The Effect of Urban-to-Rural Migration on Self-Perceived Health

Bachelor thesis

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Abstract

This study examines the effect of urban-to-rural migration on self-perceived health. Migration is considered a disruptive and stressful event, which can negatively affect one's health. The loss or gain of a social network can play a deciding role in if mental health will be affected positively or negatively. Studies point towards a 'healthy migrant effect', self-selection of people that already have better health outcomes to migrate. Migrating to a rural area could potentially have a positive effect on how people perceive their health. Rural areas are appreciated for their social and physical features that are believed to be beneficial for your health. Using data from the German Socio-Economic Panel (SOEP), the data is used to investigate for a healthy migrant effect. The self-perceived health of urban-to-rural migrants before migration takes place appears to be comparable to that of urban stayers, signifying no statistical proof for a healthy migrant effect. Two regression analyses are run to test for the impact of urban-to-rural migration on self-perceived physical and mental health, along with control variables. The results show no significant relationship between urban-to-rural migration and self-perceived mental health, possibly explainable by the loss or gain of a social support network which has opposing effects on mental health. The results of the regression analysis for self-perceived physical health and urban-to-rural migration approach significance and shows to have a positive effect on physical health. The results should be interpreted with caution, as methodological limitations of this study do not allow for this effect to be interpreted as causal.

Contents

1. Introduction

Migration is often considered to be a significant event in one's life that brings about a myriad of changes. Within the literature on migration and the effect this can have on a person, a body of research exists on mobility and the effect this can have on a person's health. Such studies often use the concept of self-perceived health. Self-perceived health can be defined as the subjective evaluation of an individual's health status. Based on their own experiences and views, it is a measurement of how a person sees their general physical and mental well-being (Bonner et al., 2017). It is frequently employed as a quick and accurate method to evaluate a person's health state and is frequently utilized in population health studies (Shields and Shooshtar, 2001). In terms of the effect of internal migration on a person's health, most of the existing research focuses on rural-to-urban mobility. Urbanisation is a global trend, and as countries start to develop the degree of rural-to-urban migration increases (Jedwab and Vollrath, 2015). As this is still a prominent migration pattern worldwide, it makes sense that much research is focussed on it. Some of the studies on migration and its impact on health include research on rural-to-urban migration in Indonesia, which showed to have an adverse effect on psychological health (Lu, 2010). Another example is the large mid-20th-century migration flow in the US from the Northern Great Plains to urban locations in the West, which is argued to have brought an elevated economic status for migrants at the cost of increased smoking and alcohol consumption (Johnson and Taylor, 2019). Counter-urbanisation is a process that has been identified in the Global North since the 1970s (Halfacree, 2009). Yet research on the effect of an urban-to-rural move on health is limited. Living in a rural area as opposed to an urban area is argued to be beneficial to a person's mental and physical health (Watkins and Jacoby, 2007). Rural areas are often perceived to be better for one's health, for example, living in rural areas decreases a person's stress and depression which will positively affect both their mental and physical health (Cox et al., 2017). As a person migrates to these rural areas, they might in time experience these health benefits, which would suggest an adaptation effect is in place (Kulu, 2005).

In recent light, the COVID-19 pandemic impacted lives in a copious amount of ways, among which internal migration patterns. Life course transitions that are associated with migration were delayed or could not follow a regular trajectory (Stawarz et al., 2022). Migration patterns seemed to favour migration towards rural areas and in many countries, there was spoken about a 'rural revival' (González-Leonardo et al., 2022). Housing preferences changed as more people started to desire detached houses in green environments (Dolls and Mehles, 2021). This may have enhanced the incentives for counter-urbanisation for reasons such as high housing and living costs in cities (Stawarz et al., 2020). Increased migration towards rural areas could change the health needs of the rural population as its size and composition changes. Understanding what the health outcomes of migration are for this new rural population allows for healthcare systems to be adapted accordingly if needed. This research adds to the existing body of literature on the effect of migration on health. Studying the relationship between health and migration is important because it can provide a greater comprehension of factors that impact the decision-making process of migration (Lu and Qin, 2014). As no research specifically considers urban-to-rural migration and its effect on self-perceived health in a European context, this research would fill a gap in the literature.

This research will aim to study if people who migrate from an urban settlement to a rural area experience a change in self-perceived health outcomes. The following research question will guide this research:

- What effect does urban-to-rural migration have on a person's self-perceived health status?

To answer this question the following sub-questions will be answered through the use of the theoretical framework:

- What effect does migration have on a person's health?
- What effect does living in a rural area have on a person's health?

After the introduction of the research problem and the background on the topic, the literature concerning the topic will be elaborated upon in the theoretical framework. A conceptual model will be introduced that illustrates the relationship between the main concepts that will be tested. Thereafter, the methodology section will introduce the dataset and variables that are used. An explanation will be given of how the data was analysed. The findings from the data analysis will be presented in the results section along with a discussion on how these relate to the theoretical framework. The conclusion will summarize the findings and answer the research questions that were put forward in the research problem. Limitations and implications of this study will be discussed in addition to avenues for future research.

2. Theoretical Framework

2.1 Literature review

2.1.1 Migration and health

When considering the effect migration has on health, different studies point towards different results. In the case of mental health, The gain or loss of social support system seems to be a crucial factor in whether the effect will be positive or negative. The potential loss of social support system can have an immediate impact on migrants' emotional well-being (Sluzki, 1992), as well as on their physical health (Záleská et al., 2014). However, when migration involves the reunion with kin, the adverse is the case and a positive association between migration and mental health is observed (Löbel and Jacobsen, 2021). Coping strategies and resilience play a significant role in determining how a migrant's mental health is affected by the stress and adjustments that are required of migration (Bhugra, 2004). The better this can be handled, the less negative impact there will be on mental health. The effects on physical health are less clear. The effects can differ significantly, both positively and negatively, both over time and among different individuals. This suggests that the outcomes of migration may vary greatly for different social groups (Sloan and Morrison, 2015). This can be attributed to the migrant selectivity that plays a part in who decides to move and who does not.

A theory on the selectivity of healthy migrants is the 'healthy migrant effect'. The healthy migrant effect states that migrants are favourably selected based on their pre-existing health status (Lu, 2008). This then gives the impression that migration has a positive effect and that migrants are healthier than the population of the receiving destination. The healthy migrant effect is mostly shown in terms of physical health, less is known about the healthy migrant effect on mental health (Stawarz et al., 2022) The majority of the research that documents this hypothesis focuses on international migration. Nonetheless, there is also research that proves the existence of the healthy migrant effect of internal migrants, some of which in the context of China (Lu and Qin, 2014; Tong and Piotrowski, 2012), the United Kingdom (Wallace and Kulu, 2013), and Germany (Holz, 2021). For internal migrants, the healthy migrant effect is hypothesized to not be notable as strongly. Sometimes even having a reverse effect and showing lower health outcomes as migrants with poor health migrate to areas with poorer health conditions (Green et al., 2015). The barriers to internal migration are generally considered to be less high than to international migration. Internal migrants face lower migration costs due to lower transportation expenses, the lack of legislative restrictions and anticipated discrimination, less severe social network loss, and less isolation (Van Hear et al., 2017). A study that compared internal migrants with European and non-European migrants in Germany found support for the healthy migrant effect in all three groups considering their physical health (Holz, 2021). The effect proved to be stronger for the international migrants than it was for the internal migrants. In terms of mental health, internal migrants showed to have lower health outcomes than non-migrating natives. Holz (2021)

theorizes there might be two possible explanations for these lower mental health outcomes. Either an 'unhealthy migrants effect' is in force for native Germans or the loss of a social support system deteriorates their health. Different forms of internal migration and different demographic characteristics can also lead to different health outcomes. Work-related internal migration in Germany was found to have an overall positive effect on physical and mental health after migration (Stawarz et al., 2022). When the impact of the educational level was taken into consideration, results started to differ based on educational classification. Highly educated movers their health was positively impacted, whereas lower-educated movers reported a decrease in health. Stawarz et al. argued that this might be related to an anticipatory effect of work-related migration where highly educated movers perceive migration as an opportunity and lower educated movers would feel forced to migrate.

Research on the effect of internal migration on various aspects of health largely focuses on rural-to-urban migration. Such as a study on the significant mid-century migratory flow in the United States from the Northern Great Plains to metropolitan areas in the West, which is believed to have boosted migrants' economic position at the expense of increasing smoking and alcohol intake (Johnson and Taylor, 2019). Another example is research on rural-urban migration in Indonesia, which found it to be detrimental to psychological health (Lu, 2010). Some studies do consider the effect of urban-to-rural migration on mental health, however, these include populations with a large share of individuals with predefined mental health disorders (Philo and Parr, 2004; Owoeye et al., 2011). These are therefore not representative of a general population. Urban-to-rural migration in China among older adults has been shown to have a positive effect on both self-rated physical and mental health after controlling for pre-migration and post-migration selection effects (Gao et al., 2020).

2.1.2 Rural areas and health

Urban-to-rural migration occurs throughout all different life course stages, even though it primarily has been associated with middle-aged or older age groups who favour amenity-rich areas (Stockdale and Catney, 2012). The COVID-19 pandemic caused a small increase in the occurrence of urban-to-rural migration which was witnessed among a wide variety of ages (González-Leonardo et al., 2022; Rowe et al., 2022). Rural areas attracted a wide variety of people and their reasons for making such a move also vary. One of the main attractive factors of rural areas is the quality of the environment (Bijker et al., 2012). The rural environment often gets described by migrants in terms that resemble the rural idyll: an image of rural environments being the ideal place to live and where life is quiet, healthier, happier, and where the sense of community is strong. The physical and social features that are associated with rural living make people think that living in these areas will result in a higher quality of life than if they were to live in an urban area (Watkins and Jacoby, 2007). This rural idyll thus works as an additional pull factor of rural areas next to a variety of housing and their affordability and personal reasons such as family, which work as pull factors for the decision to move to a specific rural area (Bijker et al., 2012).

This idea that rural living is better for your physical and mental health can be attributed to its physical and social features. The presence of physical features of nature in residential areas has proven to be linked to a decreased prevalence of stress and depression (Cox et al., 2017). The physical feature of 'fresh air' is considered one of the attractive factors of living in a rural area (Bijker et al., 2012). A cross-sectional study in Scotland found that people living in rural areas reported better self-reported respiratory health than their urban counterparts (Iversen et al., 2005). Living in a rural area provides more opportunities to interact and to be exposed to nature. Jimenez et al. (2021) provide an overview and review of cross-sectional studies that further investigate the relationship between nature exposure and health. They found evidence for improved blood pressure, psychological well-being, physical exercise, sleep, and cognitive performance when people increase their exposure to nature. The presence of green spaces is also partially related to the disparities in health between urban and rural areas, which are discovered in several research (Verheij et al., 2008).

The social features of the rural area include the sense of community that is generally believed to be prevalent among the inhabitants. The idea of the rural community and its strong local ties to family, friends, and neighbours that makes life better can be traced back to the concept of Gemeinschaft in the works of Tönnies (Tönnies, 1955 in Harper, 1989). In a community that resembles a gemeinschaft, social ties are stronger and people can rely on each other. The feeling of belonging to a community can have a positive effect on how people rate their own general and mental health (Michalski et al., 2020). The social connectedness can provide a sense of safety and security, having the knowledge that there are always people that are willing to help, positively affects how a person's mental health is perceived (Jackson et al., 2011).

Caution has to be taken when making generalizing statements about rural living being better for a person's physical and mental health. Although there is a variety of studies that point towards the benefits of living in a rural area, the diversity in rural settlements has to be acknowledged. Small and remote rural communities tend to experience worse health status than urban areas as a result of difficult access to health services (Monette, 2012). The prevalent health services can be insufficient and non-varied, hereby not meeting the specific needs of the community, creating healthcare inequalities between urban and rural areas (Douthit et al., 2015). Negative health outcomes in rural areas are also impacted by lower screening rates and delayed diagnoses for some health issues such as cancer (Smith et al., 2008). Furthermore, the community feeling does not apply to everyone living in rural areas. People can still feel isolated and lack a social support system. When this is the case, people in rural areas perceive their mental health more negatively (Jackson et al., 2011) and are at an even greater risk for mental health issues (Letvak, 2002).

2.2 Conceptual Model

The Conceptual model in Figure 1 is the visual representation of the relationships between the main concepts that have been discussed in the theoretical framework. The model shows the relationship between migration and health outcomes, which the literature has shown to have various effects and can be affected by the healthy migrant effect. The rural environment is added to the model to see if this has a moderating effect on the previously mentioned relationship. In the theoretical framework, it was explained that people find the rural environment an attractive place to live because of its physical and social features and therefore attracts internal migrants who are drawn in by the positive effects these features can possibly have on their health. Several control variables that will be used in the statistical analysis are added to the model to signify that these might have a mediating effect on health outcomes.

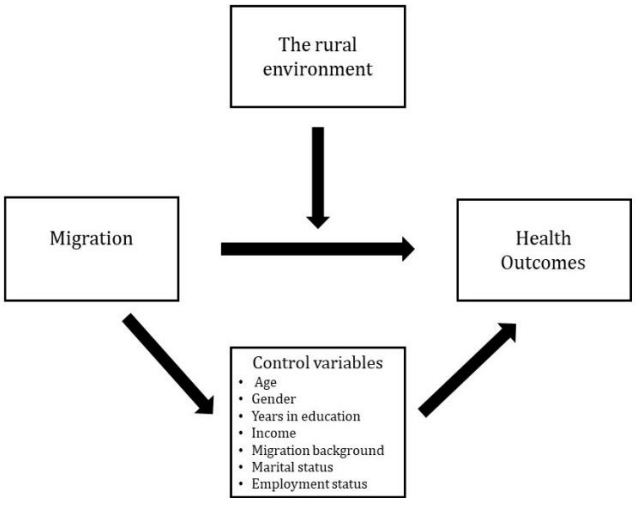

Figure 1: Conceptual Model

2.3 Hypotheses

Based on the literature the following hypotheses will be tested in this research:

- The people who migrate from urban to rural areas have a comparable health to those who decide to stay.
- The people who migrate from urban to rural will experience better health outcomes, based on research that shows a predominantly positive effect of living in rural areas on someone's health.

3. Methodology

3.1 Data

The data that was used for this study originates from the German Socio-Economic Panel (SOEP), conducted by the Deutsches Institut für Wirtschaftsforschung (DIW Berlin). The SOEP has been running since 1984 and has since then yearly surveyed individuals in private households on a diverse range of topics relating to the life course, making it suitable for longitudinal analysis. Over the years, the panel has consisted of about 30,000 participants from 15,000 households (Goebel et al., 2019). The SOEP uses multi-stage random probability sampling and the default method for data collection is face-to-face interviewing. The latest version of the data is the SOEP-Core v37eu dataset (SOEP, 2022). Since SOEP data consists of personal information, strong guidelines are in place to protect the data. The data is not widely accessible to just everyone, as the data is only allowed to be used for scientific purposes. Before accessing the data, an application has to be submitted for an agreement with DIW Berlin. To guarantee that applicants are affiliated with a research institution, a supervising professor has to apply for the data in the case that a student wants to use the data, which is the case for this bachelor thesis. Accessing the data means that the user will have to agree to uphold the data's secrecy and security. This entails that the data was handled according to the European Union's General Data Protection Regulation (GDPR).

3.2 Variables

SF-12v2 Health Survey

The dependent variable in this study is self-perceived health. This variable is represented by the SF-12v2 health survey, a shortened version of the SF-36 health survey, consisting of 12 questions that assess a person's health-related quality of life. There are two main dimensions: the Physical Component Summary Scale (PCS) for physical health, and the Mental Component Summary Scale (MCS) for mental health (Andersen et al., 2007). Both components exist out of several indicator variables, each of which is assigned its weight based on how accurately it measures the relevant concept. These components are converted to a continuous scale which results in a score from 0 to 100 where a higher score signifies better health, allowing the score to be treated as a continuous variable (Ware et al., 2002). The variable has been surveyed in the panel by-annually since the year 2002. The SF-12v2 has proven to be widely deployable and a reliable tool to assess a population's self-perceived health (Ruotolo et al., 2021; Shah et al., 2018; Udugampolage et al., 2021).

Migration

The main explanatory variable in this analysis is urban-to-rural migration. Since the SOEP does not contain such a variable, one had to be computed. The variable was computed through the use of a variable in the dataset that denounces what type of region a respondent is living in. The variable spatial category by BBSR (Federal Institute for Building, Urban and Spatial Research) makes the distinction between urban and rural regions (BBSR, n.d.). It has to be noted here that using the spatial categorization by the BBSR gives quite a dichotomous view of what is considered

urban and rural, as it does not allow for the recognition of diversity that exists within what is considered urban or rural. Since the SOEP is a longitudinal survey, the data allows us to tell when a person has moved, and in combination with the change in spatial category, what region they moved to. This way a variable was computed that includes the cases for which an urban-to-rural move was made. These urban-to-rural migrants are compared to a group for which the spatial category remained urban over the two years, the urban stayers.

Control Variables

Several control variables are used in the analysis to enhance the validity as self-perceived health can be influenced by several key factors and demographic characteristics (Shields and Shooshtar, 2001).

- Age: As people age, they are more likely to encounter problems with their health and thus rate their health lower. For this reason, the ages of respondents in the year migration would have taken place were transformed into a categorical variable as the effect of age might be different per life stage. The youngest age category of 18-24 is used as the reference category.
- Gender: The data only allowed for distinguishment between individuals identifying as male and female. Male is being used as the reference category.
- Years in education: Education is measured in the amount of years that an individual has attended education at the time of the completion of the survey. The amount of years is based on the type of degree a person holds. The values range from 7, indicating primary education, to 18, indicating university education.
- Income: Income is measured on the household level and contains the current monthly net household income in euros.
- Migration background: The cases are divided into 3 different categories: no migration background, indirect migration background, and direct migration background. A direct migration background was assigned to individuals who were not born in Germany and an indirect migration background to individuals who have a parent with a direct migration background. No migration background functions as the reference category.
- Marital status: The cases are divided into 5 different categories: married, single, divorced, widowed and separated. The reference category is marital status married.
- Employment status: The cases are divided into 5 different categories: employed, unemployed, retired, in school/training, and active in another way (e.g. unpaid labour or military service). The reference category is employment status employed.

3.3 Selection of cases

Data from the years 2010 and 2012 was used for this research. Two consecutive years were not an option since the SF-12v2 is only conducted bi-annually. For the years 2010 and 2012, all relevant variables were included in the SOEP-Core survey and had the highest total number of responses. The cases where spatial category remained urban over the two years were selected as the urban stayers, and the cases where spatial category changed from urban to rural were selected as the urban-to-rural migrants. Only individuals aged 18 to 64 are considered in the analysis, as children generally do not decide if and where they move to, and the elderly might move because of health or care reasons. Any cases where a relevant variable had a non-valid result or a missing value were excluded from the sample. After these selection steps had taken place, the initial dataset containing over 150 000 cases was reduced to 9061 cases that fulfilled the criteria. For an overview of the descriptive statistics of these cases, see Appendix A.

3.4 Data analysis

The data were analysed using the statistical software IBM SPSS 28. The first step in the data analysis was to take potential selection bias into account and test for the healthy migrant effect. To do this the health of urban-to-rural migrants was compared to the health of urban stayers. Several studies on migration and its impact on health advocate this method because it takes into consideration any pre-existing differences between migrants and non-migrants, therefore any relationship that will be shown is considered more valid (Lu, 2010; Stillman et al.,2009). A two-sample t-test was performed to test if there is a significant difference between the mean score on the SF-12v2 of those who plan to migrate from urban to rural and those in the urban area who do not migrate. The main statistical analysis for this research consists of two multiple linear regressions. In these regressions, the PCS and MCS from the SF-12v2 act as the dependent variables. The decision to use the PCS and MCS as separate variables for the analysis was made because the literature suggests that the types of self-perceived health might be impacted differently by migration. Using them combined might give a false indication that both are impacted in the same way and to the same degree. The main independent variable in both analyses was urban-to-rural migration. The other independent variables were added to the model with the primary function to act as control variables.

4. Results

4.1 Two sample t-test

Table 1 shows the descriptive statistics that are associated with the two-sample t-test. As can be conducted from Table 1 and Figure 2, the mean score for the SF-12v2 for both urban-to-rural migrants and urban stayers is comparable, with urban stayers even scoring slightly higher than urban-to-rural migrants. Table 2 shows the results of the two sample t-test that was performed in order to establish whether a healthy migrant effect was in force in the data that was used. For full results of the two sample t-test, see appendix B. The corresponding null hypothesis for this test is phrased as follows: “In the population, the mean score for the SF-12vs of urban-to-rural migrants is equal to that of urban stayers”. The results are interpreted with the assumption of equal variances. The p-value for the Levene’s test is 0.731, which means that the test results are not significant and therefore it is assumed that variances are equal. This was already expected when considering the distribution of the data in the boxplot in Figure 2. For the results of the two-sample t-test, the significance of the two-sided p-value is considered, since the goal of the test is to establish whether the means are equal or not. Taking into account the p-value of 0.441, the two-sample t-test proves to not be significant. The null hypothesis stating that the mean score is equal is therefore not rejected. Based on these results there is no statistical proof that in the sample the health of urban-to-rural migrants is different to that of urban stayers, which means that there is no proof that selection plays a role and a healthy migrant effect is in force. This observation supports the proposition made in the theoretical framework that the healthy migrant effect may not apply to internal migration due to lower migration costs within the same country. Internal migrants are likely to face fewer barriers to migration such as different healthcare/administrative systems, language barriers, less severe social network loss, and less isolation (Van Hear et al., 2017). This means that they have to take fewer factors into account in their decision-making process and therefore put less emphasis on the need to be in an overall good health condition. Since there is no statistically significant proof for pre-existing health differences between the health of the urban-to-rural migrants and urban stayers in the sample, the following results of the regression analysis testing the effect of urban-to-rural migration on physical and mental health can be interpreted with more validity (Lu, 2010; Stillman et al.,2009).

Table 1: Descriptive statistics two-sample t-test

Groups migration	N	Mean	Std. deviation	Std. error mean
Urban stayers	8895	50.7647	6.68883	0.07092
Urban-to-rural migrants	116	50.3608	6.55392	0.50868

Table 2: Results two-sample t-test

	Levene's test		T-test for equality of means			
	F	**Sig.**	**t**	**One-sided p**	**Two-sided p**	**Mean difference**
Equal variances assumed	0.118	0.731	0.771	0.220	0.441	0.40385
Equal variances not assumed			0.786	0.216	0.433	0.40385

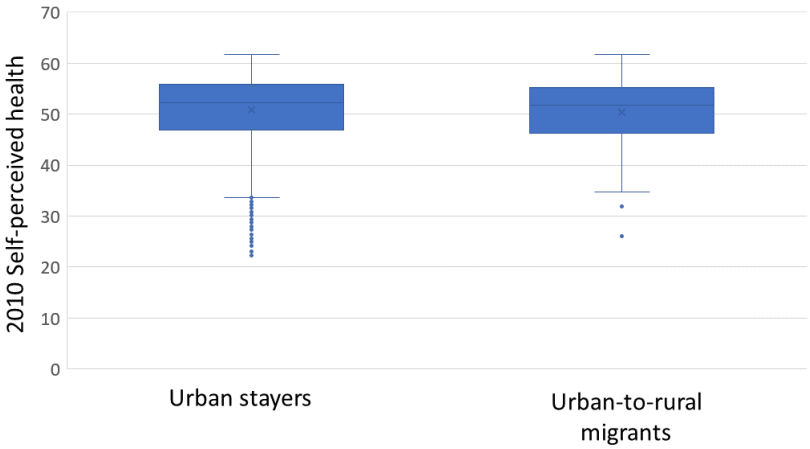

Figure 2: Boxplot comparing mean score SF-12v2 urban stayers and urban-to-rural migrants

4.2 Regression Mental Summary Scale

The first regression analysis considers the effect of urban-to-rural migration and the control variables on self-perceived mental health. As can be told from Table 3, the model showed no issues with multicollinearity as all variables show a tolerance that is at least >0.2 and a VIF<5. The model proved to be significant at a 95% confidence level with a p-value that is <0.001. The associated R squared for this regression is 3.9%, which can be considered quite low and thus indicates that the model does not hold a lot of explanatory power. For full results of the regression, see Appendix C.

The variables that are significant at α=0.05 are age in the categories 25-34, 35-44, 45-54, gender, employment status unemployed, employment status retired, income, and all categories in marital status. The main independent variable in this research, urban-to-rural migration, proved not to be significant as it has a p-value of 0.895. A possible explanation for this could be the various effects migration can have on mental health as discussed in the theoretical framework. The potential loss or gain of a social support network has been identified by multiple studies as a determining factor in the effect of migration on mental health (Chadwick and Collins, 2015; Löbel and Jacobsen, 2021; Sluzki, 1992). It is probable that migration meant a loss of a support network for some and a gain in support network for others. This is related to a limitation in the methodology, as there is for example no data on the distance of the moves. A move to a rural area from a nearby city is likely to have a less severe impact on the social network than a move to a rural area across the country. Also, the diversity in rural communities where migrants might have ended up could have different effects. As Jackson et al. (2011) concluded in their research, people in rural areas do not always experience this sense of a tight-knit community for which rural areas often get idealized, they can also experience adverse effects due to isolation. This would have meant that self-perceived mental health was affected differently for different people. With the way

this research was designed, only the short-term effects of migrating to a rural area on mental health can be considered. As migration itself is considered a stress-inducing event that causes a variety of changes, it is likely that this impacts mental health negatively during and shortly after the migration process (Bhugra, 2004). This theory reflects the results of the study by Stawarz et al. (2022) on work-related internal migration. They found mental health was negatively impacted by migration in the time before and shortly after migration had taken place, but this effect turned positive as time after migration progressed. As time progresses, people have had more time to cope with changes and adapt to the new environment, allowing room for the positive impacts of migration on mental health to take place.

Table 3: Results regression analysis MCS

	B	t	Sig.	Tolerance	VIF
Urban-to-rural migration (reference: urban-stayers)	-0.100	-0.132	0.895	0.994	1.006
Age (reference: 18-24)					
25-34	-1.292	-2.864	0.004	0.363	2.757
35-44	-1.635	-3.478	<0.001	0.266	3.765
45-54	-1.145	-2.402	0.016	0.227	4.399
55-64	0.748	-1.490	0.136	0.230	4.344
Gender (reference: male)	-1.147	-5.551	<0.001	0.970	1.031
Employment status (reference: employed)					
Unemployed	-2.024	-6.774	<0.001	0.846	1.182
In school/training	-.547	-0.780	0.435	0.844	1.185
Retired	2.167	2.714	0.007	0.915	1.093
Not employed but active in other way	-0.249	-0.398	0.691	0.963	1.038
Income	0.000	8.345	<0.001	0.810	1.234
Education number of years	-0.014	-0.358	0.720	0.790	1.266
Marital status (reference: married)					
Separated	-3.239	-5.415	<0.001	0.968	1.033
Single	-1.068	-3.495	<0.001	0.570	1.753
Divorced	-0.967	-2.676	0.007	0.904	1.106
Widowed	-2.606	-3.602	<0.001	0.943	1.060
Migration background (reference: no migration background)					
Direct migration background	0.118	0.367	0.714	0.917	1.091
Indirect migration background	-0.108	-0.237	0.812	0.946	1.057

4.3 Regression Physical Summary Scale

The second regression analysis considers the effect of urban-to-rural migration and the control variables on self-perceived physical health. Since the same variables are used as for the first regression for self-perceived mental health, this model also showed no issues with multicollinearity as all variables have the same values for tolerance and VIF. The model proved to be significant at a 95% confidence level with a p-value that is 0.000. The associated R squared for this regression is 18.9%, which is significantly higher than the R squared of the previous regression of 3.9%. This means that this model holds more explanatory power and is thus better able to explain the effect of the independent variables on self-perceived physical health. For full results of this regression, see Appendix D.

The variables that are significant at α=0.05 are age in all categories, employment status unemployed, retired, and not employed but active in another way, income, education, and marital status divorced, see Table 4. Age shows a clear relationship with a deterioration of self-perceived physical health. Every age category shows a higher t-statistic than the one before and a stronger negative effect. As age progresses, physical health tends to decline, so this relationship was

expected to show up in the results. In contrast to the regression analysis on mental health, the physical health shows to be negatively affected when employment status is retired. An explanation for this could be that retired people also tend to be older and thus suffer more health problems. Years spent in education has a positive effect on self-perceived physical health. This is consistent with the results of the research by Stawarz et al. (2022) where highly educated internal migrants perceived their physical health to be positively impacted by migration. Again the main independent variable in this research, urban-to-rural migration, proved not to be significant if taking a 95% confidence interval into account, as the p-value is 0,105. However, compared to the regression analysis on the MCS, this variable does approach significance at a 95% confidence level and therefore will be considered as a relationship worth exploring. The value of the B coefficient of 1,059 tells us that urban-to-rural migration, as compared to staying in an urban area, has a positive effect on physical health. Since there was no statistically significant difference in self-perceived health prior to migration between migrants and stayers, this effect is not caused by self-selection to migrate by already healthier individuals, like in the research by Holz (2021). The change occurred during or after the migration has taken place. An explanation for this could be the physical and social features of the rural area that positively contribute to physical health as discussed in the theoretical framework. These features often act as pull factors for migrants (Bijker et al., 2012). Living in a rural area exposes people to more nature and green spaces which are proven to have beneficial effects on physical health (Jimenez et al., 2021). Having natural elements near the place of residence decreases anxiety and stress (Cox et al., 2017), which has a positive effect on physical health (Larzelere and Jones, 2008). Whether this is a causal effect can however not be concluded, due to the type of statistical tests that have been run.

Table 4: Results regression analysis PCS

	B	t	Sig.	Tolerance	VIF
Urban-to-rural migration (reference: urban-stayers)	1.059	1.622	0.105	0.994	1.006
Age (reference: 18-24)					
25-34	-1.991	-5.133	<0.001	0.363	2.757
35-44	-4.097	-10.132	<0.001	0.266	3.765
45-54	-6.879	-16.781	<0.001	0.227	4.399
55-64	-8.886	-20.579	<0.001	0.230	4.344
Gender (reference: male)	-0.304	-1.709	0.088	0.970	1.031
Employment status (reference: employed)					
Unemployed	-3.771	-14.675	<.001	0.846	1.182
In school/training	0.207	0.344	0.731	0.844	1.185
Retired	-1.683	-2.451	0.014	0.915	1.093
Not employed but active in other way	-2.176	-4.038	<.001	0.963	1.038
Income	0.000	6.392	<.001	0.810	1.234
Education number of years	0.453	13.029	<.001	0.790	1.266
Marital status (reference: married)					
Separated	0.820	1.593	0.111	0.968	1.033
Single	-0.231	-0.879	0.380	0.570	1.753
Divorced	-0.752	-2.417	0.016	0.904	1.106
Widowed	1.185	1.904	0.057	0.943	1.060
Migration background (reference: no migration background)					
Direct migration background	0.367	1.331	0.183	0.917	1.091
Indirect migration background	0.083	0.211	0.833	0.946	1.057

5. Conclusion

This study investigated the relationship between migration and health and in particular the effect of urban-to-rural migration on self-perceived health. Regarding the effects of migration on health, various studies show different results. The impact on mental health seems to greatly depend on whether a social support system is lost or gained by migrating. The impact on physical health change over time and vary from person to person. A possible explanation for this could be the healthy migrant effect, which contends that migrants are frequently self-selected based on their health status, creating the appearance that migration improves health. Rural areas are perceived as environments with certain physical and social features that will make for a happier, healthier, and more community-focused life. Those living in rural areas surrounded by more nature tend to have better health outcomes, including lower levels of stress and depression. In rural regions, the feeling of community fosters social connection, safety, and support, all of which have a favourable impact on mental health. However, it is important to note that not all rural areas offer the same health benefits, which can lead to healthcare inequalities and isolation.

The results of this research indicate that there is no selection or a healthy migrant effect in the sample. Mean scores for the SF-12v2 in the two-sample t-test between urban-to-rural migrants and urban stayers are comparable, which suggests that there is no difference in self-perceived health status. This is in line with research that suggests the migration costs are lower for internal migrants (Van Hear et al., 2017), which could weaken the healthy migrant effect. The results contrasts research by Holz (2021) and Saarela and Finnäs (2008) who did find a selection effect for internal migrants. The regression analysis on the mental summary scale shows a significant model but with low explanatory power, and migration from urban to rural areas does not appear to be a significant factor. This lack of significance may be attributed to the different ways in which mental health may be impacted by migration, such as the possible loss or gain of social support networks, which might vary based on the size and variety of rural communities and the time that has passed since migration. The regression analysis on the physical summary scale shows a significant model with a higher explanatory power. Other factors that proved to be significant were age, income, education, marital status, and employment status. In this model urban-to-rural migration approached significance, indicating that it does affect self-perceived physical health. This result corresponds with research by Gao et al. (2020). The theoretical framework offers explanations for the possible advantages of rural life for physical health, including exposure to greenery and nature, which lessen stress and anxiety. However, due to the limits of the carried out statistical analyses, the causation of this impact cannot be confirmed as other factors might be at play.

Evaluating some of the findings in this study is difficult due to some of the limitations in methodology and the variables that were used. Some of the limitations related to variables are related to the migration variable that was computed. Using the spatial category distinction between urban and rural areas by the BBSR does not recognise the diversity in urban and rural areas that potentially could have impacted the relationship between migration and health differently. Also, the distance covered in the move is not known. The reason for migration is also unknown. The literature suggest that different reasons for migration could impact health after migration differently (Stawarz et al., 2022). The same counts for differences in demographic groups (Sloan and Morrison, 2015), which was not accounted for in this research. Making the distinction between reason for migration or demographic group could be an interesting approach to take in future research. Methodological limitations rest on the types of statistical tests that were performed. These tests consider the average effects of migration on health, there is no distinction between the short-term and long-term effects. Furthermore, since panel data was used, a fixed effect model would have been a more suitable type of testing. This would have controlled for unobserved heterogeneity in characteristics in the data. Future research on this topic could take the aforementioned methodological limitations into account. If such a research detects the same

effects, a follow-up study using qualitative methods could be an interesting avenue for research. This would allow for more in-depth knowledge to be uncovered on how urban-to-rural migration can affect self-perceived physical and mental health.

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Appendices

Appendix A: Descriptive statistics of all variables used (SOEP wave 2010)

	Urban-to-rural migrants *N=166*	**Urban stayers** *N=8895*
SF-12v2 health score	50.60 (6.35)	50.42 (6.72)
MCS	49.09 (10.14)	49.97 (9.84)
PCS	52.11 (9.78	51.04 (9.20)
Age	43.53 (13.39)	45.47 (12.62)
18-24 (%)	11.4	9.9
25-34 (%)	23.5	16.6
35-44 (%)	19.3	22.8
45-54 (%)	25.3	27.6
55-64 (%)	20.5	23.1
Gender (%)		
Female	51.8	53.7
Male	48.2	46.3
Employment status (%)		
Employed	66.9	76.7
Unemployed	24.7	16.1
In school/training	4.2	2.5
Retired	1.8	1.8
Active in another way	2.4	2.8
Household income	2720.39 (1801.13)	3294.79 (2283.29)
Years in education	13.13 (2.88)	12.76 (2.82)
Marital status (%)		
Married	43.3	59.2
Single	34.9	26.0
Divorced	16.3	9.5
Separated	3.0	3.1
Widowed	2.4	2.1
Migration background (%)		
No migration background	87.3	81.9
Direct migration background	7.2	12.6
Indirect migration background	5.4	5.6

For continuous variables the means are presented and the standard deviation are placed in parenthesis, categorical variables are shown in percentages

Appendix B: Full SPSS results two sample t-test

Group Statistics

	Groups Migration	N	Mean	Std. Deviation	Std. Error Mean
2010 Self perceived health	Urban stayers	8895	50,7647	6,68883	,07092
	Urban-to-rural migrants	166	50,3608	6,55392	,50868

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
2010 Self perceived health	Equal variances assumed	,118	,731	,771	9059	,220	,441	,40385	,52379	-,62289	1,43059
	Equal variances not assumed			,786	171,476	,216	,433	,40385	,51360	-,60995	1,41765

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
2010 Self perceived health	Cohen's d	6,68640	,060	-,093	,214
	Hedges' correction	6,68695	,060	-,093	,214
	Glass's delta	6,55392	,062	-,092	,215

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

Appendix C: Full SPSS results regression MCS

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,196[a]	,039	,037	9,65986

a. Predictors: (Constant), migback=[3] indirect migration background, migration=2.0, Separated, Not employed but active in other way, Gender (1=fem), Retired, In schoolt/training, Education Number of Years , Divorced, 35-44, Widowed, migback=[2] direct migration background, Unemployed, 25-34, Income, Single, 55-64, 45-54

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33808,234	18	1878,235	20,128	<,001[b]
	Residual	843735,583	9042	93,313		
	Total	877543,817	9060			

a. Dependent Variable: MCS: Summary Scale Mental (NBS)

b. Predictors: (Constant), migback=[3] indirect migration background, migration=2.0, Separated, Not employed but active in other way, Gender (1=fem), Retired, In schoolt/training, Education Number of Years , Divorced, 35-44, Widowed, migback=[2] direct migration background, Unemployed, 25-34, Income, Single, 55-64, 45-54

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	50,784	,658		77,217	,000		
	migration=2.0	-,100	,759	-,001	-,132	,895	,994	1,006
	25-34	-1,292	,451	-,049	-2,864	,004	,363	2,757
	35-44	-1,635	,470	-,070	-3,478	<,001	,266	3,765
	45-54	-1,145	,477	-,052	-2,402	,016	,227	4,399
	55-64	,748	,502	,032	1,490	,136	,230	4,344
	Gender (1=fem)	-1,147	,207	-,058	-5,551	<,001	,970	1,031
	Unemployed	-2,024	,299	-,076	-6,774	<,001	,846	1,182
	In schoolt/training	-,547	,701	-,009	-,780	,435	,844	1,185
	Retired	2,167	,798	,029	2,714	,007	,915	1,093
	Not employed but active in other way	-,249	,626	-,004	-,398	,691	,963	1,038
	Income	,000	,000	,096	8,345	<,001	,810	1,234
	Education Number of Years	-,014	,040	-,004	-,358	,720	,790	1,266
	Separated	-3,239	,598	-,057	-5,415	<,001	,968	1,033
	Single	-1,068	,306	-,048	-3,495	<,001	,570	1,753
	Divorced	-,967	,361	-,029	-2,676	,007	,904	1,106
	Widowed	-2,606	,724	-,038	-3,602	<,001	,943	1,060
	migback=[2] direct migration background	,118	,321	,004	,367	,714	,917	1,091
	migback=[3] indirect migration background	-,108	,456	-,003	-,237	,812	,946	1,057

a. Dependent Variable: MCS: Summary Scale Mental (NBS)

Appendix D: Full SPSS Results regression PCS

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,435[a]	,189	,187	8,30890

a. Predictors: (Constant), migback=[3] indirect migration background, migration=2.0, Separated, Not employed but active in other way, Gender (1=fem), Retired, In schoolt/training, Education Number of Years , Divorced, 35-44, Widowed, migback=[2] direct migration background, Unemployed, 25-34, Income, Single, 55-64, 45-54

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145284,152	18	8071,342	116,912	,000[b]
	Residual	624239,956	9042	69,038		
	Total	769524,108	9060			

a. Dependent Variable: PCS: Summary Scale Physical (NBS)

b. Predictors: (Constant), migback=[3] indirect migration background, migration=2.0, Separated, Not employed but active in other way, Gender (1=fem), Retired, In schoolt/training, Education Number of Years , Divorced, 35-44, Widowed, migback=[2] direct migration background, Unemployed, 25-34, Income, Single, 55-64, 45-54

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	50,463	,566		89,204	,000		
	migration=2.0	1,059	,653	,015	1,622	,105	,994	1,006
	25-34	-1,991	,388	-,081	-5,133	<,001	,363	2,757
	35-44	-4,097	,404	-,186	-10,132	<,001	,266	3,765
	45-54	-6,879	,410	-,333	-16,781	<,001	,227	4,399
	55-64	-8,886	,432	-,406	-20,579	<,001	,230	4,344
	Gender (1=fem)	-,304	,178	-,016	-1,709	,088	,970	1,031
	Unemployed	-3,771	,257	-,151	-14,675	<,001	,846	1,182
	In schoolt/training	,207	,603	,004	,344	,731	,844	1,185
	Retired	-1,683	,687	-,024	-2,451	,014	,915	1,093
	Not employed but active in other way	-2,176	,539	-,039	-4,038	<,001	,963	1,038
	Income	,000	,000	,067	6,392	<,001	,810	1,234
	Education Number of Years	,453	,035	,139	13,029	<,001	,790	1,266
	Separated	,820	,515	,015	1,593	,111	,968	1,033
	Single	-,231	,263	-,011	-,879	,380	,570	1,753
	Divorced	-,752	,311	-,024	-2,417	,016	,904	1,106
	Widowed	1,185	,622	,019	1,904	,057	,943	1,060
	migback=[2] direct migration background	,367	,276	,013	1,331	,183	,917	1,091
	migback=[3] indirect migration background	,083	,392	,002	,211	,833	,946	1,057

a. Dependent Variable: PCS: Summary Scale Physical (NBS)