DEMOGRAPHIC RESEARCH
A peer-reviewed, open-access journal of population sciences

DEMOGRAPHIC RESEARCH

VOLUME 40, ARTICLE 32, PAGES 933–962
PUBLISHED 12 APRIL 2019
https://www.demographic-research.org/Volumes/Vol40/32/
DOI: 10.4054/DemRes.2019.40.32

Research Article

Migrant health convergence and the role of material deprivation

Silvia Loi

Jo Mhairi Hale

Contents

Demographic Research: Volume 40, Article 32
Research Article

Migrant health convergence and the role of material deprivation

Silvia Loi[1]

Jo Mhairi Hale[2]

Abstract

BACKGROUND
Cross-national research shows that although immigrants initially have better health than their native-born counterparts, their health deteriorates over time in their destination countries, converging to natives' health (health convergence). Explanations include acculturation to negative health behaviors, exposure to low socioeconomic status, and social exclusion.

OBJECTIVE
This study is the first to examine how material deprivation, a measure of relative disadvantage that includes elements of SES and social exclusion, interacts with duration of stay to affect immigrants' health convergence.

METHODS
Using data from Italy (2009), we assess the association between duration of stay and three health outcomes, and we estimate interaction effects of duration of stay with material deprivation.

RESULTS
We find immigrants' duration of stay is negatively associated with self-rated health, chronic morbidity, and activity limitations. Immigrants' health converges to natives', net of controls. Convergence is most dramatic for self-rated health, but the pattern is also reflected in chronic morbidity and activity limitations. The health of immigrants who live in conditions of material deprivation is more similar to natives' health at shorter durations of stay, compared to their not-deprived counterparts.

CONTRIBUTION
The paper contributes to a better understanding of the role of social exclusion – measured as material deprivation – on the immigrant–native health convergence

[1] Max Planck Institute for Demographic Research, Rostock, Germany. Email: loi@demogr.mpg.de.
[2] Department of Geography and Sustainable Development, University of St Andrews, St Andrews, Scotland and Max Planck Institute for Demographic Research, Rostock, Germany

process. It is the first to assess the interaction of material conditions and duration of stay in a host country.

1. Introduction

Health is a key dimension of the migrant integration process, but research on migrant health or strategies for monitoring and managing the health consequences of migration in Europe remains sparse (Rechel, Mladovsky, and Devillé 2012; WHO 2010). Migrants are, on average, socioeconomically disadvantaged compared to natives (Eurostat 2014; Portes and Rumbaut 1996), and the negative health effects of material deprivation are clear and strong (Elo 2009; Link and Phelan 1996). However, there is a significant body of international research showing that migrants have better health relative to natives than this socioeconomic disadvantage would predict (Abraído-Lanza et al. 1999; Hummer, Benjamins, and Rogers 2004; Markides and Coreil 1986). This is termed the 'healthy immigrant effect' (HIE).

Two hypotheses proffered to explain the HIE are that migrants are positively selected on health because of the challenges of successful migration, and that migrants have better health behaviors (e.g., low smoking prevalence) (Lechner and Mielck 1998; Palloni and Arias 2004; Ronellenfitsch and Razum 2004).

An extension of this research shows that despite having better health upon arrival, migrants' health worsens and converges to the health of the native population as migrants' duration of stay in the receiving country increases (Goldman et al. 2014; Muhuri and Gfroerer 2011; Williams 2012). Researchers hypothesize that acculturation, negative assimilation, and poor socioeconomic conditions drive the loss of migrants' health advantage (Lechner and Mielck 1998; Palloni and Arias 2004; Ronellenfitsch and Razum 2004). Much of the literature focuses on the assimilation hypothesis to explain the progression from HIE to migrant–native health convergence. We argue that poor material conditions play a role in the process.

Italy provides a particularly useful context for studying these questions. During the 1970s, Italy experienced a shift from out-migration to in-migration. In 1972, for the first time, the net migration rate changed its sign from negative to positive, and in-migration has significantly increased in recent years (Bonifazi et al. 2009). Non-citizens[3] represented only 4.1% of the total population in 2005. Only ten years later this share had doubled in size, reaching 8.2% in 2015. This increasing trend is not predicted to

[3] Official statistics only report data on the non-citizen population, whereas in this work we analyze the foreign-born population. Despite the discrepancy between these two definitions, the official statistics provide an overview of the phenomenon of increased migration.

slow down or stop in the near future. Indeed, Istat projects an increase of up to 16.0% in non-citizens regularly residing in the country by 2035 and of up to 23.0% by 2065. Italy, then, has a vested interest in understanding the drivers of migrant–health convergence. Various migration streams, originating from different regions, characterize Italian migration history. The different cohorts that have in-migrated to Italy are heterogeneous; therefore, we must pay attention to this heterogeneity when analyzing migrant health, as it can affect the health selection process.

Furthermore, population ageing in high-income countries (HIC) is predicted to create economic opportunities for working-aged individuals from low- and middle-income countries (LMIC), leading to increased migration flows from LMICs to HICs (Bloom et al. 2015). Therefore, the factors contributing to the long-term health of immigrants is a policy issue that is relevant across Europe, the United States, and Canada.

The published research on migrant health in Italy is thus far mainly descriptive, and has only just begun to address mortality (Bruzzone and Mignolli 2014), hospitalizations (Pugliese et al. 2014), work-related health problems (Salvatore et al. 2013), perinatal health outcomes (Cacciani et al. 2011), self-reported health, and healthcare utilization (Caselli, Loi, and Strozza 2017; Loi et al. forthcoming). We contribute to this literature by using the Italian context as a case study to answer the following questions: (1) Is there a migrant–native health gap in Italy in self-rated health (SRH), chronic morbidity, and/or global activity limitations (GALI)? (2) How is duration of stay associated with migrants' health convergence? and (3) Does material deprivation intersect with duration of stay to affect the rate of migrant–native health convergence?

1.1 Healthy immigrant effect

Two common explanations in the US-focused literature for the HIE are selectivity of migrants and cultural factors (Bostean 2013; Markides and Coreil 1986; Perreira and Ornelas 2011). The first hypothesis refers to the selective nature of migration: healthiest individuals are more likely to initiate migration and to reach the destination countries. Once there, some research has found first generation migrants have healthier behaviors, including lower rates of smoking and less alcohol use, as well as cultural factors that may be beneficial, such as familial and social support, e.g., living in two-parent and/or multi-generational families (Abraído-Lanza et al. 1999; Lara et al. 2005; Perreira and Ornelas 2011). Researchers hypothesize these factors contribute to migrants having better health outcomes than their native counterparts.

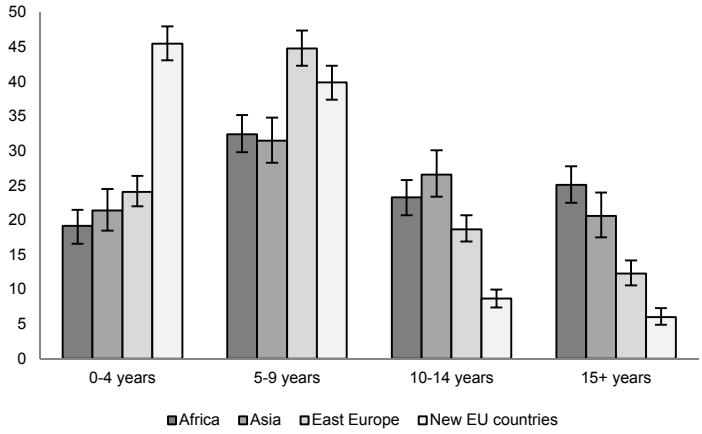
In contrast to the depth and breadth of research on the HIE in the United States, the European research is more limited. Some research shows migrant groups have a mortality advantage in Germany (Razum et al. 1998), the Netherlands (Uitenbroek and Verhoeff 2002), and France (Brahimi 1980; Khlat and Courbage 1996). This mortality advantage is often referred to as the 'Mediterranean Migrants Mortality Paradox' (Khlat and Darmon 2003), analogous to the 'epidemiologic paradox' that has been well explored in the United States (Abraído-Lanza et al. 1999; Hummer, Benjamins, and Rogers 2004; Palloni and Arias 2004). The limited body of research concerning Italy generally shows better health conditions of migrants compared to natives. A recent literature review (Caselli, Loi, and Strozza 2017) summarizes that migrants have lower overall mortality (Bruzzone and Mignolli 2014), lower hospitalization rates (Pugliese et al. 2014), fewer physical limitations, fewer chronic conditions, and better self-rated health than natives. Like in the United States, there are some exceptions related to health outcome and region of origin (because of different regional health profiles). Italy is still at a very early stage of its in-migration history, meaning most migrants are recent migrants and therefore their better average health may stem from the healthy immigrant effect.

We therefore generate the following hypothesis:

> *Hypothesis 1*: Healthy Immigrant Effect: Migrants will be, on average, less likely than native-born Italians to report activity limitations, chronic morbidity, and poor self-rated health.

This recent transition in Italy from an emigration to an immigration country was characterized by different region-specific migration streams. Figure 1 displays migrants' duration of stay by region of origin to show the significant change in the composition of migrants living in Italy in 2009, the date which the data used in this paper refers to. The majority of migrants who arrived in the 2000s originated in Eastern Europe and the new EU nations. By contrast, migrants from Africa and Asia were predominant among those who migrated in the 1990s or before (10+ years ago).

Figure 1: Migrants' duration of stay in Italy by region of birth; percentage values and confidence intervals, 2009



Because the propensity for onward or return migration of different migration cohorts or groups of migrants may vary by region of origin, we also conduct analyses on specific regions of origin.

1.2 Migrant–native health convergence

Most evidence indicates that migrant health deteriorates with increased duration of stay in the receiving country. Researchers have proposed many explanations for migrant–native health convergence, from exposure to low socioeconomic status (SES) and social exclusion to acculturation, including migrants adopting negative health behaviors like smoking and less healthy diets (Jasso et al. 2004). This process is often referred to as negative assimilation, as opposed to the classical model of assimilation. In fact, while the latter implies a reduction in social differences between migrants and natives due to migrants' upward mobility, health assimilation means migrants' health actually worsens (Abraído-Lanza, Echeverría, and Flórez 2016; Hamilton et al. 2011).

This weakening of the HIE over duration of stay has been observed in a large body of literature and for many different health outcomes, not only in the United States (Antecol and Bedard 2006; Jasso et al. 2004; Stephen et al. 1994) but also in Canada (Deri 2005; Newbold 2006; Ng 2011) and Australia (Biddle, Kennedy, and Mcdonald 2007; Chiswick, Lee, and Miller 2008). In the European context, research finds that

migrants have worse self-rated health conditions than natives, but there is also significant cross-national heterogeneity (for a review see Nielsen and Krasnik 2010). In the Swedish city of Malmo (Lindström, Sundquist, and Östergren 2001), migrant men born in Western countries, Yugoslavia, and Arab countries and migrant women born in Yugoslavia and Poland appear to have poorer SRH than natives. In Sweden, migrants have an overall health advantage, but when controlling for age at arrival and duration of stay, young migrants display an excess mortality risk that disappears with longer duration of stay (Juárez et al. 2018). In the same country, Iraqis, particularly Iraqi women, have higher prevalence of poor self-rated health than natives (Bennet and Lindström 2018). In Great Britain, results show specific migrant subpopulations originating in South Asia have worse health than natives (Chandola 2001; Nazroo 1997). In Belgium, migrants are found to have a mortality advantage that varies by region of origin (Anson 2004). Moullan and Jusot (2014) find a North–South Europe health gradient, wherein migrants to France, Belgium, and Spain report worse SRH than natives, but migrants to Southern regions, including Italy, report better health than natives.

In light of the strong evidence for HIE, it is possible that these results are an artefact of analyzing a heterogeneous group of recent and long-term migrants, as a large proportion of this European research does not take into consideration duration of stay. For example, in regard to the North–South gradient, Italy has the shortest in-migration history of these sampled countries, so the stronger migrant health advantage in Italy might simply be attributable to the initial HIE, whereas the northern health disadvantage is driven by migrant–native health convergence over longer durations of stay. The only evidence of the convergence process specific to Italy is that there is a dissipation of the mortality advantage of internal migrants who move to the northern city of Turin, compared to Turin-born individuals (Rasulo et al. 2012). On the other hand, the observed country differences in the HIE may also be driven by different selection processes affecting the heterogeneous in-migrating populations in each European country. The same origin groups observed in different destinations may be subjected to different selection processes. Our data allows us to take duration of stay into consideration, providing an opportunity to examine whether the HIE is reduced over duration of stay in Italy. We therefore hypothesize:

> *Hypothesis 2*: The reported health status of migrants in Italy with longer durations of stay will be more similar to that of natives than the reported health status of more recent migrants.

1.3 Material deprivation

The negative effects on health of poverty and deprivation (Elo 2009; Marmot 2005) are clear and strong, though the causal mechanisms are various and change over time (Link and Phelan 1996). Recently, scholars have begun to study the link between health and measures of relative deprivation, which takes into consideration not only absolute needs like food and shelter but also access to participation in a particular society, such as having a telephone (Kawachi, Subramanian, and Almeida-Filho 2002; Pförtner and Elgar 2015). Material deprivation is, thus, an especially useful measure, as it takes into account both absolute and relative deprivation (Pförtner and Elgar 2015). As such, material deprivation is related to both individual socioeconomic status and contextual conditions such as social exclusion. Poor socioeconomic conditions are found to be largely responsible for the loss of the migrant health advantage in the United States (Riosmena et al. 2015).

The European research has focused on both the role of migration in influencing the relationship between health and area-based deprivation (Boyle, Norman, and Rees 2002) and how individual material deprivation plays a role in affecting migrants' health outcomes (Borrell et al. 2008; Malmusi, Borrell, and Benach 2010). Boyle, Norman, and Rees (2002) investigate the relationship in Scotland between internal migrants' health and regional deprivation and find no evidence that migration affects the relationship between area-based deprivation and long-standing limitations. In Catalonia, both inter-regional and international migrants are more likely than natives to report poor health, and both low-SES and deprived migrants have worse SRH than natives in the same conditions (Borrell et al. 2008). Malmusi, Borrell, and Benach (2010) observe an increased likelihood of reporting poor health for individuals in poor conditions who migrated from poorer regions. Excess risk of poor health for individuals in dis-advantaged economic situations is to some extent supported, but only for women. The authors suggest that these effects might still be partly counterbalanced by health-related selection processes that influenced the likelihood of migration and return migration.

Migrants who live under the stressful conditions of material deprivation may experience a faster deterioration of their health (i.e., hastened migrant–native health convergence) over duration of stay than their less-deprived migrant counterparts. We thus hypothesize that:

> *Hypothesis 3*: Material Deprivation: Self-reports of activity limitations, chronic morbidity, and poor health will be closer to that of natives at shorter durations of stay for materially deprived migrants than for non-deprived migrants, i.e., convergence to natives happens at shorter durations of stay for those who are materially deprived.

In this data, material deprivation is measured at the same time as the health outcomes. This means that we cannot test the direction of the relationship, i.e., health concerns may cause material deprivation through financial burden and/or economic inactivity. However, as Italy provides universal health care coverage, medical bankruptcy is less common in Italy than in other nations. It is still possible that people's economic activity is impacted by health concerns. Nevertheless, migration to Italy for the most part originates in regions that are poorer than the receiving context. The most numerous migrant stocks in Italy originated from sub-Saharan and North African countries, Eastern European countries, and South East Asia. The main reason for in-migration is economic, meaning that most of the migrants are in-migrating to find a better socioeconomic context than in the originating regions. Migrants, thus, are more likely to begin their time in Italy positively selected on health but materially deprived, which suggests that material deprivation precedes poor health.

2. Data and methods

2.1 Data

We use data from two pooled surveys conducted by Statistics Italy (Istat) in 2009: the Italian module of the European Statistics on Income and Living Conditions (Eu-Silc, It-Silc in Italy) (Istat 2009a) and the It-Silc – Ad Hoc Module for the non-citizen population (It-Silc AHM) (Istat 2009b). It-Silc surveys a nationally representative sample of the resident population and includes questions on income, social exclusion, and living conditions. In addition to the standard scheme, the 2009 module focuses on material deprivation, which makes it ideal to address our research questions. It-Silc AHM was designed to collect data only on a representative sample of the non-citizen population. It follows the contents and the methodology of the original survey, contains specific information about migration, and, given the specificity of the target population, the questionnaire is translated into the ten most common languages spoken in Italy by migrants. The sample is post-stratified by geographic area, accounting for the number of families with non-citizen members and the number of non-citizen individuals residing in each area. These adjustments ensure representativeness of the non-citizen population residing in Italy by macro-area (Ripartizioni) and by citizenship.

We pool data from the 2009 It-Silc and the It-Silc AHM. As suggested by Istat, we exclude families with at least one non-citizen member from the general It-Silc to avoid over-representing the non-citizen population in the final dataset, and we validate the new dataset to ensure the correct functioning of the sampling weights.

2.2 Health outcomes

It is crucial to consider the suitability of health indicators for comparison across groups or societies characterized by different cultures and different disease distributions (Braveman et al. 2010; Burgard and Chen 2014). Therefore, to limit problems of comparability, we include multiple indicators of morbidity that define three different dimensions of health: (1) Global Activity Limitation Indicator (GALI), (2) self-reported Chronic Morbidity (CM), and (3) Self-Rated Health (SRH). These are the only three health measures in the It-Silc and It-Silc AHM. We examine all three to mitigate validity concerns and to compare possible differences in the relationship between duration of stay and material deprivation across health dimensions.

We treat GALI as a binary measure for presence versus absence of activity limitations (limited/severely limited versus not limited at all) in the previous six months. Chronic Morbidity is a yes/no response to the question 'Do you have any longstanding illness or health problem?' We code SRH as dichotomous: very poor/poor versus fair/good/very good.

2.3 Predictors

Respondents were surveyed in January–December 2009, so duration of stay is the difference between 2009 and year of immigration, coded in 5-year groups (0–4, 5–9, 10–14, or 15+ years).

According to Eurostat, material deprivation refers to "a state of economic strain and durables, defined as the enforced inability (rather than the choice not to do so) to pay unexpected expenses, afford a one-week annual holiday away from home, a meal involving meat, chicken or fish every second day, the adequate heating of a dwelling, durable goods like a washing machine, color television, telephone or car, being confronted with payment arrears (mortgage or rent, utility bills, hire purchase instalments or other loan payments)." We refer to the threshold suggested by Eurostat: an individual who cannot afford at least three of the nine items is considered to live in material deprivation.

2.4 Controls

In all our analyses we control for age (18–34; 35–49; 50–64), gender, marital status (married, never married, separated or divorced or widow(er)), education (primary versus secondary or higher), and Italian area of residence (North, Centre, South/Islands)

because there are regional differences in health distributions (OECD 2015). We restrict analyses to ages 18–64. Young people usually have lower rates of physical morbidity, and in our sample only a small proportion of individuals under age 18 report poor health. Moreover, SRH is not very accurate for children/very young individuals because health begins to be conceptualized during childhood and adolescence, making self-rating unstable at younger ages (Breidablik, Meland, and Lydersen 2009). We use age 65 as the upper bound, as given the young age structure of the population, few foreign-born individuals in the sample are over age 65. We exclude migrants from South America and high-income countries due to small sample sizes. Area of birth is detailed in Table A-1 (in Appendix). The final sample size is n = 35,952.

2.5 Analytic strategy

After briefly describing the target population, we first examine the association between nativity and health outcomes of GALI, CM, and SRH, controlling for sociodemographic characteristics of the individuals. Second, we use multivariate logistic regression to model the relationship between health outcomes and duration of stay, controlling for age, gender, marital status, educational level, and Italian area of residence. We use robust standard errors clustered by household. Further, we include region of birth to account for compositional changes in the migrant population across different migration cohorts. Third, we study the interaction between duration of stay and material deprivation. We display predicted probabilities of the health outcomes using Stata's margins command to avoid the incomparability of coefficients across logistic regression models and to display interactions in a more intuitive way (Allison 1999).

3. Results

3.1 Descriptive results

Because of Italy's ageing population and the young age structure of the non-citizen population, the difference between the age profiles of the two is remarkable. Register-based statistics are available for citizen vs. non-citizen instead of native vs. foreign-born. The share of non-citizen young individuals (0–14) is higher than that of Italians (18.9% vs. 13.3%), while the share of elders (65+) is much lower (3.0% vs. 23.4%).

In addition to the differences in the age structure, there is a significant difference in the share of native-born versus foreign-born individuals living in material

deprivation (Table A-2 in Appendix). Approximately 35% of migrants live in material deprivation compared to 13% of natives. African-origin migrants are the most deprived group (50%) followed by Asians (39%). Eastern Europeans and individuals born in the new EU countries have a similar share of deprived individuals (28% and 29% respectively).

3.2 Hypothesis 1: Healthy immigrant effect

As hypothesized, Table 1 shows that, on average, migrants are less likely to report GALI and CM than natives, net of age, gender, marital status, education, area of residence in Italy, and region of origin. The estimates for SRH are not significant. Also evident in Table 1 is the significant variability by region of origin, to which we will return.

Table 1: Foreign- versus native-born Odds Ratios of activity limitations, chronic morbidity, and poor self-rated health, adjusted for age, gender, marital status, education, and area of residence in Italy

	GALI			CM			SRH		
Variables	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**
Nativity									
Ref. Native-born Italian									
Africa	0.623***	(0.057)	0.522 – 0.745	0.546***	(0.052)	0.453 – 0.657	0.827	(0.116)	0.628 – 1.089
Asia	0.475***	(0.058)	0.374 – 0.604	0.446***	(0.057)	0.348 – 0.572	0.889	(0.147)	0.643 – 1.228
East Europe	0.638***	(0.053)	0.542 – 0.750	0.646***	(0.054)	0.548 – 0.762	0.871	(0.104)	0.690 – 1.100
New EU entries	0.455***	(0.041)	0.382 – 0.542	0.442***	(0.040)	0.369 – 0.529	0.699**	(0.084)	0.552 – 0.885
Constant	0.133***	(0.009)	0.116 – 0.153	0.138***	(0.010)	0.120 – 0.159	0.039***	(0.004)	0.032 – 0.048
Observations	36,011			36,187			36,925		
Log likelihood	–14081			–13604			–7411		
Chi2	2017			1528			803		

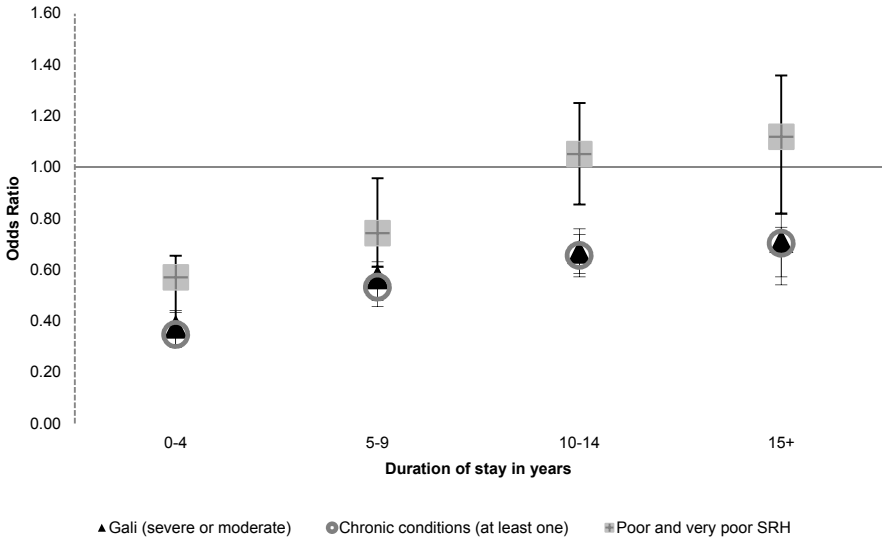
Note: Robust standard errors in parentheses; *** p<0.001, ** p<0.01, * p<0.05, + p<0.1.

3.3 Hypothesis 2: Migrant–native health convergence

We next test Hypothesis 2, that health conditions of migrants will be more similar to the native-born Italian population for migrants who have a longer duration of stay. Figure 2 shows the odd ratios (OR) of each health outcome for migrants compared to the native-born by duration of stay, net of age, sex, marital status, education, and Italian area of residence. As duration of stay increases, the value of all ORs approach 1, indicating

convergence. The health gap between migrants and natives is clearly narrower for migrants who have lived in Italy for 10 years or more.

Figure 2: Odds ratios of GALI, CM, and SRH by duration of stay compared to native-born Italians, adjusted for covariates (Reference category: natives)



Compared to natives, migrants who have lived in Italy for less than 5 years are 50%–70% less likely to report activity limitations (OR 0.38, CI 0.32–0.45), chronic morbidity (OR 0.36, CI 0.30–0.40), and poor/very poor health (OR 0.51, CI 0.40–0.70), net of controls. However, migrants who have been in Italy 5–9 years are only half as likely as more recent migrants to report poorer health. By 10 or more years of stay the gap is even narrower (GALI OR 0.7, CI 0.60–0.90; CM OR 0.7, CI 0.60–0.80). Once migrants have been in Italy ten years or more, they are as likely to report poor health as natives, once adjusted (full model in Appendix, Table A-4). Presence of activity limitations and chronic morbidity display a similar pattern, although they are still statistically significantly different.

Figure 3: Odd ratios of health outcomes by duration of stay and region of birth, adjusted for covariates (Reference category: natives)

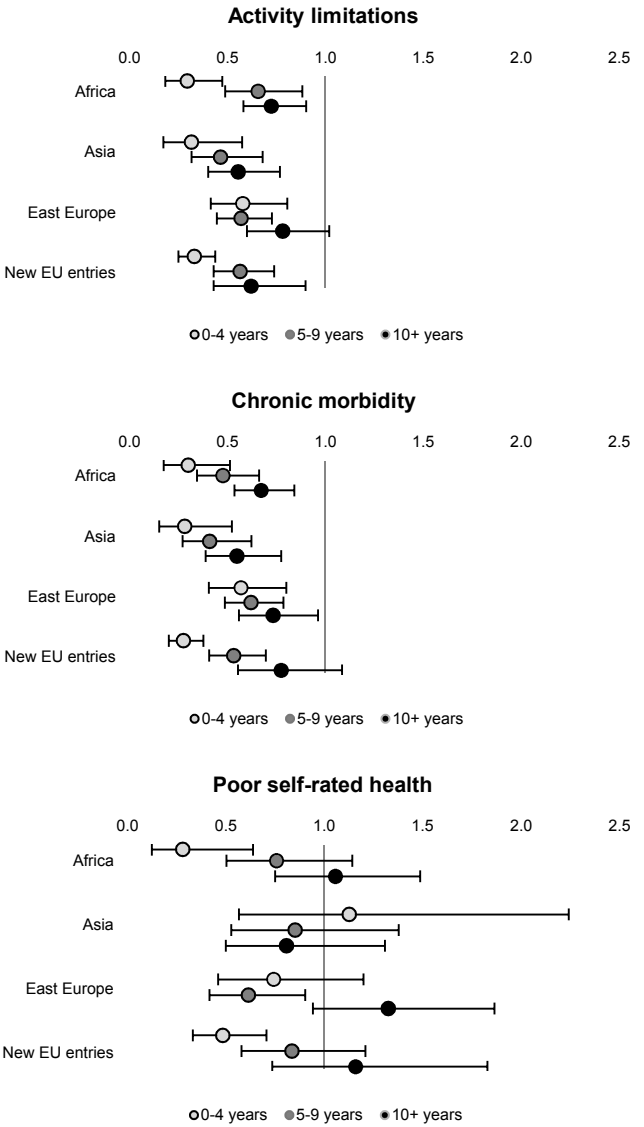


Figure 3 shows the results of the analyses specific to region of origin. These analyses take into account some of the compositional differences in the migration cohorts that can have an influence on the selectivity process. From the results we can see that for all origin regions there is a clear gradient in the migrant–native health gap, such that it is smaller for groups who have been in Italy longer. This suggests the robustness of our previous results. All subgroups of migrants are significantly less likely than natives to report activity limitations and chronic morbidity in the years immediately after their arrival. Most subgroups also report poorer self-rated health, though not all ORs are statistically significant.

The migrant–native health convergence is particularly pronounced for Africans and immigrants from the new EU countries who initially have a strong HIE. Their health advantage appears to diminish more than the other groups'. The estimates for SRH are not statistically significant, but show the same pattern in terms of African- and new EU-origin migrants (full model in Appendix, Table A-6).

In sum, we find evidence for Hypothesis 2 that the HIE is less strong with duration of stay in Italy, suggesting migrant–native health convergence. This may be partially explained by material deprivation, as a large share of migrants to Italy are exposed to material deprivation post-migration, and those who live in material deprivation are more likely to suffer from poor health (Table A-3 in Appendix).

It is thus important to take material deprivation into consideration. Is material disadvantage driving this convergence process?

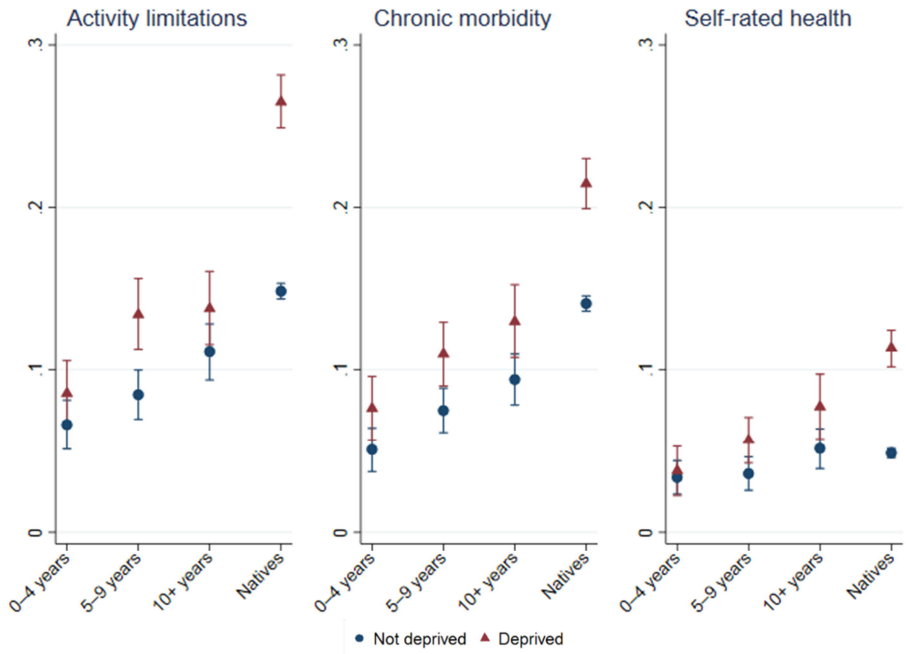
3.4 Hypothesis 3: Material deprivation's association with health convergence

Using natives as the reference, we analyze the interaction between duration of stay and material deprivation in order to explore whether migrants who have longer durations of stay and report living in conditions of material deprivation have health outcomes closer to natives than their non-deprived migrant counterparts. Do materially deprived migrants experience faster narrowing of the migrant–native health gap than non-deprived migrants?

In order to most clearly present these results, we estimate the predicted probability of each health outcome for migrants and natives who do or do not experience material deprivation (Figure 4). The models additionally adjust for age, sex, marital status, education, region of birth, and Italian area of residence. Figure 4 shows materially deprived, native-born Italians have worse health outcomes on all three measures. As predicted, taking material deprivation into consideration does attenuate the association between duration of stay and health (Table A-4 and Table A-5 in Appendix). However,

as in Hypothesis 2, migrants appear to experience the same trend of worsening health across all three measures the longer they are in Italy, even net of material deprivation.

Figure 4: Predicted probability of GALI, chronic morbidity, and SRH by duration of stay and material deprivation, adjusted for covariates (Reference category: natives)



One way to interpret Figure 4 is to consider the slopes of the lines that could be drawn across the triangles (materially deprived) and the circles (not deprived). Materially deprived migrants have a much higher likelihood of reporting health problems than native-born Italians. These results are evidence for Hypothesis 3.

Migrants from different regions of origin experience dissimilar living conditions and are likely to encounter different contexts of reception in Italy. As aforementioned, migrants from Africa and Asia are significantly more likely to live in material deprivation than migrants from the new EU countries. We therefore conduct robustness checks for Hypothesis 3. Examining the interaction between material deprivation and duration of stay separately for each region of origin we obtain consistent results, though sample sizes are too small to generate adequate power (results available upon request).

4. Discussion and conclusion

This paper studies the healthy immigrant effect, trends in migrant–native health convergence, and the role material deprivation may play in hastening that convergence. As evidence for our first hypothesis, migrants are less likely to report activity limitations and chronic morbidity or to rate their health as 'poor'. Our results support Hypothesis 1: there appears to be a HIE during the first period after arrival in Italy (0–4 years).

We also find support for our second hypothesis that there is migrant–native health convergence: as duration of stay increases the health of migrants deteriorates, weakening their advantage over natives. This convergence process exists regardless of birth region. Africans show a particularly strong pattern: they are the most selected at entry into Italy, but their health appears to deteriorate more quickly than migrants from other regions.

In testing our third hypothesis that material deprivation interacts with duration of stay, we find materially deprived migrants who have been in Italy longer have worse health (i.e., closer to natives' health) than migrants who may be protected by better socioeconomic conditions. The worst health outcomes are reported by the groups of migrants (by region of origin) with the highest share of individuals living in conditions of material deprivation.

This paper is not without limitations. Migrants may shift their health reference group from non-migrants in their region of origin, who may have poorer average health, to native-born Italians, who may have better conditions, thereby changing the way that migrants think about their health. To limit this issue we include multiple indicators of morbidity – not only self-rated health but also physical limitations and chronic morbidity, which are more objective measures. That all three of these outcomes show the same trends increases our confidence in the results.

The lack of longitudinal data in Italy means that we are limited to cross-sectional data to study a dynamic phenomenon, and that we cannot interpret our results in a causal manner. That our results are robust to sensitivity analyses, based on testing the same hypotheses on different regions of origin (available upon request), and consistent with previous evidence in the international literature, partially assuages our concerns. In countries that do have longitudinal data and when Italian longitudinal data becomes available, these data sources should be exploited to retest these hypotheses. In addition to exploring convergence by region of origin, an additional area of research worth investigating is whether there are gender differences in migrant health convergence. Other risk factors that are not measured in the data are likely to contribute to the health deterioration of migrants. In particular, poor working conditions and strenuous and physically demanding jobs can result in health risks. Different pathways of

discrimination (e.g., healthcare access, labor market, daily living) may be important factors in understanding deterioration of migrant health in the receiving contexts. When data becomes available, further research on the topic should include exposure to discrimination.

Material deprivation is measured at only one point in time, and therefore with our data we cannot disprove the possibility of reverse causation – that migrants' poor health causes their material deprivation. However, since most migrants to Italy are economic migrants, it is likely that those individuals who report material deprivation in 2009 have consistently experienced material deprivation, at least since their migration. Furthermore, the Italian National Health System provides comprehensive coverage for all Italian citizens and, since 2002, for all foreign citizens with legal residence (France, Taroni, and Donatini 2005). This universal coverage means health conditions are less likely to cause financial hardship in Italy than in nations with less generous welfare states.

In fact, our estimates may be downwardly biased: people who report no material deprivation in 2009 may have experienced a significant degree of poverty prior to that. One implication of this is that exposure to material deprivation may drive more of the migrant–native health convergence than our results indicate. Our results may also be downwardly biased because Istat sampled only 'regular' (authorized) migrants. Although this has not been studied in the Italian context, we hypothesize irregular (unauthorized) migrants may be more exposed to material deprivation, with the accompanying negative health effects, including faster migrant–native health convergence.

Because this data only includes migrants who have stayed in Italy, we cannot account for the effects of return migration (the so-called 'Salmon Bias') or healthy remigration (Wallace and Kulu 2014). Evidence is mixed for how health status affects return migration, with findings for both negative and positive health selection. Migrants may return to their countries of origin when severely sick (Abraído-Lanza et al. 1999; Riosmena, Wong, and Palloni 2013), upon reaching pension age (Rogers, Raquillet, and Castro 1978), or, conversely, when they are healthy (Sander 2007). If individuals return to their countries of origin when sick, our estimates would be biased downwards. Setting the upper age bound at 64 should help minimize negative health selection, given that severe health problems are more likely to occur at older ages. Despite these limitations, this paper provides a novel contribution to the literature on migrant health convergence and the role of material deprivation.

To conclude, we argue that socioeconomic disadvantage and social exclusion may erode the health capital with which migrants enter receiving countries (HIE). The migrant–native health convergence process will be exacerbated by ageing, when migrants enter higher risk ages for health frailties. In conclusion, if new receiving

countries like Italy do not design and implement specific policies addressing the social integration of migrants, the deterioration of the health conditions of migrants is likely to become a public health issue with consequences for overall healthcare system sustainability.

5. Acknowledgements

This work is financially supported by the Max Planck Society within the framework of the research initiative "The Challenges of Migration, Integration and Exclusion" (WiMi).

References

Abraído-Lanza, A.F., Dohrenwend, B.P., Ng-Mak, D.S., and Turner, J.B. (1999). The Latino mortality paradox: A test of the 'salmon bias' and healthy migrant hypotheses. *American Journal of Public Health* 89(10): 1543–1548. doi:10.2105/AJPH.89.10.1543.

Abraído-Lanza, A.F., Echeverría, S.E., and Flórez, K.R. (2016). Latino immigrants, acculturation, and health: Promising new directions in research. *Annual Review of Public Health* 37: 219–236. doi:10.1146/annurev-publhealth-032315-021545.

Allison, P.D. (1999). *Multiple regression: A primer*. Thousand Oaks: Pine Forge Press.

Anson, J. (2004). The migrant mortality advantage: A 70 month follow-up of the Brussels population. *European Journal of Population* 20(3): 191–218. doi:10.1007/s10680-004-0883-1.

Antecol, H. and Bedard, K. (2006). Unhealthy assimilation: Why do immigrants converge to American health status levels? *Demography* 43(2): 337–360. doi:10.1353/dem.2006.0011.

Bennet, L. and Lindström, M. (2018). Self-rated health and social capital in Iraqi immigrants to Sweden: The MEDIM population-based study. *Scandinavian Journal of Public Health* 46(2): 194–203. doi:10.1177/1403494817730997.

Biddle, N., Kennedy, S., and McDonald, J.T. (2007). Health assimilation patterns amongst Australian immigrants. *Economic Record* 83(260): 16–30. doi:10.1111/j.1475-4932.2007.00373.x.

Bloom, D.E., Chatterji, S., Kowal, P., Lloyd-Sherlock, P., McKee, M., Rechel, B., Rosenberg, L., and Smith, J.P. (2015). Macroeconomic implications of population ageing and selected policy responses. *The Lancet* 385(9968): 649–657. doi:10.1016/S0140-6736(14)61464-1.

Bonifazi, C., Heinz, F., Strozza, S., and Vitiello, M. (2009). The Italian transition from emigration to immigration country. New Delhi: IDEAs (IDEAs Working Paper 5).

Borrell, C., Muntaner, C., Solà, J., Artazcoz, L., Puigpinós, R., Benach, J., and Noh, S. (2008). Immigration and self-reported health status by social class and gender: The importance of material deprivation, work organisation and household labour. *Journal of Epidemiology and Community Health* 62(5): e7. doi:10.1136/jech.2006.055269.

Bostean, G. (2013). Does selective migration explain the Hispanic paradox? A comparative analysis of Mexicans in the US and Mexico. *Journal of Immigrant and Minority Health* 15(3): 624–635. doi:10.1007/s10903-012-9646-y.

Boyle, P., Norman, P., and Rees, P. (2002). Does migration exaggerate the relationship between deprivation and limiting long-term illness? A Scottish analysis. *Social Science and Medicine* 55(1): 21–31. doi:10.1016/S0277-9536(01)00217-9.

Brahimi, M. (1980). La mortalité des étrangers en France. *Population* 35(3): 603–622. doi:10.2307/1532400.

Braveman, P.A., Cubbin, C., Egerter, S., Williams, D.R., and Pamuk, E. (2010). Socioeconomic disparities in health in the United States: What the patterns tell us. *American Journal of Public Health* 100(S1): 186–196. doi:10.2105/AJPH.2009.166082.

Breidablik, H.J., Meland, E., and Lydersen, S. (2009). Self-rated health during adolescence: Stability and predictors of change (Young-HUNT Study, Norway). *European Journal of Public Health* 19(1): 73–78. doi:10.1093/eurpub/ckn111.

Bruzzone, S. and Mignolli, N. (2014). Mortalità per causa degli stranieri in Italia. In: Rapporto osservasalute 2014. Milano: Università Cattolica del Sacro Cuore: 310–318.

Burgard, S.A. and Chen, P.V. (2014). Challenges of health measurement in studies of health disparities. *Social Science and Medicine* 106: 143–150. doi:10.1016/j.socscimed.2014.01.045.

Cacciani, L., Asole, S., Polo, A., Franco, F., Lucchini, R., De Curtis, M., Di Lallo, D., and Guasticchi, G. (2011). Perinatal outcomes among immigrant mothers over two periods in a region of central Italy. *BMC Public Health* 11(294): 1–11. doi:10.1186/1471-2458-11-294.

Caselli, G., Loi, S., and Strozza, S. (2017). Migration health and mortality in Italy: An unfinished story. In: Trovato, F. (ed.). *Migration, health and survival: International perspectives*. Cheltenham: Edward Elgar: 234–257. doi:10.4337/9781785365973.00018.

Chandola, T. (2001). Ethnic and class differences in health in relation to British South Asians: Using the new national statistics socio-economic classification. *Social Science and Medicine* 52(8): 1285–1296. doi:10.1016/S0277-9536(00)00231-8.

Chiswick, B.R., Lee, Y.L., and Miller, P.W. (2008). Immigrant selection systems and immigrant health. *Contemporary Economic Policy* 26(4): 555–578. doi:10.1111/j.1465-7287.2008.00099.x.

Deri, C. (2005). Understanding the 'healthy immigrant effect' in Canada. Ottawa: University of Ottawa, Department of Economics (Working Paper 0502E).

Elo, I.T. (2009). Social class differentials in health and mortality: Patterns and explanations in comparative perspective. *Annual Review of Sociology* 35(1): 553–572. doi:10.1146/annurev-soc-070308-115929.

Eurostat (2014). Young people: Migration and socioeconomic situation [electronic resource]. Luxembourg: Eurostat. (http://ec.europa.eu/eurostat/statistics-explained/index.php/Young_people_-_migration_and_socioeconomic_situation (accessed February 1, 2017).

France, G., Taroni, F., and Donatini, A. (2005). The Italian health-care system. *Health Economics* 14(S1): 187–202. doi:10.1002/hec.1035.

Goldman, N., Pebley, A.R., Creighton, M.J., Teruel, G.M., Rubalcava, L.N., and Chung, C. (2014). The consequences of migration to the United States for short-term changes in the health of Mexican immigrants. *Demography* 51(4): 1159–1173. doi:10.1007/s13524-014-0304-y.

Hamilton, E.R., Berger Cardoso, J., Hummer, R.A., and Padilla, Y.C. (2011). Assimilation and emerging health disparities among new generations of US children. *Demographic Research* 25(25): 783–818. doi:10.4054/DemRes.2011.25.25.

Hummer, R.A., Benjamins, M.R., and Rogers, R.G. (2004). Racial and ethnic disparities in health and mortality among the US elderly popuation. In: Anderson, N.B., Bulatao, R.A., and Cohen, B. (eds.). *Critical perspectives on racial and ethnic differences in health in late life*. Washington, D.C.: National Academies Press: 69–110.

Istat (2009a). Indagine sul reddito e le condizioni di vita [electronic resource]. Rome: Istat. https://www.istat.it/it/archivio/5663.

Istat (2009b). Reddito e condizioni di vita delle famiglie con stranieri [electronic resource]. Rome: Istat. https://www.istat.it/it/archivio/52405.

Jasso, G., Massey, D.S., Rosenzweig, M.R., and Smith, J.P. (2004). Immigrant health: Selectivity and acculturation. In: Anderson, N.B., and Bulatao, R.A., and Cohen,

B. (eds.). *Critical perspectives on racial and ethnic differences in health and late life*. Washington, D.C.: National Research Council: 227–266.

Juárez, S.P., Drefahl, S., Dunlavy, A., and Rostila, M. (2018). All-cause mortality, age at arrival, and duration of residence among adult migrants in Sweden: A population-based longitudinal study. *SSM – Population Health* 6: 16–25. doi:10.1016/j.ssmph.2018.07.007.

Kawachi, I., Subramanian, S.V., and Almeida-Filho, N. (2002). A glossary for health inequalities. *Journal of Epidemiology and Community Health* 56(9): 647–652. doi:10.1136/jech.56.9.647.

Khlat, M. and Courbage, Y. (1996). Mortality and causes of death of Moroccans in France, 1979–91. *Population* 8: 59–94.

Khlat, M. and Darmon, N. (2003). Is there a mediterranean migrants mortality paradox in Europe? *International Journal of Epidemiology* 32(6): 1115–1118. doi:10.1093/ije/dyg308.

Lara, M., Gamboa, C., Kahramanian, M.I., Morales, L.S., and Hayes Bautista, D.E. (2005). Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. *Annual Review of Public Health* 26: 367–397. doi:10.1146/annurev.publhealth.26.021304.144615.

Lechner, I. and Mielck, A. (1998). Decrease in the 'healthy migrant effect': Trends in the morbidity of foreign and German participants in the 1984–1992 Socioeconomic Panel. *Gesundheitswesen* 60(12): 715–720.

Lindström, M., Sundquist, J., and Östergren, P.O. (2001). Ethnic differences in self reported health in Malmö in southern Sweden. *Journal of Epidemiology and Community Health* 55(2): 97–103. doi:10.1136/jech.55.2.97.

Link, B.G. and Phelan, J.C. (1996). Understanding sociodemographic differences in health: The role of fundamental social causes. *American Journal of Public Health* 86(4): 471–473. doi:10.2105/AJPH.86.4.471.

Loi, S., Rusciani, R., Spadea, T., Costa, G., and Egidi, V. (forthcoming). Salute, stili di vita e accesso a sistemi sanitari. In: Perez, M. (ed.). *Vita e percorsi di integrazione degli immigrati in Italia*. Rome: Istat: 15–45.

Malmusi, D., Borrell, C., and Benach, J. (2010). Migration-related health inequalities: Showing the complex interactions between gender, social class and place of origin. *Social Science and Medicine* 71(9): 1610–1619. doi:10.1016/j.socscimed.2010.07.043.

Markides, K.S. and Coreil, J. (1986). The health of Hispanics in the southwestern United States: An epidemiologic paradox. *Public Health Reports* 101(3): 253–265.

Marmot, M. (2005). Social determinants of health inequalities. *Lancet* 365(9464): 1099–1104. doi:10.1093/acprof:oso/9780198565895.001.0001.

Moullan, Y. and Jusot, F. (2014). Why is the 'healthy immigrant effect' different between European countries? *European Journal of Public Health* 24(S1): 80–86. doi:10.1093/eurpub/cku112.

Muhuri, P.K. and Gfroerer, J.C. (2011). Mortality associated with illegal drug use among adults in the United States. *The American Journal of Drug and Alcohol Abuse* 37(3): 155–164. doi:10.3109/00952990.2011.553977.

Nazroo, J.Y. (1997). *The health of Britain's ethnic minorities: Findings from a national survey*. London: PSI.

Newbold, K.B. (2006). Chronic conditions and the healthy immigrant effect: Evidence from Canadian immigrants. *Journal of Ethnic and Migration Studies* 32(5): 765–784. doi:10.1080/13691830600704149.

Ng, E. (2011). The healthy immigrant effect and mortality rates. *Health Reports* 22(4): 25–29.

Nielsen, S.S. and Krasnik, A. (2010). Poorer self-perceived health among migrants and ethnic minorities versus the majority population in Europe: A systematic review. *International Journal of Public Health* 55(5): 357–371. doi:10.1007/s00038-010-0145-4.

OECD (2015). *OECD reviews of health care quality: Italy 2014*. Paris: OECD Publishing.

Palloni, A. and Arias, E. (2004). Paradox lost: Explaining the Hispanic adult mortality advantage. *Demography* 41(3): 385–415. doi:10.1353/dem.2004.0024.

Perreira, K.M. and Ornelas, I.J. (2011). The physical and psychological well-being of immigrant children. *Future of Children* 21(1): 195–218. doi:10.1353/foc.2011.0002.

Pförtner, T.K. and Elgar, F.J. (2015). Widening inequalities in self-rated health by material deprivation? A trend analysis between 2001 and 2011 in Germany. *Journal of Epidemiology and Community Health* 70(1): 82–89. doi:10.1136/jech-2015-205948.

Portes, A. and Rumbaut, R.G. (1996). *Immigrant America: A portrait*. Berkeley: University of California Press.

Pugliese, A., Burgio, A., Geraci, S., Petrelli, A., and Baglio, G. (2014). Ospedalizzazione tra gli stranieri in Italia. In: Rapporto osservasalute 2014. Milano: Università Cattolica del Sacro Cuore: 273–281.

Rasulo, D., Spadea, T., Onorati, R., and Costa, G. (2012). The impact of migration in all-cause mortality: The Turin Longitudinal Study, 1971–2005. *Social Science and Medicine* 74(6): 897–906. doi:10.1016/j.socscimed.2011.10.045.

Razum, O., Zeeb, H., Akgün, H.S., and Yilmaz, S. (1998). Low overall mortality of Turkish residents in Germany persists and extends into a second generation: Merely a healthy migrant effect? *Tropical Medicine and International Health* 3(4): 297–303. doi:10.1046/j.1365-3156.1998.00233.x.

Rechel, B., Mladovsky, P., and Devillé, W. (2012). Monitoring migrant health in Europe: A narrative review of data collection practices. *Health Policy* 105(1): 10–16. doi:10.1016/j.healthpol.2012.01.003.

Riosmena, F., Everett, B.G., Rogers, R.G., and Dennis, J.A. (2015). Negative acculturation and nothing more? Cumulative disadvantage and mortality during the immigrant adaptation process among Latinos in the United States. *International Migration Review* 49(2): 443–478. doi:10.1111/imre.12102.

Riosmena, F., Wong, R., and Palloni, A. (2013). Migration selection, protection, and acculturation in health: A binational perspective on older adults. *Demography* 50(3): 1039–1064. doi:10.1007/s13524-012-0178-9.

Rogers, A., Raquillet, R., and Castro, L.J. (1978). Model migration schedules and their applications. *Environment and Planning A: Economy and Space* 10(5): 475–502. doi:10.1068/a100475.

Ronellenfitsch, U. and Razum, O. (2004). Deteriorating health satisfaction among immigrants from Eastern Europe to Germany. *International Journal for Equity in Health* 3(4): 1–10. doi:10.1186/1475-9276-3-4.

Salvatore, M.A., Baglio, G., Cacciani, L., Spagnolo, A., and Rosano, A. (2013). Work-related injuries among immigrant workers in Italy. *Journal of Immigrant and Minority Health* 15(1): 182–187. doi:10.1007/s10903-012-9673-8.

Sander, M. (2007). Return migration and the 'healthy immigrant effect.' Berlin: DIW (SOEPpapers 60).

Stephen, E.H., Foote, K., Hendershot, G.E., and Schoenborn, C.A. (1994). Health of the foreign-born population: United States, 1989–90. *Advance Data* 14(241): 1–12.

Uitenbroek, D.G. and Verhoeff, A.P. (2002). Life expectancy and mortality differences between migrant groups living in Amsterdam, the Netherlands. *Social Science and Medicine* 54(9): 1379–1388. doi:10.1016/S0277-9536(01)00120-4.

Wallace, M. and Kulu, H. (2014). Migration and health in England and Scotland: A study of migrant selectivity and salmon bias. *Population, Space and Place* 20(8): 694–708. doi:10.1002/psp.1804.

WHO (2010). Health of migrants: The way forward: Report of a global consultation, Madrid, Spain, 3–5 March 2010. Geneva: WHO.

Williams, D.R. (2012). Miles to go before we sleep: Racial inequities in health. *Journal of Health and Social Behavior* 53(3): 279–295. doi:10.1177/0022146512455804.

Appendix

Table A-1: Composition of regions of birth

Geographical area of birth	Countries
New EU countries* (after EU15**)	Bulgaria, Czech Republic, Cyprus, Hungary, Estonia, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia.
East Europe	Albania, Bosnia-Herzegovina, Croatia, Macedonia, Ukraine, Moldova, Montenegro, Kosovo, Russian Federation, Serbia.
Africa	All African countries.
Asia	Bangladesh, China, India, Indonesia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam.
South America	All South American countries.
Developed economies	EU15, USA, Canada, Australia, Switzerland, Japan, Andorra, Iceland, Liechtenstein, Monaco, Norway, New Zealand.

Source: UN country classification.
Note: * Croatia joined the EU in 2013 so it is not included in this category. ** Countries that joined the EU after the fifteen founding members.

Table A-2: Descriptive statistics

	Foreign-born		Native-born	
	Mean/proportion	CI	Mean/proportion	CI
Age	37.34	37.01–37.66	41.93	41.74–42.10
Female	0.52	0.49–0.50	0.50	0.50–0.53
Education (% secondary+)	0.86	0.85–0.87	0.89	0.88–0.89
Marital status				
Married	0.59	0.57–0.59	0.58	0.58–0.59
Never married	0.31	0.29–0.32	0.34	0.33–0.35
Separated/divorced/widowed	0.11	0.10–0.12	0.07	0.07–0.08
Italian region				
North	0.56	0.54–0.57	0.44	0.43–0.44
Centre	0.23	0.22–0.24	0.19	0.18–0.19
South/Islands	0.20	0.19–0.21	0.37	0.36–0.38
Materially deprived	0.30	0.29–0.31	0.13	0.12–0.14
Duration of stay	8.26	8.10–8.43	–	–

Table A-3: Percentage of individuals in poor health, by material deprivation

	Material deprivation	
	Deprived	Not deprived
GALI*	10.7	7.2
CM*	9.2	6.4
Poor SRH*	4.6	2.5

Note: * p<.001.

Table A-4: Hypothesis 2: Migrant–native health convergence full model

	GALI			CM			SRH		
Variables	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**
Age (ref. 18–34)									
35–49	1.984***	(0.102)	1.794 – 2.194	1.884***	(0.097)	1.702 – 2.084	1.981***	(0.161)	1.690 – 2.323
50–64	4.075***	(0.218)	3.669 – 4.527	3.370***	(0.184)	3.028 – 3.750	3.715***	(0.314)	3.148 – 4.384
Female (ref. Male)	1.194***	(0.034)	1.129 – 1.264	1.088**	(0.033)	1.026 – 1.153	1.102*	(0.048)	1.011 – 1.201
Marital status (ref. Married)									
Never married	1.128**	(0.050)	1.035 – 1.230	1.113*	(0.050)	1.020 – 1.215	1.364***	(0.090)	1.198 – 1.553
Separated/divorced/ widowed	1.241***	(0.067)	1.117 – 1.379	1.409***	(0.076)	1.268 – 1.566	1.515***	(0.116)	1.304 – 1.760
Primary education (ref. secondary +)	2.041***	(0.085)	1.881 – 2.214	0.601***	(0.026)	0.552 – 0.655	0.467***	(0.028)	0.416 – 0.524
Residence (ref. North)									
Centre	1.044	(0.046)	0.959 – 1.138	0.917*	(0.040)	0.841 – 1.000	1.149*	(0.077)	1.009 – 1.310
South and Islands	1.118**	(0.044)	1.036 – 1.207	0.757***	(0.031)	0.699 – 0.819	1.164**	(0.069)	1.038 – 1.307
Nativity (ref. Native-born Italian)									
Immigrant 0–4 years	0.378***	(0.037)	0.312 – 0.457	0.347***	(0.037)	0.282 – 0.427	0.571***	(0.078)	0.437 – 0.748
Immigrant 5–9 years	0.570***	(0.043)	0.492 – 0.661	0.532***	(0.041)	0.457 – 0.620	0.744**	(0.081)	0.601 – 0.920
Immigrant 10+ years	0.690***	(0.050)	0.598 – 0.797	0.678***	(0.051)	0.585 – 0.785	1.085	(0.114)	0.882 – 1.334
Constant	0.135***	(0.009)	0.117 – 0.154	0.139***	(0.010)	0.120 – 0.160	0.040***	(0.004)	0.032 – 0.049
Observations	35,952			36,130			36,865		
Log likelihood	–14058			–13583			–7393		
Chi2	2015			1515			808.4		

Note: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1.

Table A-5: Material deprivation's association with health convergence

	GALI			CM			SRH		
Variable	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**
Age class (ref. 18–34)	2.018***	(0.104)	1.823 – 2.233	1.901***	(0.098)	1.718 – 2.104	2.017***	(0.164)	1.719 – 2.366
35–49	4.268***	(0.230)	3.841 – 4.743	3.460***	(0.189)	3.109 – 3.851	3.916***	(0.332)	3.317 – 4.623
50–64									
Female (ref. Male)	1.200***	(0.035)	1.134 – 1.271	1.092**	(0.033)	1.029 – 1.158	1.106*	(0.049)	1.014 – 1.207
Marital status (ref. Married)	1.103*	(0.049)	1.012 – 1.203	1.097*	(0.049)	1.005 – 1.197	1.326***	(0.088)	1.164 – 1.511
Never married	1.186**	(0.064)	1.067 – 1.318	1.367***	(0.074)	1.230 – 1.520	1.418***	(0.109)	1.220 – 1.647
Separated/divorced/ widowed									
Primary education (ref. secondary +)	1.887***	(0.080)	1.737 – 2.050	0.638***	(0.028)	0.585 – 0.696	0.519***	(0.031)	0.461 – 0.584
Residence (ref. North of Italy)									
Centre	1.013	(0.044)	0.930 – 1.104	0.898*	(0.040)	0.824 – 0.979	1.104	(0.074)	0.968 – 1.259
South and Islands	0.975	(0.039)	0.901 – 1.055	0.687***	(0.029)	0.632 – 0.746	0.969	(0.060)	0.859 – 1.093
Material deprivation (ref. Not deprived)									
Deprived	2.190***	(0.113)	1.978 – 2.424	1.710***	(0.093)	1.538 – 1.902	2.587***	(0.183)	2.253 – 2.971
Nativity (ref. Native)									
Immigrant 0–4 years	0.389***	(0.051)	0.300 – 0.503	0.313***	(0.046)	0.235 – 0.418	0.676*	(0.114)	0.486 – 0.941
Immigrant 5–9 years	0.513***	(0.054)	0.416 – 0.631	0.481***	(0.051)	0.391 – 0.592	0.726*	(0.114)	0.533 – 0.989
Immigrant 10+ years	0.703***	(0.068)	0.581 – 0.850	0.621***	(0.062)	0.511 – 0.754	1.062	(0.145)	0.813 – 1.388
Material deprivation × Duration of stay									
Deprived × 0–4 years	0.609*	(0.118)	0.417 – 0.891	0.916	(0.194)	0.605 – 1.387	0.436**	(0.122)	0.253 – 0.754
Deprived × 5–9 years	0.786	(0.121)	0.582 – 1.062	0.902	(0.142)	0.663 – 1.227	0.629*	(0.136)	0.412 – 0.961
Deprived × 10+ years	0.593***	(0.088)	0.444 – 0.792	0.854	(0.129)	0.635 – 1.149	0.607*	(0.125)	0.405 – 0.909
Constant	0.062***	(0.004)	0.055 – 0.069	0.126***	(0.009)	0.109 – 0.145	0.033***	(0.004)	0.027 – 0.041
Observations	35,952			36,130			36,865		
Log likelihood	–13915			–13518			–7289		
Chi2	2181			1596			977.8		

Note: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1.

Table A-6: Hypothesis 3: Region of origin (reference categories in brackets)

	GALI			CM			SRH		
Variable	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**	**OR**	**Robust SE**	**CI**
Age class (ref. 18–34)									
35–49	1.982***	(0.102)	1.792 – 2.192	1.880***	(0.097)	1.699 – 2.081	1.990***	(0.162)	1.696 – 2.334
50–64	4.064***	(0.218)	3.659 – 4.514	3.346***	(0.182)	3.007 – 3.723	3.730***	(0.316)	3.159 – 4.404
Female (ref. Male)	1.195***	(0.035)	1.129 – 1.265	1.084**	(0.033)	1.022 – 1.150	1.102*	(0.049)	1.011 – 1.202
Marital status (ref. Married)									
Never married	1.130**	(0.050)	1.036 – 1.232	1.113*	(0.050)	1.020 – 1.215	1.371***	(0.091)	1.204 – 1.562
Separated/divorced/ widowed	1.241***	(0.067)	1.117 – 1.379	1.403***	(0.076)	1.262 – 1.559	1.520***	(0.116)	1.308 – 1.766
Residence (ref. North)									
Centre	1.046	(0.046)	0.960 – 1.140	0.917*	(0.040)	0.841 – 1.000	1.148*	(0.076)	1.008 – 1.308
South and Islands	1.122**	(0.044)	1.039 – 1.210	0.759***	(0.031)	0.701 – 0.821	1.168**	(0.069)	1.041 – 1.311
Primary education (ref. secondary+)	2.045***	(0.087)	1.881 – 2.222	1.683***	(0.074)	1.543 – 1.835	2.150***	(0.129)	1.912 – 2.419
Africa (ref. Natives)									
0–4 years	0.294***	(0.071)	0.183 – 0.473	0.299***	(0.082)	0.174 – 0.513	0.280**	(0.117)	0.123 – 0.637
5–9 years	0.656**	(0.099)	0.488 – 0.882	0.477***	(0.080)	0.344 – 0.661	0.757	(0.159)	0.502 – 1.141
10+ years	0.724**	(0.081)	0.581 – 0.902	0.672***	(0.077)	0.536 – 0.842	1.056	(0.184)	0.750 – 1.487
Asia (ref. Natives)									
0–4 years	0.315***	(0.097)	0.172 – 0.575	0.282***	(0.089)	0.152 – 0.523	1.127	(0.395)	0.566 – 2.242
5–9 years	0.464***	(0.090)	0.317 – 0.679	0.409***	(0.087)	0.270 – 0.622	0.851	(0.209)	0.526 – 1.377
10+ years	0.555***	(0.092)	0.401 – 0.768	0.548***	(0.097)	0.388 – 0.774	0.808	(0.198)	0.499 – 1.307
East Europe (ref. Natives)									
0–4 years	0.578**	(0.098)	0.415 – 0.805	0.569**	(0.099)	0.404 – 0.800	0.742	(0.181)	0.460 – 1.198
5–9 years	0.569***	(0.071)	0.445 – 0.727	0.619***	(0.075)	0.487 – 0.785	0.613*	(0.121)	0.416 – 0.903
10+ years	0.782+	(0.106)	0.600 – 1.020	0.732*	(0.102)	0.558 – 0.962	1.325	(0.231)	0.942 – 1.865
New EU entries (ref. Natives)									
0–4 years	0.330***	(0.047)	0.249 – 0.437	0.275***	(0.044)	0.200 – 0.377	0.483***	(0.093)	0.331 – 0.705
5–9 years	0.564***	(0.078)	0.430 – 0.739	0.531***	(0.073)	0.406 – 0.695	0.835	(0.157)	0.578 – 1.208
10+ years	0.620*	(0.117)	0.429 – 0.898	0.774	(0.133)	0.553 – 1.085	1.159	(0.270)	0.735 – 1.829
Constant	0.135***	(0.010)	0.117 – 0.155	0.141***	(0.010)	0.122 – 0.162	0.040***	(0.004)	0.032 – 0.049
Observations	35,952			36,130			36,865		
Log likelihood	–14050			–13574			–7385		
Chi2	2028			1517			821		

Note: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1.