Health Inequalities in Germany: Is the Healthy Immigrant Effect (HIE) operative?

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1. Introduction

In the professional literature about health differences between migrants and the native population (McDonald et al. 2004), a wide body of research has been dedicated to the "Healthy Immigrant Effect" (HIE). This empirical phenomenon consists of two dimensions: a cross-sectional one, where it can be observed that migrants display better health outcomes than the average native population and a longitudinal observation of a declining health advantage with increasing years since migration. The scholarly work on the former observation follows different explanatory trajectories. It is debated whether initial health advantages for migrants are either given by idiosyncratic aspects of the sending population such as culture, diet or health behaviours (Akresh, 2007; Kennedy et al. 2006, Razum and Rohrmann, 2002), by remigration of unhealthy individuals – the *salmon bias* – (Abraido-Lanza et al., 1999; Lu and Qin, 2014; Wallace and Kulu, 2014, Razum et al., 1998) or health selection favouring the influx of healthier individuals (Kennedy et al., 2015; Jass & Massey, 2004; Fuller-Thomson et al., 2016). The health decline can be attributed to the adaptation of unhealthy behaviours (Akresh, 2007) or the low socioeconomic status of migrants in the host country and its associated health detrimental effects, like acculturative stress, discrimination, lacking access to health care or poor housing (Berry, 2013; Elkeles and Seifert; 1996; Gantz, 2009; Williams, 1999; Wittig et al., 2008).

This article provides a methodological contribution to the health selection perspective: by choosing a different native comparison group, namely internal migrants, it is possible to reduce unobserved heterogeneity such as motivation or other factors correlated with health selection (Kennedy et al., 2015). Hamilton (2015), using data from the March Current Population survey, revealed a reduction in the migrant health advantage when the comparison group is changed to natives with internal migration experience, but concluded that it would be necessary to distinguish between recent and non-recent migrants in order to find more convincing evidence for selection. This problem can be addressed by using data from the Socioeconomic Panel (SOEP), since this dataset contains exactly this information. Further, I model health through the SF-12 questionnaire, using a physical and mental health scale. The main body of HIE literature focuses on self-rated health status, but by using a more complex instrument I try to address the problem of varying cultural dependant perceptive biases (Castiñeira et al., 2013, Puyat, 2013; Nolan, 2012; Newbold and Danforth, 2003; McDonald and Kennedy, 2004; Vang et al. 2015; Hamilton et al., 2009, Kwak 2016, Subedi and Rosenberg, 2014, Kennedy et al., 2015).

To test the hypotheses pooled data of the SOEP is used. The SOEP provides individual and household data on socioeconomic variables as well as health outcomes and migrational background. This article has the following structure: Firstly, I will discuss selection processes, its preconditions and the connection between socioeconomic status and health. In the following part I give an overview of the propensity score matching method, the data and measurements. The last part consists of the presentation and discussion of the results.

2. Theoretical framework

2.1 Health selection

Health selection has been widely used to explain differences in health between social groups (West, 1991; Joung et al., 1998; Chandola, 2003; Lundberg, 1991), where it has been shown that individual health predispositions represent a significant estimator for mobility chances (Lu et al., 2014; Arcaya et al.,2015). In the context of labour migration, it is assumed, that differing labour market conditions (labour prices) between source and host and country, as well as migration costs determine the composition and scale of migration. According to theory, selectivity in favour of healthier individuals will rise with increasing skill prices in the host country, increasing migration costs and decreasing cross-country transferability of skills. Migration is therefore only worthwhile for individuals from the higher part of the health distribution (Kennedy et al., 2015; Jasso et al., 2004; Borjas, 1987). Selection can be equally extended to a more collective context: Arcaya et al. (2015) revealed, that families who have reported to have children with health problems were less likely to take part in a program, that enabled families living in high-poverty neighbourhoods to move to a low-poverty neighbourhood. Health selection therefore is not exclusively operative for the single individual.

Borjas (1987) points out that selection on skill will be negative, when incomes in the source country are more unequally distributed than in the host country, but median incomes of the source country exceed median incomes of the host country. This is particularly relevant, since the type of selection determines the composition of the migrant population and thus its subsequent socioeconomic dimension, which in turn will affect health outcomes.

In order to observe the type of health selection which leads to the HIE, certain indicators as formulated by Borjas (1987) have to be inspected first: income distribution and median incomes of source and host country. It can be observed that almost all countries which are typically associated with labour migration to Germany like Southern and Eastern Europe and Turkey (Brücker et al., 2014) score higher in the GINI-Coefficient and display therefore more unequal income distributions when compared to Germany (Central Intelligence Agency, 2018; Gasparini and Tornarolli, 2015). It can also be observed that median income from typical countries of origin are lower than in Germany (OECD, 2017).

The typical sending countries are associated with relatively high migration costs, when measured per mile, but non-monetary costs are assumed to be higher than monetary costs, like psychic costs due to the loss of social networks and social capital (Borjas, 1987; Sjaastad, 1962). Long distance family, friend and romantic relationships are more difficult to maintain the longer the distance (Johnson, 2001; Dainton et al., 2001).

According to the theoretical considerations it can be assumed:

H1: Recent migrants have better health outcomes than native Germans

2.2 Social structure and health deterioration

Differences in relative labour prices between countries allow an upward social mobility in absolute terms, but an either stagnation or selection into the lower social classes in the host country, therefore a downward mobility in relative terms. The socioeconomic situation and the migrant experience itself generate a social sphere, where the availability of resources to maintain, to produce or to protect one's health is scarce (Jungbauer-Gans et al, 2009; Link et al, 1995), e.g. migrants display lower levels of education, are more often employed as workers and less often employed as civil servants, have lower levels of income and are less often home owners than native Germans. (Autorengruppe Bildungsberichterstattung, 2017; Statistisches Bundesamt 2016; De Groot et al., 2010; Özcan et al. 2006). Furthermore, it could be observed that about half of the migrant population in Germany stated to have been subjected to discrimination due to their ethnicity (Tucci et al., 2014).

Declining migrant health is also a result of the underutilization of health care services (Schaffer al., 2009; Schröttle et al., 2008; Wittig et al., 2008). Health care utilization is equally a function of socioeconomic status, migrational status and the experience of discrimination. Typical reasons for underutilization are attributed to a lower degree in health literacy and ability to seek for adequate health service (Schaefer et al., 2017; Nölke et al., 2015), language difficulties (Behrens et al., 2008), lack of trust in medical treatment or lack of cultural competence of medical professionals (Behrens et al, 2008; Callies et al., 2007).

German research on the HIE has mainly been focused on mortality (Razum et al., 2002, Razum et al. ,1998; Zur Nieden et al., 2016) and concluded a prevailing all-cause mortality advantage for migrants. Razum et al. (2002) found out, regarding suicidal tendencies that German natives display a higher prevalence than migrants. Fewer research has been conducted regarding other health indicators, but there is evidence that migrants in Germany rate their own health better than Germans (Kotwal, 2010). Sander (2007) found out that Turkish migrants, who rate their health as "poor" have a lower tendency of remigrating to Turkey, implying counterevidence for the salmon-bias and strengthening health selection perspective. The considerations lead to the assumption:

H2: Non-Recent Migrants have worse health outcomes than recent migrants

3. Changing the comparison group

The existing literature made clear that migrants do not represent a random sample of their country of origin (Chiquiar et al, 2005; Kaestner et al., 2014). Analogically, neither internal migrants represent a random sample of the native population (Borjas et al., 1992; Gabriel et al., 1995; Lu, 2008; Chen, 2011). It is therefore likely that migrants and internal migrants are more similar to each other than migrants and the general native population, regarding unobserved like motivation and ambition. If health selection takes place this has two consequences: if there is a positive selection on health, either migrant group will show higher levels of health than the respective population from which the migrants are drawn. This leads to a decrease in the health advantage, when migrants are compared to internal migrants rather than the general native population. Hamilton (2015) could find a reduction of the gap between migrants and U.S born individuals concerning the self-rated health status, when a comparison group of U.S. born individuals is chosen, that recently has moved across state lines. It can therefore be assumed that:

H3: The health advantage of recent migrants will be reduced, when the comparison group is changed to native internal migrants

4. Methods

3.1 Sample

The data used in this study stem from the German Socioeconomic Panel (SOEP) collected by the German Institute for Economic Research (DIW), which surveys over 12.000 households annually. Households are selected either by random-walk procedure, register and interviewer and selection on specific household features. The panel is conducted via telephone and computer assisted interviews with individuals aged 17 or older. Particularly relevant is the migration sample, which over represents individuals from countries which, according to immigration trend analysis, will become more relevant in the future. Oversampling took place for people from Poland, Romania, successor states of the former Soviet Union, Greece, Italy, Spain, Portugal, Arab and predominantly Muslim countries (Wagner et. al, 2008; Brücker et al., 2014). Included was data from the waves 2013-2016, where each wave provided different information. Individuals chosen from former waves (2013 and 2015) were surveyed with the health relevant instruments in the waves 2014 and 2016 (e.g. socioeconomic information was drawn from the former waves). The sample is limited to 16.278 observations with valid responses on predictor measures. Item nonresponse rate on health information is negligibly small (< 3%). Excluded from the sample were refugees, tourists, individuals with a net household income of more than 20.000 Euros, individuals over the age of 65 and migrants from high GDP economies such as Australia, USA, Benelux states, UK, France, Austria or Switzerland. The focus of this work lies in the comparison of health outcomes of foreign born persons who have a direct migration experience from weak economies.

3.2 Measures

3.2.1.1 Health outcomes

Health is modelled according the health-related quality of life measured by the SOEP Version of the Medical Outcomes Short Form 12 (SF-12). Through 12 items the SF-12 measures physical functioning, role limitations due to physical health problems, bodily pain, general

health, vitality, social functioning, role limitations due to emotional problems and mental health. A 0-100 scale for physical and mental health was computed (see Ware et al., 1995), where high values correspond with high levels of health.

3.2.1.2 Independent variables

The independent variables were constructed in the following way: migrants were coded if an individual was not born in Germany to foreign born parents. According to the variable, which indicated the year a migrant has left the source country, years since migration (ysm) were computed and migrants were dichotomized into *recent migrants* (ysm ≤ 10) and *non-recent migrants* (ysm > 10). Native Germans were coded if the individual holds German citizenship and both parents were born in Germany. Native Germans with internal migration experience were coded if native Germans have either changed residence within the borders of the Federal Republic in the last year or have founded a new household. Covariates included sex, age (squared), educational level (low, middle, high), log household income, employment status (1=employed 0=unemployed) and partnership status (1=partnership, 0=no partnership).

3.3 Analysis

The analysis is aimed at estimating the effect of migration on health outcomes for individuals who migrated to Germany. Rosenbaum and Rubin (1983) addressed the problem of selection bias due to unobserved heterogeneity by performing propensity score matching, which directly compares individuals which are similar to one another. By using a logistic regression model the probability to get the treatment (e.g. being a migrant) is estimated on the basis of the covariates. The probability obtained from this model is the propensity score. Matching on the basis of the propensity score inhibits the convenience of reducing dimensionality compared to matching directly on covariates. Using a potential outcome framework means of health outcomes are estimated. The counterfactual for migrant health is health if the individual was a native German. The same intuition holds for the inverse case but vice versa. Based on these estimates the average treatment effect on the treated (ATT) is given by the mean of the difference of the potential outcome for health of migrants and health of migrants if they were not migrants. The ATT will be computed for recent migrants vs. native Germans, non-recent migrants vs. native Germans, recent vs. non-recent migrants, recent migrants vs. native German internal migrants and non-recent migrants vs. native German internal migrants (see **Table 1**).

Tabelle 1 – Matching groups for treatment effect calculation

Model 1	Recent Migrants vs. Native Germans
Model 2	Non-Recent Migrants vs. Native Germans
Model 3	Recent Migrants vs. Non-Recent Migrants
Model 4	Recent Migrants vs. Native German Internal Migrants
Model 5	Non-Recent Migrants vs. Native German Internal Migrants

5. Results

4.1 Sample characteristics

Table 2 shows characteristics of the outcome variable and covariates separated by migrational group. Bivariate group comparisons between migrational groups inhibit potential to confuse if there are more than two groups, thus the following comparisons of summary statistics are made intuitively rather than statistically.

Table 2 – Sample summary statistics

	Recent Migrants[a]	Non-recent Migrants[b]	All native Germans	Native German internal migrants
Physical Scale	81.0 (21.6)	74.2 (24.7)	73.4 (22.5)	75.7 (22.6)
Mental Scale	77.3 (14.7)	73.3 (16.8)	71.6 (17.1)	70.3 (18.8)
Age	36.1 (9.5)	42.6 (10.8)	45.3 (13.01)	36.2 (12.1)
Monthly HH-Income	2399.0 (1113.0)	2716.5 (1316.0)	3430.0 (1723.3)	2727.8 (1570.7)
Sex (1=Woman)	56.3	53.1	54.9	55.2
Education				
Low	26.7	28.3	10.5	15.4
Middle	41.6	50.6	58.9	58.5
High	32.4	21.1	30.6	26.2
Currently Employed	57.8	62.3	72.0	69.3
Partner	71.2	73.8	57.5	32.9
N	794	1147	10011	864

Regarding the HIE, first descriptive observations speak for the existence of the said effect, where recent migrants score higher in physical health than native Germans and non-recent migrants, while non-recent migrants seem to have similar levels of physical levels of health as native Germans. Changing the comparison group, the patterns are comparable, but native German internal migrants score to some degree higher than non-recent migrants. In mental health the HIE is in the same pattern observable as in physical health. Changing the comparison group would not change the order. When looking at the covariates it can be observed that recent migrants tend to be younger than non-recent migrants and native Germans, but similar to native German internal migrants. Recent migrants have less monthly household income than the other groups, where native Germans score the highest. Women outnumber men across all groups between 3.1-6.3%. For recent migrants the educational distribution seems to be skewed more towards low and high education. For non-recent migrants the distribution is more skewed towards lower education than towards high education. For native Germans the distribution is skewed more towards middle and high levels, while the low level percentage is the lowest across all groups. Native German internal Migrants have higher percentages of low level education than native Germans, but in general the distribution is more skewed towards medium and high levels of education. Native Germans are most often employed, followed by native German internal migrants, non-recent migrants and recent migrants. Non-recent migrants dominate the shares of having a partner, while recent migrants tend to have similar percentages. There is a wide gap to native Germans and even a higher gap to native German internal migrants.

4.2 Propensity Score Matching Analysis

Table 3 shows the ATT for each comparison group shown in **Table 2**. Standard errors were obtained via the measure proposed by Abaie et al. (2016). Recent migrants, on average, have statistically significant 4.7 points more on the physical and 8.0 points more on the mental health scale than native Germans. For non-recent migrants there is only a significant advantage on the mental health scale of 3.81 points, when compared to native Germans. Recent migrants have both a health advantage on the physical health scale (4.02) and the mental health scale (3.50) when compared to non-recent migrants. Changing the comparison group yields the following results: recent migrants show no statistically significant difference in physical health, but a relatively large advantage on the mental health scale (9.0) when compared to native German internal migrants. A similar pattern is observable for non-recent migrants, where the mental health advantage amounts to 4.0 points.

Table 3 – Average treamtent effects on the treated of migration on physical and mental health

	Coef.	Std. Err.	Z	P>|z|	95 % Conf. Intervall	
Physical						
Model 1	4.79	1.21	3.94	0.000	2.41	7.20
Model 2	1.31	1.04	1.26	0.206	-0.72	3.34
Model 3	4.02	1.56	2.58	0.010	0.97	7.10
Model 4	4.03	2.23	1.18	0.071	-.34	8.42
Model 5	3.15	2.00	1.61	0.108	-.69	7.00
Mental						
Model 1	8.00	.90	8.81	0.000	6.20	9.75
Model 2	3.81	.75	5.12	0.000	2.35	5.27
Model 3	3.50	1.07	3.24	0.001	1.40	5.60
Model 4	9.00	1.40	6.57	0.000	6.32	11.70
Model 5	4.00	1.30	3.12	0.002	1.48	6.51

6. Discussion

Regarding the HIE the study produced ambiguous results. The typical pattern of an initial health advantage for recent migrants could be found, while non-recent migrants seem to be statistically indistinguishable from native Germans, when physical health is the variable of interest. A hierarchy is implied, where recent migrants score higher in physical health than non-recent migrants, which in turn, have to some degree the same physical health as native Germans.

For physical health the results strengthen the selection perspective. The findings concerning physical health are in line with recent literature on immigrant health selection. By changing the comparison group to internal movers (or migrants) Hamilton (2015) found out that the health advantage was reduced up to 35%, whereas the results of the present study showed an entire disappearance of health differences between recent migrants, as well as non-recent migrants, and native internal migrants. This could be due to various factors like the estimation method (regression models vs. propensity score matching), the outcome variable (self-reported health status vs. SF-12 scales), the variable to identify internal migrants (in the present study the identifier cannot distinguish between internal movers who move across federal states or within the same city) or the distinction between recent and non-recent migrants.

The results strongly suggest a health assimilation effect. Health assimilation is especially well documented for health indicators such as chronicle diseases (Biddle et al., 2007) or obesity (Antecol et al., 2006). It is frequently attributed to the exposure to environmental and cultural factors, which in turn alter health behaviour. Health preventive behaviour, especially diet, is subject to cultural assimilation, leading in general to worse health behaviour like a higher intake in saturated fats (Allen et al. 2007; Biddle et al., 2007; Antcol et al., 2006). Evidence for Germany suggests that migrants from the typical migration countries, such as Greece, Italy, Spain or Turkey appropriate culturally untypical ways of food preparation and consumption, e.g. reduction of sea food consumption or addition of dairy products with high fat portion (Klamt, 2004). But it is misleading to treat culture as an endogenous agent. Health disparities, according to theory are also strongly linked to socioeconomic status and the availability of material and social resources (Jungbauer-Gans et al, 2009; Link et al, 1995; Hamilton et al., 2011). As the socioeconomic profiles of the present study have shown, in line with selection theory, migrants tend to be disadvantaged in resources, which in turn inhibits potential for health detrimental effects. In relation to health protective behaviour, higher smoking prevalence (Lampert et al., 2018) and lower physical activity are associated low SES rather than high SES settings (Yang et al., 1996). Nölke et al. (2015) demonstrate a higher usage of internet for health related information in upper and middle class settings than in lower class settings; an association that was equally observable between migrants and non-migrants, where the former were less inclined to use the internet for health related issues.

The migrant experience itself can also explain the significant difference between recent and non-recent migrants. Significant correlations have been found between perceived discrimination and physical illness, high blood pressure and adverse birth outcomes, e.g. pre-term birth rate (Jackson et al., 2003; Ziegler et al., 2009).

Concerning mental health, migrants have a health advantage across all comparison groups. The mental health advantage across all groups imply higher migration costs are for international migrants than internal migrants and an even higher amount of mental strength is required in order to establish one-self in a new country. Moving within the borders of the country is not associated with stressors like acculturative stress, e.g. the necessity to adapt to an entirely new cultural environment. Social networks are easier and less costly to maintain if the distance between actors decreases. I argue, that internal native migrants do not require an extra surplus of robustness in terms of mental strength, which on the other hand is necessary for international migration.

It is frequently discussed whether social networks in migrant high density areas partially absorb health detrimental dynamics. Migrants in the United States, who live in a neighbourhood context with a high density of coethnics show significant better health outcomes than migrants living outside these contexts (Eschbach et al., 2004; Murillo, 2017). Especially in the context of mental health strong social ties and high social cohesion provided by coethnic groups alleviate levels of mental health.

6.1 Limitations

Even though a more complex instrument than self-rated health status has been used, bias in the outcome measure (SF-12) is still possible. The overall intercultural equivalence and validity of the physical and mental health scale is given to a certain degree, yet Differential Item Functioning for age, employment, education, gender or migrational status cannot be entirely discarded (Schulz, 2012). There is evidence for age effects, where older migrants tend to overemphasize the occurrence of pain than native Germans. Further it has been suggested that items of the psychometric measures of the SF-12 are vulnerable to a deficiency in discriminatory power. Bias on these measures can equally lead to an overestimation of mental health, since it can be assumed that the propensity to reveal information on mental health is not random and skewed along lines of migrational and cultural background (Rudmin et al., 2001; Fraine et al., 2009)

The analysis was restricted to cross-sectional pooled data, unobserved heterogeneity cannot be dismissed and causal inference cannot be made on a longitudinal basis, especially in the context of the healthy immigrant phenomenon, where the subsequent health decline represents a crucial feature of the effect.

Furthermore, it is possible, that effects can be biased due to the data structure. It cannot be ruled out that every household has the same probability to enter the panel and a general “middle class bias” can be anticipated (Becker, 2014).

Allen et al. (2007) find that health preventive behaviour especially diet worsens with every immigrant generation and attribute it to cultural assimilation, but it is strongly dependent on country of origin. Stratifying the present data along dimensions of countries of origin would decrease the respective sample size and compromise representativeness even further. Future research should entail a distinction especially between high and low GDP countries.

As already mentioned, the internal migrant identifier variable does not consider any distance. Individuals, who just moved within the city limits and individuals, who moved between federal states are equally captured, the health advantage is therefore biased and underestimated. Future research should consider to identify internal migrants more precisely.

7. Conclusion

In the present study I compared health outcomes of recent migrants (ysm $\leq$ 10) and non-recent migrants (ysm > 10) to native Germans and native Germans with internal migration experience using data from the German Socioeconomic Panel. Physical and mental health scales were computed from the SF-12 health questionnaire. Propensity score matching analysis revealed a Healthy Immigrant Effect (HIE) for physical health, where recent migrants show higher health outcomes than non-recent migrants and native Germans. Non-recent migrants stay statistically insignificant compared to native Germans, providing evidence for a health assimilation effect. In order to find more evidence for health selection the comparison group of native Germans was changed to native Germans with internal migration experience, representing a subsample of the German population. The change yielded a disappearance of statistically significant differences between both immigrant groups and the native German internal migrant group. The findings are in line with current research on health selection perspectives. Regarding mental health, recent and non-recent migrants stay significantly advantaged compared to either native German comparison groups. This finding implies stronger

selection on mental health, buffering effects of social networks or response bias in the outcome measure. Yet recent migrants show significantly higher mental health scores than non-recent migrants, what translates into a health decline. The provided evidence strengthens the perspective to promote sensibility among policy makers towards public health issues in the context of migration. The fact that the share of persons with migrational background in Germany amounts to 21 per cent (Statistisches Bundesamt, 2015), does not only represent a general relevance of migrant health in public health matters, but likewise in the light of demographic change and sustainability, it becomes more and more important to address health matters adequately.

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