming that immigrants on a skilled visa are on average more positively selected than their counterparts on a family visa, this positive selection based on skill levels seems to be correlated to a positive selection with respect to mental health status. Compared to the base group of female Australian borns, foreign-born women from all regions except MENA and the Americas face significantly lower risk of poor mental health.

For men we find that English immigrants have a lower probability of suffering from poor mental health compared to the natives (column (2) of Table 4). However this result is not significant. In addition, column (6) of the same table shows that male immigrants born in New Zealand are significantly less likely to suffer from poor mental health compared to the Australian born population.

Immigrants that come for humanitarian reasons to Australia might suffer from post-traumatic stress disorder or other mental health impairments. Unfortunately, the HILDA dataset lacks complete information on visa category as it does not include any information whether an immigrant entered on a family or on a skill visa. For humanitarian visa we have some information though it is incomplete. More than a quarter of our immigrant observations have a missing value in the humanitarian visa variable, which is why we can not use it in our main regression. To ensure that humanitarian immigrants, that might suffer from mental health impairments due to their flight, do not bias our results we conduct a robustness check excluding those immigrants of whom we know that they came for humanitarian reasons. Table A4 shows that results stay mainly unchanged.

Figure 2 illustrates the health assimilation process over time for women and men, respectively. We use our estimates from Equation 1 to predict poor mental health incidence of an average immigrant to Australia. A reference case of a 40 year old, married, employed resident from New South Wales with low education is defined. The predicted incidence for poor mental health for a base case native is 15% (13%) for women (men), respectively and is included in the form of a horizontal line in our figures. Panel (a) and (c) of Figure 2

Figure 2: Predicted mental health status for immigrants by years since migration and migration cohort




(a) Language (Women)

(b) Region of Birth (Women)

(c) Language (Men)

(d) Region of Birth (Men)

*Source:* Own calculation based on HILDA survey Wave 15. *Note:* Predictions are based on a base case of a 40 year old, married, employed resident from New South Wales with low education.

provide the results for English and non-English immigrants and panel (b) and (d) for the three main regions of birth of Australian immigrants: New Zealand, Asia and Europe. To account for changing visa composition over time, we run our predictions for four different migration cohorts.

On arrival (ysm=0) the incidence of poor mental health is lower for the majority of immigrant women and men from the most recent cohort (2000-2015) when compared to the

natives. Over time, this initial health advantage slows down and predicted incidence of poor mental health converges to the level of natives and even overshoots it.

With respect to language and region of birth, we find striking differences. Predicted incidence of poor mental health is lower for English immigrants than for non-English immigrants irrespective of gender for all cohorts and years since migration. Further, immigrant women and men from New Zealand have lower predicted incidence of poor mental health compared to immigrants from Asia and the European Union. Due to geographical proximity, immigrants from New Zealand most likely face lower cultural and language barriers to mental health care than immigrants from Asia or Europe. In addition, monetary and psychological costs of migration itself tend to be lower for immigrants from New Zealand.

An extensive literature deals with self-selection into migration with respect to wages (Chiquiar and Hanson, 2005). However, literature on self-selection with respect to health is scarce (Farré (2016); Jasso et al. (2004) represent notable exceptions). Our study indicates that female immigrants to Australia have a better mental health than natives at arrival. Unlike natives, immigrants are positively selected in terms of their mental health status. Australia's *Migration Act 1958* restricts entry for individuals with physical or mental health impairments. It is therefore likely that applicants with (severe) mental health conditions were not granted with a visa. Further, migration itself might have a positive effect on mental health. Using a natural experiment, Stillman et al. (2009) find that Tongans granted with a visa to New Zealand through a lottery displayed better mental health levels than their counterparts who participated in the lottery but were not drawn.

Additionally, we find that immigrant's likelihood of suffering from poor mental health increases with years since migration. Acculturation might be one reason for this. This term refers to the exposure of immigrants to the host country's environment and possible adaption of native-born behavior (such as diet and life styles) (Antecol and Bedard, 2006). Although more relevant for physical health, acculturation could also affect mental health e.g.

if working life in host country is more stressful than in someone's home country.

With respect to heterogeneous effects for different groups of immigrants we find that English immigrants face a lower risk of suffering from poor mental health. In their paper, Clarke and Isphording (2015) find a negative effect of language deficiency on physical health of Australian immigrants. According to the authors, the mechanism behind this result is improved efficiency of health production e.g. by improved communication with health personnel or better processing of health information. Indeed, this may also hold for mental health, e.g. if doctor and patient communicate in a common language this certainly improves the health service someone receives. Besides direct effects of language on quality of health care, also indirect effects should be considered. A good knowledge of the local language is associated with favorable labor market outcomes (Bleakley and Chin, 2006; Chiswick and Miller, 2010; Shields and Price, 2002) which in the end will also be beneficial for access to health care. Clarke and Isphording (2015) argue that language will enable social and economic integration of immigrants, which is crucial for generating inputs into the health production function.

Subsidized services from Australia's public health system are available to all permanent residents (Clarke and Isphording, 2015). However, utilization rates might differ for immigrants and natives. HILDA collects information on doctor visits only on a irregular basis. Consequently, we can not include this information in our main panel analysis. We use pooled survey data from available waves 2009 and 2013 and compare the shares among natives and immigrants who state to have visited a health care provider in general and a mental doctor in particular within the preceding 12 months before being interviewed. Table 5 shows that Non-English immigrants report fewer doctor visits than their English counterparts. While 14 percent of interviewed English female immigrants report to have visited a mental health doctor within the last year, only 8 percent of Non-English immigrants do so. For men, this gap is smaller: 10 percent of English vs. 9 percent of Non-English immigrants report to have

consulted a mental doctor in the previous year. Eventhough these results are based on only two survey years, it might provide a first hint that health care usage differs among different groups of immigrants.

Table 5: Health care usage

| Variable | Native | English | Non-English |
|---|---|---|---|
| Women | | | |
| Visit mental health doctor | 0.13 | 0.14 | 0.08 |
| N | 6,158 | 722 | 737 |
| Visit health care provider | 0.73 | 0.69 | 0.63 |
| N | 8,408 | 1,047 | 1,171 |
| Men | | | |
| Visit mental health doctor | 0.10 | 0.10 | 0.09 |
| N | 4,351 | 713 | 419 |
| Visit health care provider | 0.59 | 0.63 | 0.51 |
| N | 7,345 | 1,127 | 830 |

*Source:* Own calculation based on HILDA survey Wave 15, year 2009 and 2013. The term health care provider is defined rather broad and refers to doctors, mental health professionals, chiropractors, physiotherapist, optometrists, nurses or midwives to name only some examples.

Salant and Lauderdale (2003) elaborate in their study that increased acculturation fosters help-seeking and use of professional services. Following this line of argumentation, English immigrants to Australia might be more acculturated than Non-English immigrants.

# 5 Conclusion

Mental health impairments are the most prevalent disease among the working age population in rich countries and cause massive direct and indirect costs to individuals and society. By analyzing immigrants' assimilation in mental health, this paper contributes to the literature since existing studies focus mainly on immigrants' physical health assimilation. Furthermore, this study adds to the literature as it takes into account heterogeneous effects for different groups of immigrants.

Using Australian household survey data, this paper provides evidence that the probability of suffering from poor mental health increases with time since migration. For female

immigrants a strong health advantage at arrival is found. When arriving to Australia, they possess a 4 percentage points lower risk of suffering from poor mental health than their native counterparts after controlling for relevant observable characteristics. This can possibly be explained by positive selection. Australia screens immigrants' health status before granting them a visa. Consequently, immigrants to Australia are more positively selected in terms of health status than the native population, which explains this health advantage at arrival.

Differences in mental health status among immigrants from different regions and language background are immense. We identify that immigrants with English as their mother tongue have a notably good mental health status. Additionally, immigrants from New Zealand display a particularly low likelihood of suffering from poor mental health suggesting that not only language skills but also cultural proximity to the host country seems to be correlated to psychic well-being.

This paper showed that Non-English immigrants in Australia face a higher probability of suffering from poor mental health and are less likely to have visited a mental health doctor within the last year. Consequently, policies that lower the language barriers to mental health care should be considered when targeting expenditures on mental health services.

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# Appendix

Table A1: Testing functional form of years since migration (ysm)

| Dep. variable: | Women | Men |
|---|---|---|
| Poor mental health | (1) | (2) |
| YSM: 0 | -0.072*** | -0.104*** |
| | (0.026) | (0.028) |
| YSM: 1-5 | -0.026** | -0.008 |
| | (0.011) | (0.013) |
| YSM: 6-10 | -0.007 | 0.013 |
| | (0.012) | (0.013) |
| YSM: 11-15 | 0.019 | 0.030** |
| | (0.012) | (0.012) |
| YSM: 15+ | 0.027*** | 0.022** |
| | (0.010) | (0.009) |
| Age | 0.012*** | 0.012*** |
| | (0.001) | (0.001) |
| Age sq. | -0.000*** | -0.000*** |
| | (0.000) | (0.000) |
| Married | -0.071*** | -0.054*** |
| | (0.006) | (0.006) |
| High education | -0.051*** | -0.043*** |
| | (0.007) | (0.007) |
| Medium education | -0.027*** | -0.035*** |
| | (0.007) | (0.007) |
| Employed | -0.098*** | -0.153*** |
| | (0.005) | (0.008) |
| Household income (in 1000 AUD) | -0.003*** | -0.003*** |
| | (0.0003) | (0.0003) |
| Child immigrant | -0.014 | -0.010 |
| State dummies included | Yes | Yes |
| N(ind.) | 11,652 | 10,897 |
| N(obs.) | 77,167 | 67,910 |

*Source:* Own calculation based on HILDA survey Wave 15.
*Note:* Base groups: Immigration Status - Natives; Education - Low. Further, year fixed effects are included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on individual level.

Table A2: Continuous outcome variable

| Dep. variable: | Language | | Cohort | | Region | |
|---|---|---|---|---|---|---|
| Mental health score | Women | Men | Women | Men | Women | Men |
| (continuous) | (1) | (2) | (3) | (4) | (5) | (6) |
| Non-English | 1.519*** | -0.731* | | | | |
| | (0.396) | (0.441) | | | | |
| English | 3.607*** | 1.033** | | | | |
| | (0.445) | (0.466) | | | | |
| Cohort Pre1970 | | | -2.125* | 2.403** | | |
| | | | (1.134) | (1.169) | | |
| Cohort 1970-1984 | | | -2.051** | 0.256 | | |
| | | | (0.948) | (1.009) | | |
| Cohort 1985-1999 | | | -1.005 | -1.102 | | |
| | | | (0.660) | (0.714) | | |
| Cohort 2000-2015 | | | 2.164*** | 0.541 | | |
| | | | (0.411) | (0.459) | | |
| New Zealand | | | | | 4.590*** | 2.277*** |
| | | | | | (0.570) | (0.536) |
| Europe | | | | | 1.479*** | -0.451 |
| | | | | | (0.461) | (0.490) |
| Asia | | | | | 2.135*** | -0.464 |
| | | | | | (0.412) | (0.478) |
| Africa | | | | | 1.323** | 1.166* |
| | | | | | (0.673) | (0.672) |
| MENA | | | | | -1.456* | -2.260** |
| | | | | | (0.867) | (0.889) |
| Oceania | | | | | 3.408*** | 1.974*** |
| | | | | | (0.812) | (0.752) |
| North America | | | | | 4.434*** | -1.663* |
| | | | | | (0.771) | (0.872) |
| Americas | | | | | -0.302 | -3.894*** |
| | | | | | (0.936) | (1.037) |
| Years since mig. | -0.307*** | -0.130*** | -0.077 | -0.049 | -0.293*** | -0.117*** |
| | (0.032) | (0.035) | (0.049) | (0.054) | (0.032) | (0.035) |
| Years since mig. sq. | 0.005*** | 0.002*** | 0.002*** | -0.001 | 0.005*** | 0.002*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |
| N(ind.) | 11,652 | 10,897 | 11,652 | 10,897 | 11,652 | 10,897 |
| N(obs.) | 77,167 | 67,910 | 77,167 | 67,910 | 77,167 | 67,910 |

*Source:* Own calculation based on HILDA survey Wave 15.
*Note:* Dependent variable: mental health score (0-100). Higher scores indicate better health. Base group: Australian-born natives. The following covariates are included in the analysis: Age, age squared, education, marital status, household income, state of residence and child immigrant dummy. Year fixed effects are included. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$. Robust standard errors in parenthesis.

Table A3: Marginal effects of probit model

| Dep. variable: | Language | | Cohort | | Region | |
|---|---|---|---|---|---|---|
| Poor mental health | Women | Men | Women | Men | Women | Men |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Non-English | -0.031** | 0.014 | | | | |
| | (0.012) | (0.015) | | | | |
| English | -0.053*** | -0.018 | | | | |
| | (0.013) | (0.015) | | | | |
| Cohort Pre1970 | | | 0.024 | -0.038 | | |
| | | | (0.037) | (0.034) | | |
| Cohort 1970-1984 | | | 0.028 | -0.008 | | |
| | | | (0.029) | (0.029) | | |
| Cohort 1985-1999 | | | 0.011 | 0.008 | | |
| | | | (0.021) | (0.021) | | |
| Cohort 2000-2015 | | | -0.042*** | -0.005 | | |
| | | | (0.014) | (0.015) | | |
| New Zealand | | | | | -0.058*** | -0.033** |
| | | | | | (0.017) | (0.015) |
| Europe | | | | | -0.028* | 0.009 |
| | | | | | (0.015) | (0.017) |
| Asia | | | | | -0.040*** | 0.004 |
| | | | | | (0.013) | (0.015) |
| Africa | | | | | -0.037* | -0.021 |
| | | | | | (0.020) | (0.020) |
| MENA | | | | | 0.011 | 0.057* |
| | | | | | (0.031) | (0.031) |
| Oceania | | | | | -0.048* | -0.026 |
| | | | | | (0.025) | (0.024) |
| North America | | | | | -0.050* | 0.023 |
| | | | | | (0.026) | (0.051) |
| Americas | | | | | 0.004 | 0.049 |
| | | | | | (0.033) | (0.035) |
| Years since mig. | 0.004*** | 0.002 | 0.001 | 0.001 | 0.004*** | 0.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |
| N(ind.) | 11,652 | 10,897 | 11,652 | 10,897 | 11,652 | 10,897 |
| N(obs.) | 77,167 | 67,910 | 77,167 | 67,910 | 77,167 | 67,910 |

*Source:* Own calculation based on HILDA survey Wave 15.
*Note:* Base group: Australian-born natives. The following covariates are included in the analysis. Age, education, marital status, household income, state of residence, child immigrant dummy, age squared, years since migration squared. Further, year fixed effects are included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on individual level.

Table A4: Excluding humanitarian immigrants - heterogenous effects

| Dep. variable: | Language | | Cohort | | Region | |
|---|---|---|---|---|---|---|
| Poor mental health | Women | Men | Women | Men | Women | Men |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Non-English | -0.038*** | 0.006 | | | | |
| | (0.013) | (0.014) | | | | |
| English | -0.059*** | -0.023 | | | | |
| | (0.015) | (0.016) | | | | |
| Cohort Pre1970 | | | 0.026 | -0.037 | | |
| | | | (0.039) | (0.036) | | |
| Cohort 1970-1984 | | | 0.033 | -0.006 | | |
| | | | (0.031) | (0.031) | | |
| Cohort 1985-1999 | | | 0.008 | 0.004 | | |
| | | | (0.021) | (0.022) | | |
| Cohort 2000-2015 | | | -0.042*** | -0.009 | | |
| | | | (0.013) | (0.015) | | |
| New Zealand | | | | | -0.062*** | -0.039** |
| | | | | | (0.020) | (0.017) |
| Europe | | | | | -0.031** | -0.002 |
| | | | | | (0.015) | (0.017) |
| Asia | | | | | -0.052*** | -0.006 |
| | | | | | (0.014) | (0.015) |
| Africa | | | | | -0.041* | -0.024 |
| | | | | | (0.024) | (0.021) |
| MENA | | | | | 0.021 | 0.053 |
| | | | | | (0.037) | (0.035) |
| Oceania | | | | | -0.049 | -0.032 |
| | | | | | (0.031) | (0.025) |
| North America | | | | | -0.052* | 0.018 |
| | | | | | (0.028) | (0.047) |
| Americas | | | | | 0.010 | 0.058 |
| | | | | | (0.038) | (0.040) |
| Years since mig. | 0.005*** | 0.002 | 0.001 | 0.001 | 0.005*** | 0.002 |
| | (0.001) | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) |
| Years since mig. sq. | -0.00008*** | -0.000003 | -0.00003 | -0.000001 | -0.00008*** | -0.00003 |
| | (0.00002) | (0.00002) | (0.00003) | (0.00003) | (0.00002) | (0.00002) |
| Covariates | Yes | Yes | Yes | Yes | Yes | Yes |
| N(ind.) | 11,594 | 10,842 | 11,594 | 10,842 | 11,594 | 10,842 |
| N(obs.) | 76,229 | 67,068 | 76,229 | 67,068 | 76,229 | 67,068 |

*Source:* Own calculation based on HILDA survey Wave 15.

*Note:* Base group: Australian-born natives. The following covariates are included in the analysis: Age, age squared, education, marital status, household income, state of residence and child immigrant dummy. Year fixed effects are included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered on individual level.