

## For better or for worse mental health in old age: Exogamy in Germany

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### Abstract

In later life, social ties become increasingly important for one's mental health. In this study, we test whether exogamous unions are beneficial to the mental health of older immigrants and natives (60+), through the pathway of gaining or losing local social ties through their native or non-native spouse. First, we examine the characteristics of exogamous natives and immigrants to control for selection effects. Next, we analyze the social networks of endogamous and exogamous individuals. We use random effects and correlated random effects models to measure the extent to which social networks play a role in older individuals' mental health. Results show that exogamous immigrants fare better than endogamous immigrants mostly due to selection effects. Endogamous natives remain to be most advantaged for both men and women. Exogamous native women have significantly lower mental health than their endogamous counterparts, while we observe no differences among native men of different union types. Social network influences mental health, but does not fully explain the mental health gap among the groups. This work serves to enrich the discussion on the role family and the diversification of union type play in mental health in older ages.

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## **1 Introduction**

In rapidly aging and increasingly transnational societies across the Western world, mental health and wellbeing of older immigrants have become topics of growing importance. As the number of older foreign-born individuals surge in countries that have previously seen little diversity among the older population, ensuring parity of mental health between natives and immigrants is a vital step toward a healthier and inclusive society. The mental health of older immigrants can be of research interest for two main reasons. On the one hand, it is an issue with practical implications for policymakers, who can benefit from insights regarding the needs and coping strategies of age-related issues for older adults of immigrant background. On the other hand, the unique circumstances under which individuals of immigrant background age might elucidate some of the theoretical concerns of researchers on the mechanisms behind mental health and the aging process.

Findings on the health status of older immigrants versus non-immigrants have been contradictory, some of which pointing to an immigrant health advantage while others suggest a disadvantage (Carnein, Milewski, Doblhammer, & Nusselder, 2015; de Valk, Fokkema, & Apt, 2018; Kristiansen, Razum, Tezcan-Güntekin, & Krasnik, 2016; Reus-Pons, Mulder, Kibele, & Janssen, 2018). As foreign-born individuals in Europe have only recently aged into near-retirement age in significant numbers, quantitative analyses on the well-being and mental health of older immigrants have remained limited (Reus-Pons et al., 2018). In general, researchers point to different contextual risk factors for immigrants and natives, rather than provide a clear answer as to where immigrants stand in comparison to natives in health-related issues (Kristiansen et al., 2016). We draw from a larger body of research on the aging processes of all individuals in general, which highlights the importance of frequent social contacts on mental health for older adults (Cramm, van Dijk, & Nieboer, 2013; Han, Kim, & Burr, 2019; Stokes & Moorman, 2018), and target a specific challenge that immigrants face: having limited social networks in their destination country.

One possible moderator of the immigrant disadvantage in smaller family networks is intermarriage or the formation of long-term union with non-immigrants of the destination country. Inter-group or interethnic partnering is on the rise in most Western European countries (Lanzieri, 2012). Domestic partnership can serve as an extension to one's social network, by introducing new friends and family members in closer proximity, which may be beneficial to one's wellbeing, particularly at older ages. At the same time, having older family members nearby who potentially require care may also negatively influence one's mental health (Schmitz & Westphal, 2015).

To examine the role social network plays in the mental health of immigrants aging in the destination country, we analyze the mental health of older natives and immigrants in Germany, in either endogamous or exogamous union using the German Socio-economic Panel (GSOEP). We seek to answer whether social networks mediate the relationship between mental health and migration status. To account for compositional differences among the groups and to isolate the effect of social network expansion, gained through having a native spouse, we first check whether there are selection effects into exogamy. Then, we look at the differences in friends and family network among the groups and the roles they play for older individuals' mental health. This study seeks to contribute to pinning down the underlying mechanisms behind immigrants' mental health at older ages.

## **2 Background**

## 2.1 Exogamy, social network, and mental health

European societies are simultaneously graying and rapidly diversifying due to population aging and increasing mobility across borders as a result of EU enlargement, economic inequalities, and conflicts. Although the propensity to move across borders tends to be negatively associated with age (Mulder, 2003), many immigrants who have moved in their earlier days for work or family related reasons have adopted their new home and have chosen to stay in the destination country (Yahirun, 2014), leading to the diversification of the older population. Despite a sizable amount of return migration of transitory migrants (Dustmann & Weiss, 2007), the older immigrant population has risen steadily in most European countries in the past decade, with the number of foreign-born aged 65 and above increase from roughly 1.4 million to 1.8 million in France from 2009 to 2018, and 805,292 to 992,077 in the United Kingdom in the same years (Eurostat, 2019). Quantitative research on the mental health of this heterogeneous population has been limited.

Regular social engagement with friends and family is essential to mental health for people of all ages (House, Landis, & Umberson, 1988), but the relationship of the two intensifies near retirement age or empty nest (Cattan, White, Bond, & Learmouth, 2005) due to the reshuffling of balance toward personal life, as work and child rearing obligations subside. A plethora of studies point to the essential role frequent social interactions play in well-being for older adults (Hank, 2007), often measured by loneliness (e.g. Burholt, Dobbs, & Victor, 2018; Cattan et al., 2005; Dahlberg, Andersson, & Lennartsson, 2018; Dahlberg, Andersson, McKee, & Lennartsson, 2015) or mental health (e.g. Milewski & Doblhammer, 2014; Stokes & Moorman, 2018).

Married or partnered individuals have better mental health in old-age compared to their single counterparts (Cramm et al., 2013; Dahlberg et al., 2015), particularly those who enjoy high quality spousal relationship (Stokes & Moorman, 2018), but relationships outside of the couple are shown to be vital. Frequent interaction with good friends is highly beneficial to one's well-being (Han et al., 2019) and a heterogeneous network which includes both kin and friends particularly offers a premium over kin-only networks (Dykstra, 1990). Due to a higher tendency to lose contact with friends rather than family with time, the weight of social network shifts towards family as individuals advance in age (Shaw, Krause, Liang, & Bennett, 2007). Of all family relationships, parents, siblings and children are particularly considered indispensable core family members (Komter & Vollebergh, 2002).

Immigrants, like non-immigrants, form ties of varying strength through their neighborhood, religious organizations (Carnein et al., 2015), and other social environments from which they receive informational and instrumental support (Ryan, 2007). Family network, however, is likely to differ substantially between immigrants and natives, due to the event of migration which often entails separation among nuclear, and especially extended, family members. Bearing the above, immigrants who age in the destination country are less likely to enjoy the full extent of their family network, as some members are likely to have remained in, or perhaps even return-migrated to, the origin country. Since geographic proximity is crucial to exchanging physical support (Mulder, 2018), and the lack of physical support might indirectly harm mental health as a result of poor physical health, proximity to family members remains pertinent to mental health through both direct and indirect pathways. This immigrant-particular issue can be potentially moderated by exogamous union with a native of the destination country who then serves as a bridge to local networks.

However, two potential issues can arise from exogamous unions. First, research has shown that exogamous unions are more prone to conflict and dissolution (Milewski & Kulu, 2014; Saarela & Finnäs, 2018), e.g., because exogamous union might be characterized by less homogamy than endogamous unions. This might have a negative impact in mental health. On the other hand, while exogamous natives tend to experience a strain on mental health, exogamous immigrants experience a gain, pointing to a possibility that the gain stems from the benefit of social capital provided by the native spouse (Milewski & Gawron, 2019). Considering that most older people of migration background are unlikely to have only recently formed union, we can assume that they have “survived” the initial years of potential conflicts found to be common in mixed marriages (Saarela & Finnäs, 2018). Therefore, conflict as a negative mediator between older adults’ mental health and exogamy can be reasonably considered modest, while the gain or loss of social capital should be increasingly felt in old age.

Second, not all family ties are wanted, or bring happiness (Birditt, Hartnett, Fingerman, Zarit, & Antonucci, 2015; Mulder, 2018), which may conflict the direction of their effect toward mental health. One important distinction to be made is whether the kin living nearby is older or younger, or specifically, parents or children. The intergenerational stake hypothesis stipulates that people tend to be more attached to their children than to their parents (Birditt et al., 2015). Having the former nearby is likely to have a more positive effect on one’s mental health than having the latter in close proximity. Moreover, if the older kin requires physical or emotional care, the frequency and intensity of such care is likely to be positively correlated with the closeness of relations and distance between the two kin, while it strains the caretaker’s own mental health (Schmitz & Westphal, 2015; Uccheddu, Gauthier, Steverink, & Emery, 2019). Therefore, the life stage of the kin nearby should be taken into consideration in its influence on mental health.

## **2.2 Immigrant mental health advantage or disadvantage?**

Past research has shown that although immigrants fare better than stayers in their countries of origin (Baykara-Krumme & Platt, 2018), they generally have poorer mental health compared to natives of the destination country (Levecque & Rossem, 2015; Malmusi, 2015; Milewski & Doblhammer, 2014; Sand & Gruber, 2018). Few have explored the degree to which social contacts, especially the availability of kin, mediates the effect of immigrant status on mental health. Family relationships are often characterized by mutual physical and emotional support across societies, but they might be especially intimately connected to one’s inner well-being for those whose culture heavily emphasizes family solidarity (Kagitcibasi, 2017; Mair, 2013) and collectivism (Burholt et al., 2018). The availability of ties among non-coresidential family members are often neglected in the intersection of migration and health literature.

In the attempt to quantify the health disadvantage of older immigrants, a challenge invariably arises: the salmon bias. If unhealthy or aging immigrants reliably return to their own country of origin to live out the remainder of their lives, calculation from the destination country-perspective can render them “statistically immortal” (Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). Studies in the US found that despite being generally poorer and less educated, the Hispanic population had an overall lower mortality rate than the rest of the population, due to the tendency of older and sicker immigrants to return to their origin (ibid.). There is also evidence in Europe that less successful immigrants are more prone to return to their country of origin in old age (Yahirun, 2014) and this phenomenon partly explains the lower

mortality of Turkish-origin individuals in Germany compared to ethnic Germans (Razum, Zeeb, Akgün, & Yilmaz, 1998). This consideration is generally less given in mental health studies on immigrants, but may play a role in the underestimation of immigrant mental health issues, as poorer general physical health and negative migration experience are likely to have an impact on mental health.

In order to understand the relationship between exogamy and mental health in older ages, we ask the following questions. First, to what extent can we attribute the differences in mental health between endogamous and exogamous couples to the selection process into mixed unions? Second, does the expansion of social network through one's native spouse explain the mechanism behind the relationship between exogamy and mental health?

To answer these questions, we investigate the effect of exogamy on mental health for older adults aged 60 and above in Germany using the German Socioeconomic Panel. We focus our analyses on four groups of older individuals: endogamous natives (German-born, without migration background), exogamous natives, endogamous immigrants (non-German-born), and exogamous immigrants. Social network is defined as the combination of one's own number of close friends and family members in the form of older kin, younger kin, and siblings that live nearby, and those of his or her partner's. We examine the selection effect of exogamy by exploring the socio-economic and demographic characteristics of those who enter mixed unions. Then we analyze the social network of exogamous and endogamous native and immigrants using logistic regression. We use both random effect and correlated random effect models to test the extent to which social networks influence older adults' mental health across time for the four groups. Panel attrition and union dissolution are additionally analyzed to treat selection effects.

Our results show that previously divorced individuals are more likely to form exogamous unions. For immigrant men, being of European origin, a longer stay in Germany, and having higher levels of education are associated with higher odds of being in an union with a native individual. The same is true for immigrant women, except that being of European origin is not significant. Exogamy expands immigrants' social network but contracts natives'. Having more friends, younger kin and siblings nearby are beneficial to one's mental health. Living with one's child and having older kin nearby have negative impact on older adults' mental health. Interestingly, social networks contribute little to our understanding of mental health differences. Instead, the gap in mental health between endogamous natives and endogamous immigrants seems to be largely due to selection. In contrast, we find that exogamous native women face a persistent mental health disadvantage compared to endogamous native women. Our work contributes to the literature on the pathway between mental health and social network for older individuals.

### **3 Data**

The German Socioeconomic Panel (GSOEP) is a representative longitudinal household survey for which data is collected annually since 1984 to the present day. The data, comprised of over 25,000 individuals surveyed every year, provides household composition, socioeconomic and health indicators for the population residing in Germany. The survey is specifically designed to facilitate research in social sciences pertaining to human behavior and decision making (Goebel et al., 2019).

The GSOEP's oversampling of immigrant households is instrumental for research on this subpopulation. Following historical migration flows, the sample primarily includes immigrants from Turkey, Spain,

Italy, Greece and former Yugoslavian countries. Three refreshment samples for the immigrant population were included in 1994, 2013 and 2015. In addition, the refugee survey from 2016, collected by the Institute for Employment Research (IAB) and the Research Centre on Migration, Integration, and Asylum of the Federal Office of Migration and Refugees (BAMF-FZ), was integrated into the GSOEP.

### **3.1 Sample selection and union information**

This study centers on married or cohabitating individuals aged 60 or older. The GSOEP surveys all household members in participating households, i.e., our sample is restricted to individuals in a cohabitating union. We use information on the migration background and country of birth to categorize unions as “endogamous natives”, “exogamous natives”, “endogamous immigrants” and “exogamous immigrants”. The information on a respondent’s migration background is based on the country of birth, citizenship as well as parental information for individuals born in Germany. For the purpose of this study, we only consider individuals with a direct migration background and individuals without a migration background. A “direct migration” background implies that the respondent was born outside of Germany and migrated to Germany, while no migration background means that the respondent was born in Germany and their parents were born in Germany as well. This means we exclude descendants of immigrants (i.e., individuals born in Germany whose parents were not born in Germany) from the analysis. It should be noted that if parental information is missing, descendants of immigrants who were born in Germany would be classified as having no migration background.

We categorize respondents as “endogamous natives” if both the respondent and their partner were born in Germany and have no migration background. “Exogamous natives” are respondents who were born in Germany without a migration background and whose partner was born outside of Germany. “Endogamous immigrants” are respondents who were born outside of Germany and whose partner was born in the same country. “Exogamous immigrants” refers to respondents who were born outside of Germany and whose partner was born in Germany without a migration background. We exclude individuals from the sample if they were born outside of Germany and their partner was also born outside of Germany but in a different country than the respondent.

### **3.2 Mental health**

Our main outcome variable of interest, mental health, is measured using the 12-Item Short Form survey version 2 (SF-12v2) ((Andersen, Mühlbacher, Nübling, Schupp, & Wagner, 2007)). The SF-12v2 consists of 12 questions covering eight different dimensions of health (incl. general health, mental health, pain, vitality, role limitations due to emotional problems, role limitations due to physical problems, social functioning, physical functioning). These eight different subscales were used to derive two summary scores – a physical health summary score (pcs) and a mental health summary score (mcs) – using a factor analysis (see Andersen, Mühlbacher, Nübling, Schupp, & Wagner, 2007). These scores are normalized so that they take on values between 0 and 100, with higher values representing better health. In the reference population (i.e., the overall GSOEP sample in this case), these scores have a mean of 50 and a standard deviation of 10.

The SF-12v2 scores facilitate comparisons between different subpopulations and are widely used in the social and medical sciences (Gebel & Voßemer, 2014; Marcus, 2013; Schunck, Reiss, & Razum, 2015).

They are considered to be “quasi-objective” health measures (Ziebarth, 2010) in contrast to subjective, self-reported health measures. At the same time, these measures are broader than disease-specific scores (e.g., CES-D) and can be used to facilitate comparisons across disease areas. Since 2002, the SF-12v2 is included in the GSOEP questionnaire every other year, hence, for this study we draw on data from eight waves of the survey covering the period 2002 through 2016, focusing on the mental health summary score.

### **3.3 Social networks**

We consider social networks both inside and outside of the household. We use household size and co-residence with a (potentially adult) child to operationalize networks within the household. We operationalize social networks outside the household by taking into account the number of close friends, and the availability and location of kin of the respondents as well as their partners living outside of the household. Among kin, we separate family members into one’s own “older kin” (parents and grandparents), “younger kin” (own children or grandchildren), and “siblings”, and those of one’s spouse’s. We construct binary variables for each of these groups, which indicate whether the respondent has one or more kin living outside the household but within at most one hour driving distance.

Household size and co-residence with a child are surveyed in every year. The question on close friends was included in the survey in 2003, 2008, 2011, 2013, 2015 and 2017. Information on kin was only surveyed in 1991, 1996, 2001, 2006, 2011 and 2016. This means that unfortunately there is no single wave of the survey in which information on mental health, close friends and kin are all available. Therefore, we impute information on social networks using the last observed value, or if not available, the next observed value in later waves. Specifically, we impute information on close friends in 2012, 2014 and 2016 using data from 2011, 2013 and 2015, respectively. We impute data on close friends in 2002 using data from the 2003 wave, and 2006 from the 2008 wave. Similarly, we impute data on kin networks in 2002 and 2012 using data from 2001 and 2011, respectively. Finally, when analyzing social networks and mental health in the same model, we use the surveys collected in 2002, 2006, 2012 and 2016.

### **3.4 Covariates**

In our models, we control for demographic, socioeconomic and geographic characteristics of the respondents as well as indicators of homogamy of the union to address potential selection into exogamous union as well as observable differences that might contribute to the mental health of immigrants and natives. For demographic characteristics, we account for age, gender, and origin. Although, we only focus on the age group of 60+, and include single year of age as a covariate, previous studies indicated the non-linear relationship between age and mental health (see, e.g., (Eibich, 2015)). Therefore, we also include a quadratic polynomial for age. For socioeconomic variables, we look into household income, education, and whether or not they are still working. For geographic variables, we examine the differences between East and West Germany, and urban and rural settings.

Previous studies on migration have found large heterogeneity across immigrant groups but due to the relatively small size of the immigrant population, controlling for country of origin would reduce the statistical power of our models considerably. We argue that distinguishing between EU and non-EU immigrants should be sufficient, since these two immigrant groups face very different immigration conditions in terms of mobility of family members. A binary indicator for EU origin, which takes on the

value 1 if the country of origin (incl. Germany) was a member state of the European Union at the time of the survey, and zero otherwise, is included.

To capture the duration of stay in Germany, we calculate the “proportion of life spent in Germany”. For respondents born in Germany, this indicator takes on the value of 1. For individuals born outside of Germany, we calculate the number of years since immigration and divide this by the age of the respondent. Conceptually, the coefficient on this variable would capture the convergence in mental health between immigrants and natives – as immigrants spend proportionally more time of their life in Germany (i.e., with increasing values of this indicator), they become more and more similar to Germans. Consequently, if the estimated coefficient for this variable would be zero (or not significantly different from zero), this would imply that there is no convergence between immigrants and natives over time.

Years of education and income, important aspects of socioeconomic status, are known to reliably influence mental health (McBride, 2001). We consider whether or not an individual is still working. Retirement can serve as a relief from work-related stress and can lead to improvement in mental health (Eibich, 2015). Whether the respondent has been previously divorced is also included in our models.

To account for geography, we added an indicator for respondents living in East Germany, an indicator distinguishing between respondents living in urban and rural areas, and an interaction of the two. Individuals living in rural areas might have more limited access to mental health specialists (Koller et al., 2010) and despite improvement in life satisfaction of east Germans after German reunification in 1990, important differences remain in the living conditions and health outcome between east and west Germans (Eibich & Ziebarth, 2014; Frijters, Haisken-Denew, & Shields, 2004).

We consider homogamy with respect to age, education and migration background. Previous studies primarily considered homogamy in terms of ethnicity or race, age, education and religion (see, e.g., Kalmijn, de Graaf, & Janssen, 2005; Zhang & Van Hook, 2009).

## **4 Methods**

### **4.1 Main analysis**

We conduct our analysis in four steps. First, we examine selection into exogamous union among natives and immigrants to gain a better understanding of the underlying processes. For this analysis, we use our baseline sample of 31,880 person-year observations covering the period 2002-2016. We regress the indicator for exogamous union on age, the age gap between partners, EU origin, the proportion of life spent in Germany, years of education, as well as the difference in years of education to the partner. These covariates were chosen because they can be considered to be predetermined, i.e., they are not affected by decisions and processes made within the context of the union. In contrast, whether an individual is working in old age and the household income can be influenced by the union. If, e.g., exogamous couples and endogamous couples have different preferences for joint leisure time, then any difference in employment status between these groups might be an outcome of the union rather than reflecting the selection of individuals into the union. Since the importance of these characteristics might differ by gender as well as migration status, we estimate separate logistic regression models for native men and women as well as immigrant men and women.



In the second step, we examine differences in social networks by immigrant status and union type by regressing our measures of social network on a binary indicator for immigrants, a binary indicator for exogamous unions, and an interaction of these two variables. In all models we control for the demographic, socioeconomic and geographic control variables described in section 3.4. Due to data availability, we use a smaller sample, with the exact years depending on the outcome (see section 3.3). We estimate linear random-effects panel data models to account for the longitudinal structure of the data.

In the third step, we estimate differences in mental health by migrant status and union type. Using the baseline sample of 31,880 observations covering the period 2002-2016, we regress the SF-12v2 mental health measure on the indicators of migrant status, exogamy and the interaction of these two. To understand whether any observed differences are caused by selection on observed and unobserved characteristics, we first estimate linear random effects models (RE) and include our control variables in a stepwise manner, i.e., first we control for demographic differences (incl. the age gap within the couple), then we include geographic determinants, and finally we control for socioeconomic differences (incl. our measure of educational homogamy). However, differences in unobserved characteristics might still introduce selection effects. We estimate correlated random effects models (CRE)<sup>2</sup> using the approach developed by Mundlak (1978). Intuitively, we decompose the overall variation into within-individual changes and between-group differences by including the within-person means of the covariates into the regression in addition to the normal (i.e., untransformed) covariates.

The Mundlak approach requires the assumption that the unobserved individual differences are only correlated with the within-individual means of the covariates and not with the within-person changes, which is more restrictive than the fixed effects model. However, in contrast to the fixed effects model the CRE allows us to estimate the effects of within-person changes in the covariates as well as the between-group differences for time-invariant covariates. Thus, for our estimate of the effects of union type on mental health we estimate random effects model and compare the results to correlated random effects models to examine whether unobserved time-invariant confounders influence the selection into union type.

In the final step of our analysis, we include our indicators of social networks into the model for mental health in step 3 to examine whether observed differences by migrant status and union type can be explained by differences in social networks. For this analysis we use the reduced sample covering the years 2002, 2006, 2012 and 2016. All estimations are carried out in STATA 15.

## 4.2 Robustness checks

The regression models described above can address selection into exogamous union on observable as well as time-invariant unobservable characteristics. We conduct two additional robustness checks to address other potential sources of bias. First, we examine whether panel attrition might bias our results by conducting a drop-out analysis. We regress a binary indicator measuring whether a respondent is observed in the survey in the following wave (i.e., in  $t+1$ ) on our indicators of migrant status, exogamy

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<sup>2</sup> Fixed effects panel data models can address unobserved time-invariant heterogeneity, e.g., differences in personality traits. These models use only within-individual variation in individual characteristics for the estimation of the model. However, a major drawback is that variables that are constant within individuals (e.g., migrant status) simply drop out of the model, i.e., we are not able to quantify differences between migrants and natives. Moreover, due to the small sample size there is no variation in union type for migrants, i.e., we could only quantify the effect of intermarriage on mental health for native-born individuals. Correlated random effects models are used as a compromise.

and the interaction of these two. If these indicators are statistically significant, this means that the respective group has a higher likelihood to drop out of the sample. Taken together with our findings on differences in mental health across groups, this allows us to draw conclusions on the direction of the potential bias introduced through panel attrition.

Similarly, previous studies have reported that exogamous couples have a higher likelihood to split (Saarela & Finnäs, 2018). If this is the case in our data, then these respondents would also be more likely to drop out of our sample, even though at least one of these respondents would still be observed in the data. Thus, we also regress an indicator of whether a respondent is still with the same partner in the next survey wave (conditional on being in the sample) on our indicators of migrant status, exogamy and the interaction. Again, the results of this analysis will allow us to draw conclusions on the direction of any potential bias introduced through this mechanism.

## **5 Results**

### **5.1 Descriptive statistics**

Table 1 presents the descriptive statistics of the mean and standard deviation of both the mental health score for endogamous and exogamous natives and immigrants. The general characteristics of the four groups are expressed either in percentage or mean with standard deviation. The table shows that endogamous Germans are most advantaged on average in mental health with the score of 52.6, and exogamous immigrants are have the highest average physical health score at 44.3. Endogamous immigrants have the lowest mental and physical health scores among the four groups, at 50.6 for mental and 41.4 for physical health.

In general, endogamous and exogamous Germans share more similar characteristics than endogamous and exogamous immigrants. Exogamous immigrants are more likely to be of EU origin (68%) compared to endogamous immigrants (36%). On average, exogamous immigrants have been in Germany longer than endogamous immigrants. Exogamous immigrants are more educated than endogamous immigrants (11.7 years of education versus 10.0). A larger proportion of endogamous immigrants are of the lowest income quintile (60%) compared to exogamous immigrants (29%) whereas the proportion of exogamous immigrants in the highest income quintile is higher than that of the endogamous immigrants (13% versus 5%). Endogamous immigrants also have slightly larger household size on average than others, likely due to higher co-residence with their child, which, at 46%, is more than twice as high as any other group.

In terms of social networks outside of the household, exogamous immigrants appear to share more similarities with endogamous Germans. Exogamous immigrants report 4.4 close friends on average, higher than 4.1 for endogamous immigrants and similar to 4.44 for endogamous Germans. Although exogamous immigrants and endogamous immigrants are both less likely to be living near older kin and siblings, exogamous immigrants gain family members through their partner, with 45% of exogamous immigrants having partner's siblings and 20% having partner's older kin living close by, compared to 25% and 9% respectively for endogamous immigrants. Both endogamous and exogamous Germans are more likely to have younger kin living nearby, 62% and 52%, compared to their immigrant counterparts at 47%.

*<Table 1 about here>*

## 5.2 Odds of being in exogamous partnership

Table 2 shows the odds ratio of being in an exogamous partnership. In general, women are more likely to form exogamous unions compared to men. Immigrant men from an EU country are more than twice (2.1) as likely to have a native partner than men from outside of the EU. The same was not found to be significant for immigrant women. Duration of stay in Germany, or proportion of life spent in Germany, is highly correlated with the odds of partnership with a native, especially for men. Years of education has a positive effect for exogamy for both immigrant men and women. A selection effect on education is evident for exogamous immigrants, but not for natives. Having been previously divorced, is strongly associated with higher odds of being in an exogamous union for all groups. In particular, immigrant female divorcees are 12 times more likely to be in an exogamous union than immigrant women who have not experienced divorce. Native men are more likely to be in an exogamous union if they are older than their partner, while immigrant men and women who are more educated than their partner are less likely to be in an exogamous union. Overall, descriptive statistics from Table 1 and odds ratio for exogamy in Table 2 point to a stronger selection effect into exogamy for immigrant compared to natives.

*<Table 2 about here>*

## 5.3 Differences in social network

In Figure 1, we investigate the differences between endogamous natives, endogamous immigrants, exogamous natives and exogamous immigrants. The estimates come from a random effects model controlling for demographic, geographic and socioeconomic differences (see Table A.2 in the appendix for a complete list). In the figure, endogamous natives form the reference group, i.e., all differences are relatives to endogamous Germans. Compared to endogamous natives, endogamous immigrant individuals are less likely to live close to their spouse's older kin as well as both their own and their spouse's siblings. As expected, for immigrants, exogamy is associated with an expansion of the kin network through the spouse – exogamous immigrants have essentially the same likelihood to live close to their spouse's older kin and their spouse's siblings as endogamous natives. However, they were less likely to live close to their own older kin and siblings, which reflects the disadvantage of migration. For exogamous natives, we find a lower likelihood of living close to their spouse's older kin as well as siblings. This suggests that while exogamy can increase the kin network of immigrants, the opposite holds true for natives. Interestingly, we also find that exogamous natives as well as exogamous immigrants are less likely to live close to their younger kin, and exogamous natives report fewer close friends. There are no significant differences in household size. Endogamous immigrants are significantly more likely to live with one of their children. When examining heterogeneity by gender, we find no qualitative differences (see Figure A.1 and Tables A.3 and A.4 in the appendix).

*<Figure 1 about here>*

For all individuals, women tend to have more friends (see Appendix Table A.2). Years of education and income are positively associated with the number of friends, but higher income and more educated individuals have lower propensity to live near younger kin and their own or their partner's siblings.

Previously divorced individuals have fewer friends (-0.138), and tend not to live near their own siblings or their partner's, and younger kin..

## 5.4 Mental Health

### 5.4.1 Random effects (RE) models

In Figure 2, we show the differences between endogamous and exogamous natives and immigrants in mental health separately for men and women. The full regression results for the random effects models are shown in Tables A.5 and A.6 in the appendix. In the basic model without any control variables, we find that endogamous immigrants' mental health is significantly lower than endogamous natives' for both men and women. Exogamous immigrants exhibit lower mental health than endogamous natives as well, however, the difference is only significant when we control for demographic and geographic covariates but not for socioeconomic characteristics. Interestingly, exogamous native men have similar mental health as their endogamous counterparts, while the mental health of exogamous native women is significantly lower compared to endogamous native women. The magnitude of these differences is considerable – the difference between endogamous natives and endogamous immigrants varies between 2 and 4 points, which corresponds to 0.2 to 0.4 standard deviations of the mental health score. Likewise, the difference between endogamous native women and exogamous native women corresponds to 0.2 standard deviations in mental health.

Overall, these effects confirm a “immigrant gain” and “native strain” from an exogamous union, in particular for women. Men tend to have better mental health. Less educated, and poorer older adults have poorer mental health compared to their educated and wealthier counterparts (see Appendix Table A.5). Having experienced divorce is also associated with poorer mental health.

### 5.4.2 Correlated random effects model (CRE)

The random effects model estimated in the previous section accounts for individual unobserved heterogeneity in mental health. Such heterogeneity might, e.g., arise from differences in (stable) personality traits. It seems plausible that such unobserved differences are correlated with some of the observed characteristics in the model. For example, personality traits might be correlated with baseline differences in mental health as well as the likelihood to form an exogamous union. In this case, the random effects estimator is unfortunately not consistent. Thus, we estimate a correlated random effects model, which can account for correlations between unobserved individual effects and observed characteristics. Intuitively, the model decomposes the effects of time-varying characteristics into between-group differences and within-person differences.

<Figure 3 about here>

Figure 3 compares the differences between endogamous natives, exogamous natives, endogamous immigrants and exogamous immigrants in the random effects and the correlated random effects model, again separately for men and women. A full set of regression results can be found in Table A.7 in the appendix. First, we note that unfortunately we only observe three transitions from endogamous to exogamous unions or vice versa, and thus we cannot identify any meaningful variation within individuals for union types. Thus, we decided to treat exogamy as a time-constant covariate. Consequently, the differences between the random effects and the correlated random effects model are relatively small. We

find that in the correlated random effects model the difference between endogamous natives and endogamous immigrants is considerably smaller and no longer statistically significant. This suggests that there are unobserved time-invariant characteristics, which are associated with mental health as well as the time-varying covariates included in our model, and these unobserved characteristics can explain part of the disadvantage experienced by endogamous immigrants. We do not observe differences between models for exogamous natives or exogamous immigrants, i.e. the previous finding of a mental health disadvantage for exogamous native women compared to endogamous native women persists.

There are only minor differences across all three models for most other covariates included in the estimation. Two exceptions are the indicator for East Germany as well as time spent in Germany. For East Germany, the RE model indicates a negative association with mental health, while the CRE model shows a positive association between moving to East Germany and mental health. This suggests that the negative association between living in East Germany and mental health is unlikely to operate through environmental and contextual factors, since individuals moving to East Germany seem to benefit from their move. Instead, the East German population seems to suffer from a long-term mental health disadvantage, which could be the result of negative selection due to outmigration in the 1990s and early 2000s. In contrast, while the proportion of life spent in Germany is not significant in the full sample or for men in the RE model, it has a large and significant negative association with mental health in the CRE model. This suggests that some of the immigrant disadvantage in mental health reflects a deterioration of immigrants' mental health over time rather than a permanent disadvantage or selection effect.

### **5.5 Mental health and social networks**

For Figure 4, we re-estimate our RE and CRE model using the restricted sample (covering the years 2002, 2006, 2012 and 2016) and we include our indicators of social networks as covariates to examine whether these covariates can explain differences in mental health observed between immigrants and natives as well as endogamous and exogamous couples. First, we note that in the restricted sample the difference between endogamous natives and endogamous immigrants is never statistically significant. In contrast, in all models exogamous native women have lower mental health than endogamous native women. Taking differences in social networks into account does not seem to affect the estimates for men in any meaningful way. For women, we note that accounting for social network exacerbates the gap between endogamous native women and exogamous immigrant women, however, the difference between the two groups is never statistically significant. Looking at the estimated associations between social networks and mental health, we note that having older kin, or parents, nearby, is clearly negative for mental health of women in both models. A plausible explanation is that middle-aged and older adults living close to their parents and grandparents often have care responsibilities, which have been shown to negatively affect the caregiver's mental health (Schmitz & Westphal, 2015). Similarly, living close to older kin of the spouse is negatively associated with mental health in both models, but the association is only significant for men in the random effects model. Associations between the number of close friends and living close to own or spouse's siblings change considerably across models.

*<Figure 4 about here>*

### **5.6 Panel attrition and union dissolution**

In Table 3, we contextualize our findings by examining the propensity to drop out of the panel (due to death or out-migration) and union dissolution (as a result of break-up, divorce, or widowhood). A major concern is that if immigrants and exogamous natives are more likely to drop out of our estimation sample, this might bias our estimates due to the relatively small number of immigrants and exogamous unions in our sample. In column 1, we estimate a simple RE model without any additional covariates. As expected, we find that immigrants are more likely to drop out of the sample than natives. Exogamy also seems to be associated with higher panel attrition, although exogamous immigrants' drop-out propensity is similar to that of exogamous natives. Once we account for differences in observed characteristics (Column 2) as well as unobserved heterogeneity in our CRE model (Column 3), we find that immigrants are more likely to than natives to remain in the sample.

Similarly, for union dissolution we find that immigrants and exogamous natives are less likely to remain in their current union than endogamous natives. The point estimate for exogamous immigrants is negative, but relatively small. However, once we account for differences in observed covariates as well as unobserved heterogeneity, we find that immigrants are more likely to stay with their current partner than endogamous natives. In summary, these analyses suggest that the conclusion of observed covariates and the estimation of CRE models is sufficient to control for the higher likelihood of immigrants to drop out of the sample as well as the higher likelihood of exogamous unions to dissolve.

*<Table 3 about here>*

## **6 Discussion**

Simultaneous demographic changes in the form of aging and migration pose opportunities and challenges to researchers. Germany, as the world's second most popular migrant destination, hosts over 12 million resident immigrants (United Nations, 2018), many of whom arrived as guest workers between 1961 to 1973 (Carnein et al., 2015). Those who have formed consistent labor force attachment were most likely to have stayed (Yahirun, 2014) and have now aged into advanced life stages in Germany. Disparity between their general health compared to ethnic Germans remains, with mental health of the older immigrant adults particularly little explored, mainly due to their limited numbers in the past rendering quantitative analyses difficult.

Our study contributes to the literature in several ways. First, we use the most up-to-date panel household survey in Germany to examine the changes of mental health for endogamous and exogamous immigrants and natives with consideration to selection into exogamous unions. Second, we explore the social networks of the different groups as a potential mediator to differential mental health, accounting for panel attrition and union dissolution. Lastly, we use both random effects models and correlated random effects models to address both group-level differences and within-subject changes in mental health over time.

We found that there is a selection effect for immigrants who form exogamous unions by observable characteristics, such as longer duration of stay in Germany, being of European origin, and being more educated, all of which are characteristics associated with better mental health. Our models also suggest that there are perhaps unobservable characteristics negative to mental health that are attached to immigrants in endogamous unions, which might explain a large proportion of the gap in mental health

between endogamous natives and immigrants. However, due to a lack of individuals who changed their type of union within the observed period, we cannot rule out that our estimates are still affected by selection on unobservable characteristics.

Surprisingly, there seems to be a large and persistent difference in the mental health of exogamous native women compared to their endogamous counterparts, despite little evidence for selection of natives into exogamous unions. In contrast, exogamous native men exhibit similar health as endogamous native men. This finding is in line with an earlier study reporting a higher divorce risk for exogamous unions between native women and immigrant man compared to exogamous unions between native men and immigrant women (Milewski & Kulu, 2014). It seems plausible that partnership conflicts are more common and relationship satisfaction is lower in less homogamous unions, such as exogamous unions. Yet, it is not clear why this should only hold for exogamous unions between native women and immigrant men.

Overall and in line with previous research, we find that social ties have the potential to both promote or strain mental health (Mair, 2013). Having younger kin, more friends, and siblings (own or spouse's) nearby are positively associated with better mental health, while having older kin (own or spouse's) nearby has the opposite effect. We find surprisingly little difference between one's own and spouse's kin and their connection with one's mental health, but we do observe a generational difference. This is both in line with the intergenerational stake hypothesis and also suggests that the direction of care matters. For individuals who are 60 years or older, providing care to even older family members may be deleterious to one's mental health. As the prolongation of life span directly impact the propensity of the old having to care for the oldest old, the fastest growing population inflicted with long, lingering care-intensive diseases such as dementia (Wu et al., 2016), having older kin in close proximity reasonably increases physical and mental burden.

Although social network influences mental health for older individuals, we find little evidence that supports social network as the main driving force behind the relationship between exogamy and mental health. The gap in mental health between endogamous German women and exogamous German women remains robust even with social network variables considered. If anything, our results even suggest that immigrants and exogamous natives are advantaged by their comparatively smaller social networks, since they are less likely to live close to older kin (both own and spouse's) and the presence of older kin is negatively associated with mental health. Yet, although our evidence mainly points to selection effects, there might be other unobserved pathways between exogamy and mental health for older individuals. Social network may also be insufficiently defined by the variables available in GSOEP.

From the immigrant perspective, it is difficult to determine the direction of causality between exogamy and mental health. Exogamy can be seen as a "barrier-breaking" invitation into the destination society (Rodríguez-García, 2015). In this case, exogamy may indirectly enhance mental health by providing more local networks, and reducing social distance between minority and majority group. However, more integrated immigrants might be simultaneously more likely to form a partnership with a native and have better mental health as a result of their already high level of integration pre-union. In this scenario, exogamy is only a sign that they've passed the "litmus test" (Alba & Nee, 2009) of integration, rather than serve as a vehicle to better mental health. As a result of very few individuals switching from endogamous to exogamous union and vice versa, we are unable to make definitive remarks on the direction of causality between exogamy and mental health.

It is important to note that when considering the relationship between social network and mental health for older individuals, the institutional setting of the study matters. Germany, characterized as a Bismarckian welfare state, out-performs in social provisions for retirees compared to Mediterranean states such as Italy and Spain, but under-performs compared to Social Democratic states such as Sweden and Denmark (Richardson, Carr, Netuveli, & Sacker, 2019). In states where fewer public provisions and resources are available to the elderly, individuals are more likely to heavily rely on social network for physical and emotional care (Reher, 1998), increasing the importance of geographic proximity to friends and family for mental health.

Our analyses excluded individuals born in Germany with migration background, i.e. the second generation. Second generation individuals in Germany experience unique challenges, such as higher self-perception of discrimination (Aichberger et al., 2015), yet do not face first generation difficulties, such as linguistic barrier and non-recognition of their qualifications in the labor market. Their mental health risk factors require separate scrutiny, and are beyond the scope of this paper.

The context under which individuals migrated should also be further examined. The 2016 sample of the GSOEP includes refugees, who arrived in Germany after having recently experienced conflict and trauma. Due to the focus of this paper being on social network and exogamy, the limited number of refugee cases would render this task difficult. The mental health baseline of refugees is likely to significantly differ from those who migrated for economic opportunities or to reunite with family members, and deserves careful examination in future work on the mental health of immigrants.

Our research highlights the need to consider social network as a potential pathway to mental health of immigrants, and tie together several strands of literature in exogamy, mental health, and the immigrant health disadvantage. We find that the gap in mental health among endogamous and exogamous natives cannot be fully explained by differences in social network. To better disentangle the link between exogamy and mental health, a larger sample of individuals who change their status from singlehood to exogamous or endogamous union should be examined to pin down within-subject variations across time. Examining the linkage between social network and mental health in old age in various institutional settings would enhance our understanding of the relationship between the two. We also recommend future research to consider a wider range of social contacts, in addition to friends and family, such as neighbors or social workers and their roles in facilitating healthy aging. Finally, future research should consider gendered patterns within exogamous unions.



## References:

- Abraido-Lanza, A. F., Dohrenwend, B. P., Ng-Mak, D. S., & 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. <https://doi.org/10.2105/AJPH.89.10.1543>
- Aichberger, M. C., Heredia Montesinos, A., Bromand, Z., Yesil, R., Temur-Erman, S., Rapp, M. A., ... Schouler-Ocak, M. (2015). Suicide attempt rates and intervention effects in women of Turkish origin in Berlin. *European Psychiatry, 30*(4), 480–485. <https://doi.org/10.1016/j.eurpsy.2014.12.003>
- Alba, R. D., & Nee, V. (2009). *Remaking the American Mainstream: Assimilation and Contemporary Immigration*. Harvard University Press.
- Andersen, H. H., Mühlbacher, A., Nübling, M., Schupp, J., & Wagner, G. G. (2007). *Computation of Standard Values for Physical and Mental Health Scale Scores Using the SOEP Version of SF-12v2* (pp. 171–182). Retrieved from [https://www.ratswd.de/download/schmollers/2007\\_127/Schmollers\\_2007\\_1\\_S171.pdf](https://www.ratswd.de/download/schmollers/2007_127/Schmollers_2007_1_S171.pdf)
- Baykara-Krumme, H., & Platt, L. (2018). Life satisfaction of migrants, stayers and returnees: reaping the fruits of migration in old age? | Cambridge Core. *Ageing & Society, 38*(4), 721–745.
- Birditt, K. S., Hartnett, C. S., Fingerhman, K. L., Zarit, S. H., & Antonucci, T. C. (2015). Extending the Intergenerational Stake Hypothesis: Evidence of an Intra-individual Stake and Implications for Well-being. *Journal of Marriage and Family, 77*(4), 877–888. <https://doi.org/10.1111/jomf.12203>
- Burholt, V., Dobbs, C., & Victor, C. (2018). Social support networks of older migrants in England and Wales: the role of collectivist culture. *Ageing & Society, 38*(7), 1453–1477. <https://doi.org/10.1017/S0144686X17000034>
- Carnein, M., Milewski, N., Doblhammer, G., & Nusselder, W. J. (2015). Health inequalities of immigrants: Patterns and determinants of health expectancies of Turkish migrants living in Germany. In G. Doblhammer (Ed.), *Health among the elderly in Germany* (Series on Population Studies by the Federal Institute for Population Research, Vol. 46). Opladen, Berlin, Toronto: Barbara Budrich.
- Cattan, M., White, M., Bond, J., & Learmouth, A. (2005). Preventing social isolation and loneliness among older people: a systematic review of health promotion interventions. *Ageing & Society, 25*(1), 41–67. <https://doi.org/10.1017/S0144686X04002594>

- Cramm, J. M., van Dijk, H. M., & Nieboer, A. P. (2013). The Importance of Neighborhood Social Cohesion and Social Capital for the Well Being of Older Adults in the Community. *The Gerontologist*, 53(1), 142–152.  
<https://doi.org/10.1093/geront/gns052>
- Dahlberg, L., Andersson, L., & Lennartsson, C. (2018). Long-term predictors of loneliness in old age: results of a 20-year national study. *Aging & Mental Health*, 22(2), 190–196. <https://doi.org/10.1080/13607863.2016.1247425>
- Dahlberg, L., Andersson, L., McKee, K. J., & Lennartsson, C. (2015). Predictors of loneliness among older women and men in Sweden: A national longitudinal study. *Aging & Mental Health*, 19(5), 409–417.  
<https://doi.org/10.1080/13607863.2014.944091>
- de Valk, H. A. G., Fokkema, T., & Apt, W. (2018). Health among older populations of migrant origin. In *Final Report: Demographic change and migration*. Retrieved from <https://www.jp-demographic.eu/wp-content/uploads/2015/06/full-report-fast-track-migration.pdf>
- Dustmann, C., & Weiss, Y. (2007). Return Migration: Theory and Empirical Evidence from the UK. *British Journal of Industrial Relations*, 45(2), 236–256. <https://doi.org/10.1111/j.1467-8543.2007.00613.x>
- Dykstra, P. A. (1990). Disentangling direct and indirect gender effects on the supportive network. In C. P. M. Knipscheer & T. C. Antonucci (Eds.), *Social network research: Methodological questions and substantive issues* (pp. 55–65). Amsterdam: Swets and Zeitlinger.
- Eibich, P. (2015). Understanding the effect of retirement on health: Mechanisms and heterogeneity. *Journal of Health Economics*, 43, 1–12. <https://doi.org/10.1016/j.jhealeco.2015.05.001>
- Eibich, P., & Ziebarth, N. R. (2014). Examining the structure of spatial health effects in Germany using Hierarchical Bayes Models. *Regional Science and Urban Economics*, 49, 305–320.  
<https://doi.org/10.1016/j.regsciurbeco.2014.06.005>
- Eurostat. (2019). Population on 1 January by age group, sex and country of birth (migr\_pop3ctb). Retrieved August 8, 2019, from <https://ec.europa.eu/eurostat/web/population-demography-migration-projections/data/database>
- Frijters, P., Haisken-Denew, J. P., & Shields, M. A. (2004). Money Does Matter! Evidence from Increasing Real Income and Life Satisfaction in East Germany Following Reunification. *American Economic Review*, 94(3), 730–740.  
<https://doi.org/10.1257/0002828041464551>

- Gebel, M., & Voßemer, J. (2014). The impact of employment transitions on health in Germany. A difference-in-differences propensity score matching approach. *Social Science & Medicine*, *108*, 128–136.  
<https://doi.org/10.1016/j.socscimed.2014.02.039>
- Goebel, J., Grabka, M. M., Liebig, S., Kroh, M., Richter, D., Schröder, C., & Schupp, J. (2019). The German Socio-Economic Panel (SOEP). *Jahrbücher Für Nationalökonomie Und Statistik*, *239*(2), 345–360.  
<https://doi.org/10.1515/jbnst-2018-0022>
- Han, S. H., Kim, K., & Burr, J. A. (2019). Friendship and Depression Among Couples in Later Life: The Moderating Effects of Marital Quality. *The Journals of Gerontology: Series B*, *74*(2), 222–231.  
<https://doi.org/10.1093/geronb/gbx046>
- Hank, K. (2007). Proximity and Contacts Between Older Parents and Their Children: A European Comparison. *Journal of Marriage and Family*, *69*(1), 157–173. <https://doi.org/10.1111/j.1741-3737.2006.00351.x>
- House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science*, *241*(4865), 540–545.  
<https://doi.org/10.1126/science.3399889>
- Kagitcibasi, C. (2017). *Family, Self, and Human Development Across Cultures : Theory and Applications*.  
<https://doi.org/10.4324/9781315205281>
- Kalmijn, M., de Graaf, P. M., & Janssen, J. P. G. (2005). Inter-marriage and the risk of divorce in the Netherlands: The effects of differences in religion and in nationality, 1974–94. *Population Studies*, *59*(1), 71–85.  
<https://doi.org/10.1080/0032472052000332719>
- Koller, D., Eisele, M., Kaduszkiewicz, H., Schön, G., Steinmann, S., Wiese, B., ... van den Bussche, H. (2010). Ambulatory health services utilization in patients with dementia - Is there an urban-rural difference? *International Journal of Health Geographics*, *9*(1), 59. <https://doi.org/10.1186/1476-072X-9-59>
- Komter, A. E., & Vollebergh, W. A. M. (2002). Solidarity in Dutch Families: Family Ties Under Strain? *Journal of Family Issues*, *23*(2), 171–188. <https://doi.org/10.1177/0192513X02023002001>
- Kristiansen, M., Razum, O., Tezcan-Güntekin, H., & Krasnik, A. (2016). Aging and health among migrants in a European perspective. *Public Health Reviews*, *37*(1), 20. <https://doi.org/10.1186/s40985-016-0036-1>
- Lanzieri, G. (2012). *Merging populations: A look at marriages with foreign-born persons in European countries*. Retrieved from [https://emnbelgium.be/sites/default/files/attachments/eurostat\\_mixed\\_marriages.pdf](https://emnbelgium.be/sites/default/files/attachments/eurostat_mixed_marriages.pdf)

- Levecque, K., & Rossem, R. V. (2015). Depression in Europe: does migrant integration have mental health payoffs? A cross-national comparison of 20 European countries. *Ethnicity & Health, 20*(1), 49–65.  
<https://doi.org/10.1080/13557858.2014.883369>
- Mair, C. A. (2013). Family Ties and Health Cross-Nationally: The Contextualizing Role of Familistic Culture and Public Pension Spending in Europe. *The Journals of Gerontology: Series B, 68*(6), 984–996.  
<https://doi.org/10.1093/geronb/gbt085>
- Malmusi, D. (2015). Immigrants' health and health inequality by type of integration policies in European countries. *European Journal of Public Health, 25*(2), 293–299. <https://doi.org/10.1093/eurpub/cku156>
- Marcus, J. (2013). The effect of unemployment on the mental health of spouses – Evidence from plant closures in Germany. *Journal of Health Economics, 32*(3), 546–558. <https://doi.org/10.1016/j.jhealeco.2013.02.004>
- McBride, M. (2001). Relative-income effects on subjective well-being in the cross-section. *Journal of Economic Behavior & Organization, 45*(3), 251–278. [https://doi.org/10.1016/S0167-2681\(01\)00145-7](https://doi.org/10.1016/S0167-2681(01)00145-7)
- Milewski, N., & Doblhammer, G. (2014). Mental health among immigrants: Is there a disadvantage in later life? In *Health Among the Elderly in Germany: New Evidence on Disease, Disability and Care Need*. Verlag Barbara Budrich.
- Milewski, N., & Gawron, A. (2019). Is there an association between marital exogamy of immigrants and nonmigrants and their mental health? A two-partners approach. *Demographic Research, 40*(21), 561–598.  
<https://doi.org/10.4054/DemRes.2019.40.21>
- Milewski, N., & Kulu, H. (2014). Mixed Marriages in Germany: A High Risk of Divorce for Immigrant-Native Couples. *European Journal of Population, 30*(1), 89–113. <https://doi.org/10.1007/s10680-013-9298-1>
- Mulder, C. H. (2003). *Migration dynamics: a life course approach*. Purdue University Press.
- Mulder, C. H. (2018). Putting family centre stage: Ties to nonresident family, internal migration, and immobility. *Demographic Research, 39*, 1151–1180. <https://doi.org/10.4054/DemRes.2018.39.43>
- Mundlak, Y. (1978). On the Pooling of Time Series and Cross Section Data. *Econometrica, 46*(1), 69–85.  
<https://doi.org/10.2307/1913646>
- Razum, O., Zeeb, H., Akgün, H. S., & 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 & International Health, 3*(4), 297–303. <https://doi.org/10.1046/j.1365-3156.1998.00233.x>

- Reher, D. S. (1998). Family Ties in Western Europe: Persistent Contrasts. *Population and Development Review*, 24(2), 203–234. <https://doi.org/10.2307/2807972>
- Reus-Pons, M., Mulder, C. H., Kibele, E. U. B., & Janssen, F. (2018). Differences in the health transition patterns of migrants and non-migrants aged 50 and older in southern and western Europe (2004–2015). *BMC Medicine*, 16(1), 57. <https://doi.org/10.1186/s12916-018-1044-4>
- Richardson, S., Carr, E., Netuveli, G., & Sacker, A. (2019). Country-level welfare-state measures and change in wellbeing following work exit in early old age: evidence from 16 European countries. *International Journal of Epidemiology*, 48(2), 389–401. <https://doi.org/10.1093/ije/dyy205>
- Rodríguez-García, D. (2015). Intermarriage and Integration Revisited: International Experiences and Cross-Disciplinary Approaches. *The ANNALS of the American Academy of Political and Social Science*, 662(1), 8–36. <https://doi.org/10.1177/0002716215601397>
- Ryan, L. (2007). Migrant Women, Social Networks and Motherhood: The Experiences of Irish Nurses in Britain. *Sociology*, 41(2), 295–312. <https://doi.org/10.1177/0038038507074975>
- Saarela, J., & Finnäs, F. (2018). Ethno-Linguistic Exogamy and Divorce: Does Marital Duration Matter? *Sociological Focus*, 51(4), 279–303. <https://doi.org/10.1080/00380237.2018.1431506>
- Sand, G., & Gruber, S. (2018). Differences in Subjective Well-being Between Older Migrants and Natives in Europe. *Journal of Immigrant and Minority Health*, 20(1), 83–90. <https://doi.org/10.1007/s10903-016-0537-5>
- Schmitz, H., & Westphal, M. (2015). Short- and medium-term effects of informal care provision on female caregivers' health. *Journal of Health Economics*, 42, 174–185. <https://doi.org/10.1016/j.jhealeco.2015.03.002>
- Schunck, R., Reiss, K., & Razum, O. (2015). Pathways between perceived discrimination and health among immigrants: evidence from a large national panel survey in Germany. *Ethnicity & Health*, 20(5), 493–510. <https://doi.org/10.1080/13557858.2014.932756>
- Shaw, B. A., Krause, N., Liang, J., & Bennett, J. (2007). Tracking Changes in Social Relations Throughout Late Life. *The Journals of Gerontology: Series B*, 62(2), S90–S99. <https://doi.org/10.1093/geronb/62.2.S90>
- Stokes, J. E., & Moorman, S. M. (2018). Influence of the Social Network on Married and Unmarried Older Adults' Mental Health. *The Gerontologist*, 58(6), 1109–1113. <https://doi.org/10.1093/geront/gnx151>

- Uccheddu, D., Gauthier, A. H., Steverink, N., & Emery, T. (2019). The pains and reliefs of the transitions into and out of spousal caregiving. A cross-national comparison of the health consequences of caregiving by gender. *Social Science & Medicine*, 112517. <https://doi.org/10.1016/j.socscimed.2019.112517>
- United Nations. (2018). *World migration report 2018*. Place of publication not identified: UNITED NATIONS PUBNS.
- Wu, Y.-T., Fratiglioni, L., Matthews, F. E., Lobo, A., Breteler, M. M. B., Skoog, I., & Brayne, C. (2016). Dementia in western Europe: epidemiological evidence and implications for policy making. *The Lancet Neurology*, 15(1), 116–124. [https://doi.org/10.1016/S1474-4422\(15\)00092-7](https://doi.org/10.1016/S1474-4422(15)00092-7)
- Yahirun, J. J. (2014). Take Me “Home”: Return Migration among Germany’s Older Immigrants. *International Migration*, 52(4), 231–254. <https://doi.org/10.1111/imig.12009>
- Zhang, Y., & Van Hook, J. (2009). Marital Dissolution Among Interracial Couples. *Journal of Marriage and Family*, 71(1), 95–107. <https://doi.org/10.1111/j.1741-3737.2008.00582.x>
- Ziebarth, N. (2010). Measurement of health, health inequality, and reporting heterogeneity. *Social Science & Medicine*, 71(1), 116–124. <https://doi.org/10.1016/j.socscimed.2010.03.016>

## Tables and Figures

**Table 1. Descriptive statistics**

		<u>Table 1: Descriptive statistics</u>			
		<u>Germans</u>		<u>Immigrants</u>	
		<i>Endogamous</i>	<i>Exogamous</i>	<i>Endogamous</i>	<i>Exogamous</i>
Mental health (SF-12)		52.61 (9.95)	51.15 (10.41)	50.58 (10.44)	51.26 (10.58)
Physical health (SF-12)		43.65 (9.95)	43.78 (10.31)	41.43 (9.71)	44.30 (9.95)
Age		69.42 (6.51)	69.08 (6.41)	67.99 (6.02)	69.12 (6.59)
Age gap to partner		0.96 (5.23)	2.74 (8.21)	1.47 (5.64)	1.40 (5.81)
Female		0.45 (0.50)	0.41 (0.49)	0.42 (0.49)	0.49 (0.50)
EU origin		1.00 (0.00)	1.00 (0.00)	0.36 (0.48)	0.68 (0.47)
Proportion of life spent in Germany		1.00 (0.00)	1.00 (0.00)	0.46 (0.24)	0.76 (0.25)
Living in East Germany		0.26 (0.44)	0.18 (0.39)	0.04 (0.19)	0.17 (0.38)
Living in rural area		0.37 (0.48)	0.32 (0.47)	0.21 (0.41)	0.32 (0.47)
Working		0.14 (0.34)	0.14 (0.35)	0.13 (0.34)	0.15 (0.36)
Years of education		12.07 (2.74)	11.97 (2.80)	10.04 (2.31)	11.71 (2.70)
Difference in education to partner		0.06 (2.64)	0.13 (2.83)	0.06 (2.01)	-0.12 (2.85)
<i>Income quintile</i>					
	1	0.26 (0.44)	0.30 (0.46)	0.60 (0.49)	0.29 (0.45)
	2	0.25 (0.43)	0.24 (0.43)	0.17 (0.37)	0.24 (0.43)
	3	0.16 (0.37)	0.16 (0.37)	0.09 (0.29)	0.16 (0.37)
	4	0.12 (0.33)	0.12 (0.32)	0.07 (0.25)	0.12 (0.32)
	5	0.15 (0.36)	0.13 (0.34)	0.05 (0.22)	0.13 (0.34)
Previously divorced		0.18 (0.38)	0.29 (0.45)	0.08 (0.27)	0.23 (0.42)

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	<b>Germans</b>		<b>Immigrants</b>	
	<i>Endogamous</i>	<i>Exogamous</i>	<i>Endogamous</i>	<i>Exogamous</i>
Number of close friends	4.44 (4.10)	3.99 (3.56)	4.07 (4.59)	4.41 (4.45)
Older kin live nearby	0.15 (0.36)	0.14 (0.35)	0.09 (0.29)	0.11 (0.31)
Older kin of the spouse live nearby	0.17 (0.37)	0.10 (0.30)	0.10 (0.30)	0.20 (0.40)
Siblings live nearby	0.43 (0.49)	0.43 (0.50)	0.25 (0.43)	0.27 (0.45)
Siblings of the spouse live nearby	0.43 (0.50)	0.25 (0.44)	0.25 (0.43)	0.45 (0.50)
Younger kin live nearby	0.62 (0.48)	0.52 (0.50)	0.47 (0.50)	0.47 (0.50)
Household size	2.46 (0.86)	2.53 (0.88)	3.54 (1.68)	2.62 (0.98)
Co-residence with child	0.19 (0.39)	0.22 (0.41)	0.46 (0.50)	0.22 (0.42)

Source: SOEPv34, own calculations. The table provides mean values with standard deviations in parentheses.



**Table 2. Analysis of exogamy****Table 2: Analysis of exogamy**

<i>Odds ratios</i>	<i>Dependent variable: Exogamous partnership</i>			
	<b>Germans</b>		<b>Immigrants</b>	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Age	0.987 (0.011)	0.989 (0.014)	1.003 (0.020)	1.004 (0.026)
Age gap to partner	1.045** (0.019)	1.046 (0.030)	0.981 (0.027)	1.011 (0.037)
Country of origin in EU			2.061*** (0.520)	1.396 (0.416)
Proportion of life spent in Germany			259.576*** (194.284)	168.762*** (114.658)
Years of education	0.950 (0.039)	0.965 (0.039)	1.433*** (0.114)	1.499*** (0.135)
Difference in education to partner	1.032 (0.055)	1.026 (0.044)	0.823** (0.071)	0.802*** (0.055)
Previously divorced	1.690** (0.366)	1.692** (0.381)	3.106*** (1.291)	11.883*** (5.080)
Baseline odds	0.033*** (0.005)	0.040*** (0.007)	0.010*** (0.005)	0.014*** (0.007)
N	15,921	13,014	1,637	1,308

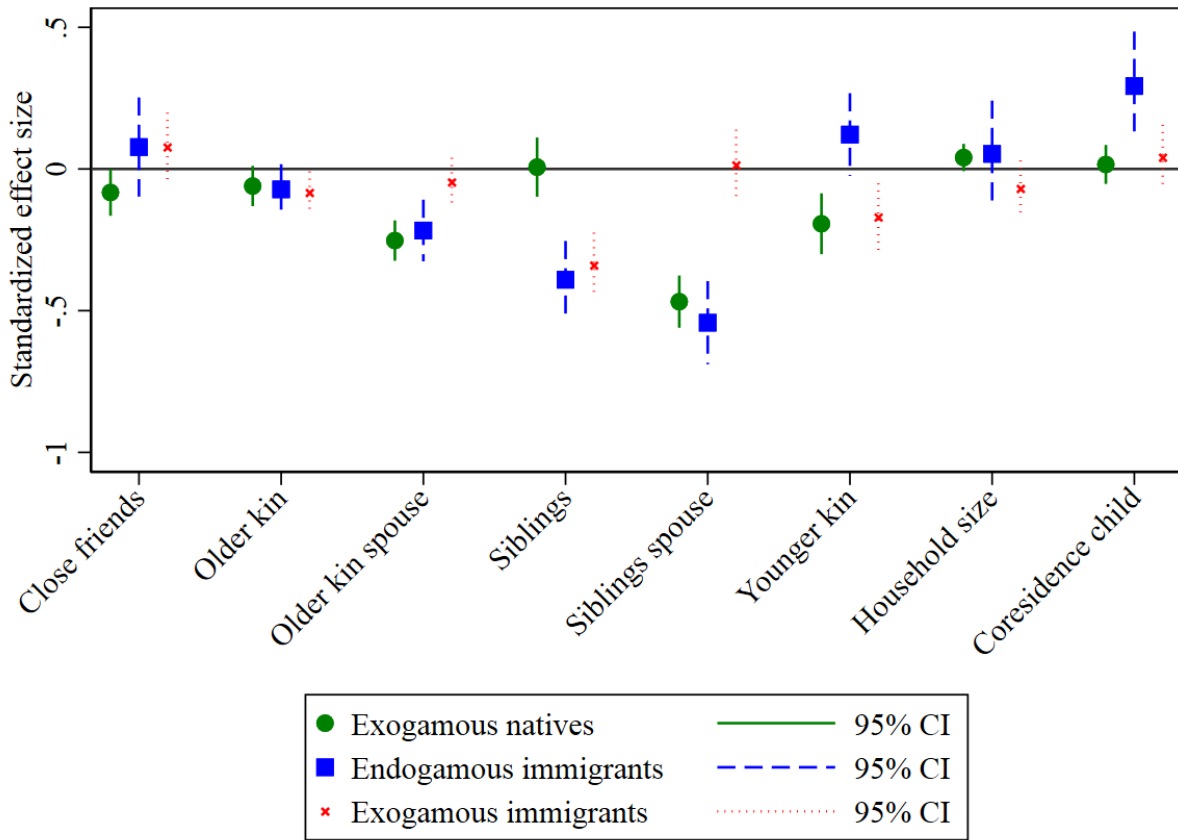
Source: SOEPv34, own calculations. Each column presents estimates of odds ratios from a separate logistic regression model. Standard error in parentheses. Age was centered around 60. Years of education was centered around the group mean. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

**Table 3. Panel attrition and union dissolution**

	<b>Table 3: Panel attrition and union dissolution</b>					
	<b>Remains in sample in t+1</b>			<b>Same partner in t+1</b>		
	<i>1</i>	<i>2</i>	<i>3</i>	<i>1</i>	<i>2</i>	<i>3</i>
<b>Immigrant</b>	-0.061*** (0.010)	-0.04 (0.024)	0.039* (0.020)	-0.063*** (0.011)	-0.042 (0.029)	0.044* (0.026)
<b>Exogamy</b>	-0.031** (0.012)	-0.023 (0.015)	-0.013 (0.012)	-0.045*** (0.016)	-0.039** (0.019)	-0.031* (0.017)
<b>Immigrant x Exogamy</b>	0.067*** (0.019)	0.078*** (0.026)	0.001 (0.022)	0.081*** (0.024)	0.098*** (0.032)	0.013 (0.028)
<b>Constant</b>	0.675*** (0.002)	0.335 (0.286)	-6.809*** (0.362)	0.620*** (0.003)	0.926*** (0.295)	-5.747*** (0.404)
<i>N</i>	36,037	33,961	32,370	36,037	33,961	32,370
<i>Random effects</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Covariates</i>	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>no</i>	<i>yes</i>	<i>yes</i>
<i>Mundlak means</i>	<i>no</i>	<i>no</i>	<i>yes</i>	<i>no</i>	<i>no</i>	<i>yes</i>

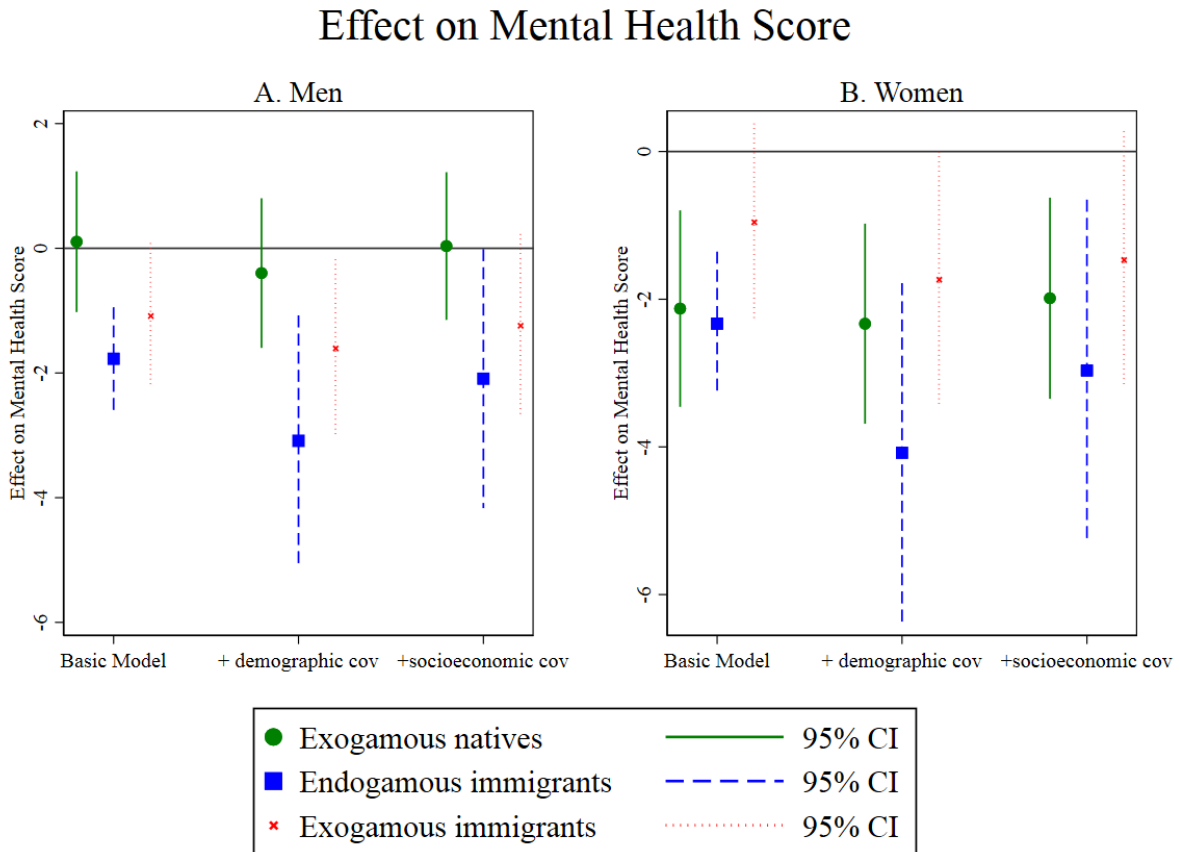
Source: SOEPv34, own calculations. Model 1 presents estimates from a random effects model without additional covariates. Model 2 additionally includes controls for age, squared age, gender, EU origin, proportion of life spent in Germany, East Germany, rural area, an interaction between East Germany and rural area, working status, education in years, income in quintiles, household size and coresidence with a child. Model 3 presents estimates from a correlated random effects model with the covariates mentioned above using the Mundlak approach. The dependent variable for the estimates in the left panel is defined as 1 if the individual is still observed in t+1 and 0 otherwise. The dependent variable in the panel on the right-hand side is defined as 1 if an individual is observed in t+1 and has the same partner as in t, and 0 if the individual is observed in t+1 but with a different partner. Significance: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

**Figure 1 Differences in social networks**



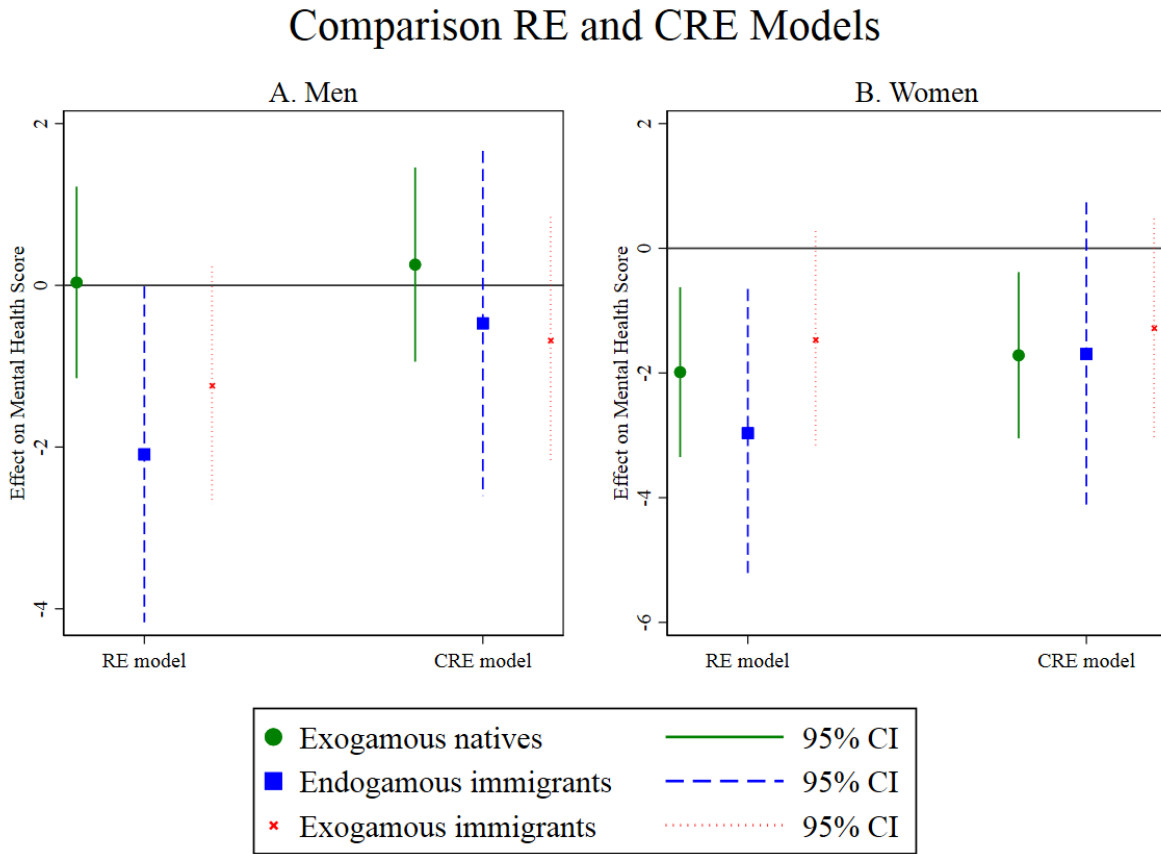
Source: SOEPv34, own calculations. Estimates come from a random effects regression model controlling for demographic, geographic and socioeconomic characteristics as shown in Table A.2 in the appendix. All outcomes were standardized.

**Figure 2 Differences in mental health by gender**



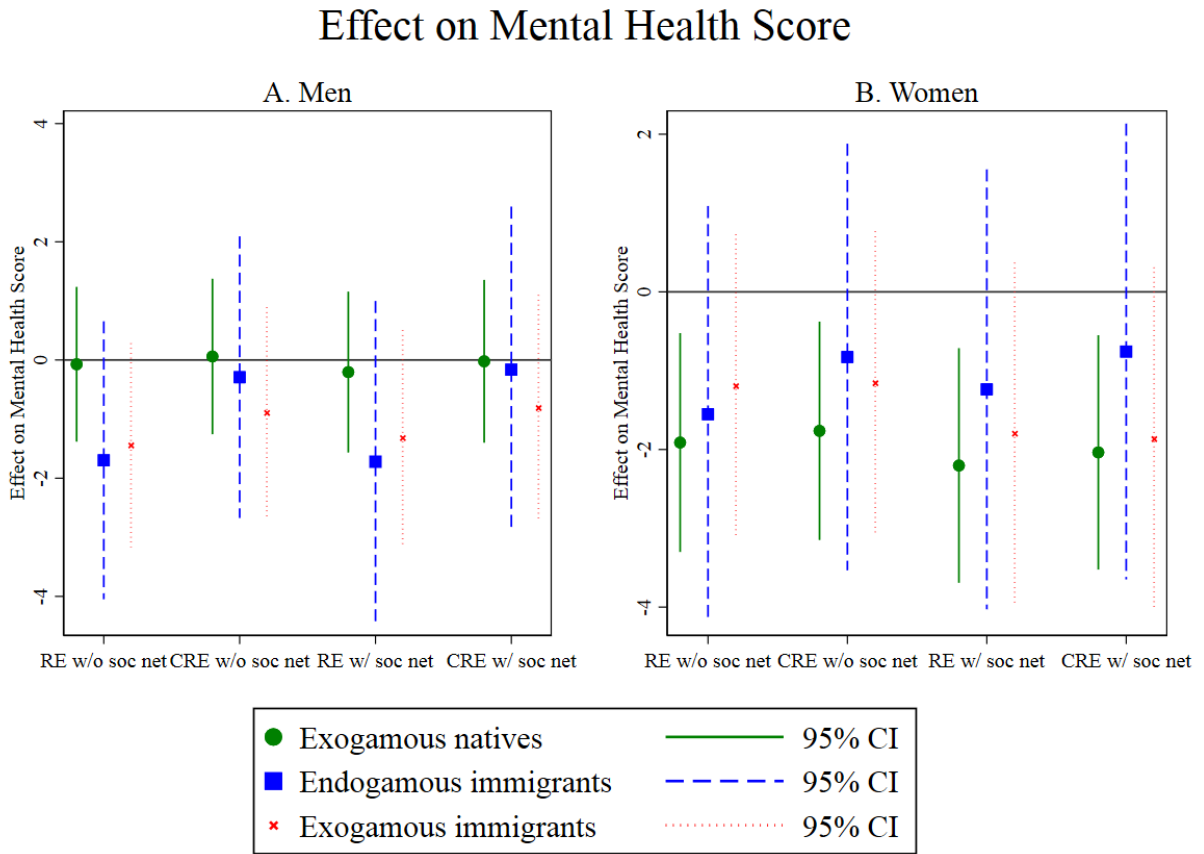
Source: SOEPv34, own calculations. Estimates come from a random effects regression model controlling for covariates as shown in Table A.6 in the appendix..

Figure 3 Model comparison



Source: SOEPv34, own calculations. All models include a full set of covariates as shown in Table A.7 in the appendix. The correlated random effects model (CRE) follows the Mundlak approach and includes within-person means for time-varying characteristics.

**Figure 4 Mental health and social networks**



Source: SOEPv34, own calculations. All models include a full set of covariates as shown in Table A.9 And A.10 in the appendix. The correlated random effects model (CRE) follows the Mundlak approach and includes within-person means for time-varying characteristics.

## Appendix

### Additional Tables

**Table A.1: Descriptive statistics**

	Mean	SD	Min	Max	N
<i>A. Health</i>					
Mental health (SF-12)	52.39	10.04	4.83	79.33	36,107
Physical health (SF-12)	43.54	9.97	9.93	71.37	36,107
<i>B. Demographic characteristics</i>					
Migrant status	0.10	0.30	0	1	36,107
Exogamy	0.07	0.25	0	1	36,037
Age	69.31	6.49	60	99	34,537
Age gap to partner	1.07	5.41	-26	50	33,396
Female	0.45	0.50	0	1	36,107
EU origin	0.95	0.22	0	1	36,107
Proportion of life spent in Germany	0.96	0.15	0	1	36,106
<i>C. Geographic characteristics</i>					
Living in East Germany	0.24	0.43	0	1	36,107
Living in rural area	0.35	0.48	0	1	36,107
<i>D. Socioeconomic characteristics</i>					
Working	0.14	0.34	0	1	36,107
Years of education	11.93	2.76	7	18	35,430
Difference in years of education to partner	0.06	2.62	-11	11	33,379
<i>Income quintile</i>					
1	0.28	0.45	0	1	36,107
2	0.24	0.43	0	1	36,107
3	0.16	0.36	0	1	36,107
4	0.12	0.33	0	1	36,107
5	0.14	0.35	0	1	36,107
Previously divorced	0.18	0.38	0	1	36,090
<i>E. Social networks</i>					
Number of close friends	4.40	4.12	0	90	27,898
Older kin live nearby	0.14	0.35	0	1	23,230
Older kin of the spouse live nearby	0.16	0.37	0	1	22,160
Siblings live nearby	0.41	0.49	0	1	26,297
Siblings of the spouse live nearby	0.41	0.49	0	1	25,153
Younger kin live nearby	0.60	0.49	0	1	25,212
Household size	2.62	1.08	2	17	157,123
Co-residence with child	0.23	0.42	0	1	157,123

Source: SOEPv34, own calculations.

**Table A.2: Analysis of social networks - full sample**

	<b>Number of close friends</b>	<b>Older kin live nearby</b>	<b>Older kin of the spouse live nearby</b>	<b>Siblings live nearby</b>	<b>Siblings of the spouse live nearby</b>	<b>Younger kin live nearby</b>	<b>Household size</b>	<b>Coresidence with child</b>
Immigrant	0.077 (0.089)	-0.072 (0.045)	-0.217*** (0.055)	-0.391*** (0.070)	-0.542*** (0.075)	0.121 (0.074)	0.053 (0.096)	0.293*** (0.098)
Exogamy	-0.083** (0.042)	-0.060* (0.036)	-0.253*** (0.036)	0.007 (0.053)	-0.468*** (0.047)	-0.193*** (0.055)	0.04 (0.025)	0.016 (0.035)
Immigrant x Exogamy	0.082 (0.090)	0.048 (0.053)	0.423*** (0.067)	0.044 (0.079)	1.024*** (0.086)	-0.098 (0.092)	-0.163** (0.069)	-0.268*** (0.084)
Age	0.073*** (0.018)	-0.222*** (0.013)	-0.173*** (0.014)	0.047** (0.018)	0.042** (0.019)	0.031* (0.017)	-0.094*** (0.007)	-0.145*** (0.011)
Age squared	-0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Age gap to partner	0.002 (0.002)	-0.002 (0.001)	0.035*** (0.002)	0.001 (0.002)	0.009*** (0.002)	-0.004* (0.002)	0.015*** (0.001)	0.015*** (0.002)
Female	0.068*** (0.022)	0.006 (0.018)	-0.052*** (0.019)	0.018 (0.024)	-0.029 (0.024)	0.037 (0.023)	0 (0.012)	-0.023 (0.016)
EU origin	-0.099* (0.056)	0.037 (0.036)	0.05 (0.038)	0 (0.050)	0.08 (0.049)	0.002 (0.053)	0.032 (0.023)	0.101*** (0.028)
Proportion of life spent in Germany	0.312** (0.139)	0.150** (0.068)	-0.007 (0.088)	0.348*** (0.107)	0.003 (0.120)	0.316*** (0.120)	-0.603*** (0.171)	-0.305* (0.173)
Living in East Germany	-0.067* (0.035)	0.023 (0.031)	0.033 (0.032)	-0.103*** (0.040)	-0.104*** (0.040)	0.042 (0.037)	0.061*** (0.022)	0.103** (0.045)
Living in a rural area	0.024 (0.024)	0.006 (0.019)	0.051** (0.021)	0.024 (0.026)	0.016 (0.026)	-0.070*** (0.025)	0.012 (0.021)	-0.01 (0.030)
East Germany x Rural area	-0.081* (0.044)	0.013 (0.039)	-0.026 (0.040)	0.039 (0.051)	0.041 (0.051)	0.035 (0.048)	-0.019 (0.033)	-0.045 (0.063)

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Working	-0.074*** (0.022)	0.047* (0.026)	0.085*** (0.028)	0.02 (0.025)	0.022 (0.025)	-0.064** (0.026)	0 (0.010)	0.02 (0.015)
Years of education	0.038*** (0.005)	0.005 (0.004)	0.003 (0.004)	-0.053*** (0.005)	-0.056*** (0.005)	-0.039*** (0.005)	-0.021*** (0.005)	-0.028*** (0.005)
Difference in education to partner	-0.015*** (0.004)	0 (0.004)	-0.009** (0.004)	0.021*** (0.005)	0.035*** (0.005)	0.020*** (0.005)	0.011** (0.004)	0.012** (0.005)
Income: 2nd quintile	0.044*** (0.017)	0.014 (0.014)	0.023 (0.015)	0.006 (0.021)	0.003 (0.020)	-0.014 (0.017)	0.070*** (0.007)	0.086*** (0.010)
Income: 3rd quintile	0.069*** (0.022)	0.01 (0.017)	0.031 (0.019)	-0.011 (0.023)	-0.001 (0.023)	-0.065*** (0.021)	0.154*** (0.012)	0.193*** (0.015)
Income: 4th quintile	0.059** (0.025)	0.006 (0.022)	0.047** (0.023)	0.016 (0.027)	0.012 (0.027)	-0.165*** (0.027)	0.257*** (0.018)	0.327*** (0.020)
Income: 5th quintile	0.124*** (0.030)	0.002 (0.025)	0.026 (0.026)	-0.031 (0.031)	-0.013 (0.031)	-0.225*** (0.033)	0.379*** (0.027)	0.460*** (0.025)
Previously divorced	-0.138*** (0.022)	-0.014 (0.020)	0.035 (0.022)	-0.109*** (0.026)	-0.074*** (0.027)	-0.123*** (0.026)	-0.037*** (0.008)	-0.063*** (0.013)
Constant	-2.904*** (0.667)	8.174*** (0.500)	6.731*** (0.525)	-0.87 (0.665)	-0.424 (0.678)	-0.801 (0.632)	3.886*** (0.312)	5.698*** (0.428)
<i>N</i>	23,718	16,067	16,065	16,317	16,322	15,927	78,021	78,021

Source: SOEPv34, own calculations. Estimates come from a random effects model using all available survey waves. Outcomes are standardized. Standard errors are clustered on the individual level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.3: Analysis of social networks - Men**

	Number of close friends	Older kin live nearby	Older kin of the spouse live nearby	Siblings live nearby	Siblings of the spouse live nearby	Younger kin live nearby	Household size	Coresidence with child
Immigrant	0.194 (0.132)	-0.098** (0.047)	-0.329*** (0.096)	-0.422*** (0.092)	-0.619*** (0.104)	0.002 (0.105)	0.039 (0.138)	0.363** (0.144)
Exogamy	-0.112* (0.058)	-0.049 (0.048)	-0.358*** (0.056)	0.003 (0.071)	-0.459*** (0.068)	-0.229*** (0.075)	0.038 (0.034)	-0.019 (0.048)
Immigrant x Exogamy	0.002 (0.132)	0.04 (0.068)	0.619*** (0.108)	0.015 (0.104)	1.046*** (0.121)	0.037 (0.127)	-0.128 (0.103)	-0.247* (0.127)
Age	0.080*** (0.025)	-0.209*** (0.017)	-0.225*** (0.020)	0.032 (0.023)	0.041* (0.024)	0.032 (0.023)	-0.111*** (0.009)	-0.173*** (0.015)
Age squared	-0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.000** (0.000)	-0.000** (0.000)	0 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Age gap to partner	0 (0.002)	-0.001 (0.002)	0.041*** (0.003)	0.004 (0.003)	0.010*** (0.003)	-0.008*** (0.003)	0.022*** (0.002)	0.022*** (0.002)
EU origin	-0.061 (0.070)	0.057 (0.041)	0.01 (0.058)	0.008 (0.065)	0.025 (0.067)	-0.063 (0.071)	0.058* (0.032)	0.138*** (0.039)
Proportion of life spent in Germany	0.431** (0.191)	0.104 (0.070)	0.021 (0.146)	0.340** (0.138)	-0.033 (0.167)	0.241 (0.165)	-0.798*** (0.248)	-0.308 (0.254)
Living in East Germany	-0.038 (0.048)	0.061 (0.044)	-0.003 (0.047)	-0.186*** (0.051)	-0.046 (0.057)	0.024 (0.052)	0.074** (0.031)	0.115* (0.059)
Living in a rural area	0.024 (0.034)	-0.011 (0.025)	0.060* (0.033)	0.043 (0.035)	0.012 (0.036)	-0.074** (0.034)	0.028 (0.025)	-0.008 (0.040)
East Germany x Rural area	-0.105* (0.060)	-0.03 (0.053)	0.031 (0.061)	0.104 (0.066)	-0.015 (0.072)	0.035 (0.066)	-0.033 (0.044)	-0.039 (0.083)
Working	-0.075** (0.030)	0.016 (0.031)	0.046 (0.037)	0.009 (0.031)	-0.02 (0.031)	-0.077** (0.032)	0.003 (0.013)	0.028 (0.020)

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Years of education	0.027*** (0.006)	0.005 (0.005)	0.008 (0.006)	-0.057*** (0.006)	-0.053*** (0.006)	-0.037*** (0.007)	-0.017*** (0.006)	-0.029*** (0.007)
Difference in education to partner	0.002 (0.006)	-0.006 (0.005)	-0.016*** (0.006)	0.022*** (0.006)	0.029*** (0.007)	0.023*** (0.007)	0.009 (0.006)	0.018** (0.008)
Income: 2nd quintile	0.049** (0.024)	-0.002 (0.019)	0.027 (0.022)	0.02 (0.027)	0.002 (0.028)	-0.011 (0.024)	0.080*** (0.010)	0.099*** (0.014)
Income: 3rd quintile	0.089*** (0.031)	0.017 (0.024)	0.031 (0.028)	-0.012 (0.030)	0.017 (0.032)	-0.056* (0.029)	0.168*** (0.016)	0.216*** (0.021)
Income: 4th quintile	0.067** (0.034)	-0.002 (0.029)	0.051 (0.035)	0 (0.037)	0.033 (0.037)	-0.154*** (0.036)	0.280*** (0.024)	0.359*** (0.027)
Income: 5th quintile	0.141*** (0.041)	-0.018 (0.033)	0.049 (0.041)	-0.041 (0.042)	0.023 (0.041)	-0.210*** (0.044)	0.408*** (0.034)	0.497*** (0.034)
Previously divorced	-0.160*** (0.030)	-0.03 (0.026)	0.007 (0.032)	-0.140*** (0.034)	-0.082** (0.037)	-0.145*** (0.037)	-0.051*** (0.014)	-0.096*** (0.023)
Constant	-3.265*** (0.919)	7.796*** (0.635)	8.748*** (0.772)	-0.292 (0.848)	-0.382 (0.883)	-0.772 (0.859)	4.659*** (0.408)	6.779*** (0.596)
<i>N</i>	12,957	8,864	8,853	9,007	9,002	8,775	43,129	43,129

Source: SOEPv34, own calculations. Estimates come from a random effects model using all available survey waves. Outcomes are standardized. Standard errors are clustered on the individual level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.4: Analysis of social networks - Women**

	Number of close friends	Older kin live nearby	Older kin of the spouse live nearby	Siblings live nearby	Siblings of the spouse live nearby	Younger kin live nearby	Household size	Coreidence with child
Immigrant	-0.033 (0.117)	-0.031 (0.082)	-0.084* (0.048)	-0.350*** (0.108)	-0.448*** (0.109)	0.271*** (0.105)	0.054 (0.123)	0.191 (0.121)
Exogamy	-0.031 (0.059)	-0.078 (0.055)	-0.120*** (0.042)	0.01 (0.080)	-0.481*** (0.063)	-0.144* (0.080)	0.034 (0.032)	0.065 (0.053)
Immigrant x Exogamy	0.136 (0.122)	0.051 (0.086)	0.181** (0.074)	0.077 (0.122)	0.996*** (0.123)	-0.280** (0.134)	-0.151* (0.085)	-0.259** (0.104)
Age	0.067** (0.027)	-0.244*** (0.022)	-0.141*** (0.019)	0.071** (0.031)	0.053* (0.030)	0.037 (0.027)	-0.084*** (0.009)	-0.128*** (0.016)
Age squared	-0.001*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	-0.001*** (0.000)	-0.000** (0.000)	0 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Age gap to partner	0.007** (0.003)	-0.004 (0.002)	0.025*** (0.002)	-0.003 (0.003)	0.008** (0.003)	0.003 (0.004)	0.003** (0.001)	0.005** (0.002)
EU origin	-0.15 (0.096)	0.002 (0.063)	0.087** (0.042)	-0.017 (0.080)	0.144** (0.073)	0.079 (0.079)	-0.007 (0.033)	0.051 (0.039)
Proportion of life spent in Germany	0.233 (0.210)	0.232* (0.126)	-0.039 (0.086)	0.372** (0.168)	0.046 (0.174)	0.397** (0.177)	-0.356* (0.216)	-0.289 (0.214)
Living in East Germany	-0.111** (0.052)	-0.019 (0.043)	0.080** (0.041)	-0.005 (0.061)	-0.170*** (0.056)	0.058 (0.055)	0.056* (0.031)	0.098 (0.072)
Living in a rural area	0.022 (0.036)	0.025 (0.031)	0.038 (0.024)	-0.002 (0.039)	0.022 (0.039)	-0.062* (0.038)	-0.006 (0.033)	-0.014 (0.044)
East Germany x Rural area	-0.043 (0.065)	0.058 (0.057)	-0.091* (0.050)	-0.034 (0.077)	0.105 (0.072)	0.034 (0.071)	-0.002 (0.048)	-0.049 (0.099)
Working	-0.054 (0.033)	0.117** (0.051)	0.077* (0.040)	0.042 (0.043)	0.116** (0.045)	-0.022 (0.045)	-0.047*** (0.012)	-0.056*** (0.018)

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Years of education	0.048*** (0.007)	0.007 (0.006)	-0.001 (0.004)	-0.047*** (0.007)	-0.059*** (0.007)	-0.043*** (0.007)	-0.027*** (0.008)	-0.029*** (0.007)
Difference in education to partner	-0.034*** (0.006)	0.006 (0.005)	0.001 (0.004)	0.021*** (0.007)	0.038*** (0.006)	0.014** (0.006)	0.011* (0.006)	0.004 (0.007)
Income: 2nd quintile	0.034 (0.024)	0.032 (0.021)	0.02 (0.020)	-0.013 (0.031)	0.005 (0.029)	-0.016 (0.025)	0.057*** (0.010)	0.068*** (0.013)
Income: 3rd quintile	0.036 (0.031)	0.001 (0.025)	0.03 (0.024)	-0.011 (0.037)	-0.022 (0.034)	-0.072** (0.030)	0.134*** (0.018)	0.158*** (0.019)
Income: 4th quintile	0.036 (0.037)	0.022 (0.034)	0.046 (0.028)	0.038 (0.041)	-0.01 (0.041)	-0.179*** (0.040)	0.222*** (0.027)	0.278*** (0.027)
Income: 5th quintile	0.095** (0.043)	0.035 (0.039)	-0.001 (0.029)	-0.016 (0.046)	-0.052 (0.048)	-0.241*** (0.048)	0.336*** (0.042)	0.399*** (0.036)
Previously divorced	-0.095*** (0.034)	0.001 (0.032)	0.058** (0.028)	-0.074* (0.039)	-0.073* (0.039)	-0.085** (0.037)	-0.042*** (0.009)	-0.048*** (0.015)
Constant	-2.531** (0.989)	8.837*** (0.820)	5.257*** (0.694)	-1.803* (1.096)	-0.841 (1.068)	-1.015 (0.947)	3.296*** (0.473)	4.963*** (0.631)
<i>N</i>	10,761	7,203	7,212	7,310	7,320	7,152	34,892	34,892

Source: SOEPv34, own calculations. Estimates come from a random effects model using all available survey waves. Outcomes are standardized. Standard errors are clustered on the individual level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.5: Analysis of mental health - full sample**

	<b>Basic model</b>	<b>+ demographic and geographic covariates</b>	<b>+ socioeconomic covariates</b>
Immigrant	-1.935*** (0.324)	-3.483*** (0.773)	-2.374*** (0.787)
Exogamy	-0.745* (0.451)	-1.206*** (0.463)	-0.817* (0.462)
Immigrant x Exogamy	1.625** (0.705)	3.058*** (0.859)	1.889** (0.867)
Age		2.310*** (0.179)	2.329*** (0.188)
Age squared		-0.017*** (0.001)	-0.017*** (0.001)
Age gap to partner		-0.004 (0.018)	0.005 (0.019)
Female		-2.044*** (0.203)	-1.849*** (0.215)
EU origin		0.576 (0.493)	0.275 (0.504)
Proportion of life spent in Germany		-2.118* (1.216)	-1.628 (1.230)
Living in East Germany		-0.974*** (0.358)	-0.763** (0.365)
Living in a rural area		-0.626*** (0.222)	-0.295 (0.227)
East Germany x Rural area		-0.59 (0.453)	-0.832* (0.458)
Working			-0.550*** (0.186)
Years of education			0.233*** (0.040)
Difference in education to partner			-0.025 (0.040)
Income: 2nd quintile			0.191 (0.156)
Income: 3rd quintile			0.721*** (0.189)
Income: 4th quintile			1.121*** (0.214)
Income: 5th quintile			1.270*** (0.233)

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Previously divorced			-0.876*** (0.234)
Constant	52.347*** (0.088)	-21.164*** (6.349)	-25.518*** (6.699)
<i>N</i>	36,037	33,349	31,880

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Source: SOEPv34, own calculations. Estimates come from a random effects model. Standard errors are clustered on the individual-level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.6: Analysis of mental health by gender**

	<b>Basic model</b>		<b>+ demographic and geographic covariates</b>		<b>+ socioeconomic covariates</b>	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Immigrant	-1.771*** (0.421)	-2.330*** (0.498)	-3.088*** (1.026)	-4.079*** (1.172)	-2.091** (1.060)	-2.965** (1.180)
Exogamy	0.105 (0.576)	-2.127*** (0.679)	-0.398 (0.612)	-2.332*** (0.691)	0.036 (0.604)	-1.986*** (0.695)
Immigrant x Exogamy	0.584 (0.913)	3.503*** (1.066)	1.884 (1.156)	4.678*** (1.270)	0.817 (1.163)	3.486*** (1.288)
Age			2.477*** (0.229)	2.129*** (0.292)	2.419*** (0.243)	2.246*** (0.301)
Age squared			-0.018*** (0.002)	-0.016*** (0.002)	-0.018*** (0.002)	-0.017*** (0.002)
Age gap to partner			0.021 (0.023)	-0.047 (0.030)	0.029 (0.025)	-0.048 (0.031)
Female						
EU origin			0.034 (0.673)	1.323* (0.727)	-0.253 (0.685)	1.015 (0.750)
Proportion of life spent in Germany			-1.094 (1.561)	-3.589* (1.894)	-0.591 (1.621)	-3.244* (1.877)
Living in East Germany			-1.535*** (0.489)	-0.32 (0.521)	-1.456*** (0.502)	0.061 (0.532)
Living in a rural area			-0.491* (0.293)	-0.807** (0.338)	-0.183 (0.302)	-0.443 (0.342)
East Germany x Rural area			-0.233 (0.613)	-0.934 (0.671)	-0.391 (0.622)	-1.253* (0.676)
Working					-0.762*** (0.232)	-0.051 (0.319)

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Years of education					0.207***	0.245***
					(0.053)	(0.063)
Difference in education to partner					-0.006	-0.012
					(0.057)	(0.058)
Income: 2nd quintile					0.289	0.078
					(0.206)	(0.236)
Income: 3rd quintile					0.587**	0.889***
					(0.254)	(0.282)
Income: 4th quintile					0.970***	1.313***
					(0.284)	(0.326)
Income: 5th quintile					0.981***	1.719***
					(0.298)	(0.372)
Previously divorced					-0.359	-1.498***
					(0.308)	(0.355)
Constant	53.176***	51.377***	-28.089***	-15.636	-29.025***	-23.860**
	(0.117)	(0.131)	(8.137)	(10.221)	(8.716)	(10.626)
<i>N</i>	19,938	16,099	18436	14,913	17558	14,322

Source: SOEPv34, own calculations. Estimates come from a random effects model. Standard errors are clustered on the individual-level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.7: Methodological Comparisons**

	<i>Full sample</i>		<i>Men</i>		<i>Women</i>	
	<b>RE</b>	<b>CRE</b>	<b>RE</b>	<b>CRE</b>	<b>RE</b>	<b>CRE</b>
Immigrant	-2.374*** (0.787)	-0.932 (0.820)	-2.091** (1.060)	-0.47 (1.088)	-2.965** (1.180)	-1.695 (1.241)
Exogamy	-0.817* (0.462)	-0.635 (0.464)	0.036 (0.604)	0.256 (0.613)	-1.986*** (0.695)	-1.716** (0.680)
Immigrant x Exogamy	1.889** (0.867)	0.631 (0.874)	0.817 (1.163)	-0.466 (1.168)	3.486*** (1.288)	2.133 (1.299)
Age	2.329*** (0.188)	2.634*** (0.224)	2.419*** (0.243)	2.647*** (0.291)	2.246*** (0.301)	2.559*** (0.357)
Age squared	-0.017*** (0.001)	-0.020*** (0.002)	-0.018*** (0.002)	-0.020*** (0.002)	-0.017*** (0.002)	-0.020*** (0.003)
Age gap to partner	0.005 (0.019)	0.136 (0.267)	0.029 (0.025)	0.016 (0.218)	-0.048 (0.031)	4.160*** (0.941)
Female	-1.849*** (0.215)	-1.717*** (0.215)				
EU origin	0.275 (0.504)	0.932 (0.765)	-0.253 (0.685)	0.428 (1.138)	1.015 (0.750)	1.556 (0.996)
Proportion of life spent in Germany	-1.628 (1.230)	-21.998*** (7.926)	-0.591 (1.621)	-22.601** (10.899)	-3.244* (1.877)	-21.472* (11.500)
Living in East Germany	-0.763** (0.365)	3.161* (1.879)	-1.456*** (0.502)	1.101 (2.102)	0.061 (0.532)	5.993** (2.823)
Living in a rural area	-0.295 (0.227)	-1.872 (1.263)	-0.183 (0.302)	-1.667 (1.286)	-0.443 (0.342)	-1.36 (2.069)
East Germany x Rural area	-0.832* (0.458)	-3.703* (2.111)	-0.391 (0.622)	-2.819 (2.461)	-1.253* (0.676)	-5.788* (3.064)
Working	-0.550*** (0.186)	-1.102*** (0.226)	-0.762*** (0.232)	-1.255*** (0.275)	-0.051 (0.319)	-0.779* (0.407)

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Years of education	0.233*** (0.040)	-0.232 (0.311)	0.207*** (0.053)	-0.06 (0.424)	0.245*** (0.063)	-0.326 (0.521)
Difference in education to partner	-0.025 (0.040)	0.159 (0.258)	-0.006 (0.057)	-0.084 (0.391)	-0.012 (0.058)	0.459 (0.332)
Income: 2nd quintile	0.191 (0.156)	-0.071 (0.182)	0.289 (0.206)	0.093 (0.241)	0.078 (0.236)	-0.244 (0.278)
Income: 3rd quintile	0.721*** (0.189)	0.410* (0.232)	0.587** (0.254)	0.289 (0.309)	0.889*** (0.282)	0.584* (0.351)
Income: 4th quintile	1.121*** (0.214)	0.786*** (0.273)	0.970*** (0.284)	0.647* (0.357)	1.313*** (0.326)	1.009** (0.424)
Income: 5th quintile	1.270*** (0.233)	0.547* (0.307)	0.981*** (0.298)	0.235 (0.387)	1.719*** (0.372)	1.051** (0.502)
Previously divorced	-0.876*** (0.234)	-2.581*** (0.666)	-0.359 (0.308)	-2.189** (1.007)	-1.498*** (0.355)	-2.895*** (0.871)
Constant	-25.518*** (6.699)	-25.924** (12.262)	-29.025*** (8.716)	-41.729*** (16.154)	-23.860** (10.626)	-17.578 (19.831)
<i>N</i>	31,880	31,880	17,558	17,558	14,322	14,322

Source: SOEPv34, own calculations. Estimates come from a random effects model (RE) or a correlated random effects model using the Mundlak approach. For time-varying covariates, the coefficient estimates for the CRE model refer to the within-individual variation. Coefficient estimates for the Mundlak means are not shown (available upon request). Standard errors are clustered on the individual-level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.8: Mental health and social networks - full sample**

	<b>RE w/o social networks</b>	<b>CRE w/o social networks</b>	<b>RE w/ social networks</b>	<b>CRE w/ social networks</b>
Immigrant	-1.461 (0.894)	-0.415 (0.914)	-1.319 (0.993)	-0.246 (1.018)
Exogamy	-0.890* (0.492)	-0.763 (0.491)	-1.103** (0.517)	-0.955* (0.518)
Immigrant x Exogamy	1.058 (0.960)	0.185 (0.963)	0.96 (1.041)	0.009 (1.045)
Age	1.926*** (0.230)	2.114*** (0.280)	1.419*** (0.263)	1.620*** (0.323)
Age squared	-0.014*** (0.002)	-0.016*** (0.002)	-0.011*** (0.002)	-0.013*** (0.002)
Age gap to partner	-0.015 (0.021)	0.136 (0.236)	0.013 (0.023)	0.118 (0.303)
Female	-1.832*** (0.239)	-1.702*** (0.239)	-1.846*** (0.251)	-1.738*** (0.252)
EU origin	0.237 (0.623)	-0.045 (1.091)	-0.071 (0.681)	-0.668 (1.271)
Proportion of life spent in Germany	-0.66 (1.392)	-10.007 (9.701)	-0.841 (1.515)	-3.154 (11.801)
Living in East Germany	-0.833** (0.396)	1.485 (2.709)	-0.583 (0.405)	3.429 (3.193)
Living in a rural area	-0.258 (0.254)	-2.019 (1.717)	-0.502* (0.270)	-0.789 (1.826)
East Germany x Rural area	-0.669 (0.499)	-4.064 (2.949)	-0.293 (0.518)	-6.959** (3.464)
Working	-0.407* (0.244)	-1.503*** (0.325)	-0.28 (0.275)	-1.714*** (0.367)
Years of education	0.189*** (0.046)	-0.581 (0.363)	0.143*** (0.049)	-1.464*** (0.470)
Difference in education to partner	-0.016 (0.044)	0.455 (0.289)	-0.007 (0.047)	1.151*** (0.368)
Income: 2nd quintile	0.343 (0.214)	0.099 (0.266)	0.509** (0.234)	0.267 (0.296)
Income: 3rd quintile	1.267*** (0.247)	1.073*** (0.339)	1.498*** (0.266)	1.406*** (0.367)
Income: 4th quintile	1.803*** (0.285)	1.703*** (0.412)	2.163*** (0.312)	2.193*** (0.463)
Income: 5th quintile	2.209*** (0.302)	1.543*** (0.462)	2.815*** (0.332)	2.284*** (0.520)

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Previously divorced	-0.404 (0.260)	-2.199** (0.895)	-0.216 (0.274)	-0.981 (1.096)
Close friends			0.133*** (0.022)	0.035 (0.030)
Older kin close			-1.073*** (0.326)	-1.625*** (0.524)
Partner's older kin close			-0.622** (0.295)	-0.706 (0.464)
Siblings close			0.297 (0.190)	-0.22 (0.328)
Partner's siblings close			0.318* (0.190)	-0.017 (0.339)
Younger kin close			0.098 (0.208)	0.133 (0.360)
Household size			-0.697** (0.325)	-0.101 (0.578)
Co-residence with child			-0.811 (0.516)	-0.381 (0.819)
Constant	-13.864* (8.255)	-23.061 (14.083)	5.979 (9.535)	-4.522 (16.164)
<i>N</i>	16,212	16,212	13,217	13,217

Source: SOEPv34, own calculations. Estimates come from a random effects model (RE) or a correlated random effects model using the Mundlak approach. For time-varying covariates, the coefficient estimates for the CRE model refer to the within-individual variation. Coefficient estimates for the Mundlak means are not shown (available upon request). Standard errors are clustered on the individual-level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.9: Mental health and social networks - Men**

	<b>RE w/o social networks</b>	<b>CRE w/o social networks</b>	<b>RE w/ social networks</b>	<b>CRE w/ social networks</b>
Immigrant	-1.697 (1.200)	-0.291 (1.216)	-1.72 (1.387)	-0.164 (1.408)
Exogamy	-0.072 (0.668)	0.06 (0.671)	-0.205 (0.695)	-0.022 (0.703)
Immigrant x Exogamy	0.327 (1.291)	-0.661 (1.289)	0.608 (1.424)	-0.624 (1.421)
Age	2.130*** (0.295)	2.125*** (0.360)	1.769*** (0.335)	1.851*** (0.418)
Age squared	-0.015*** (0.002)	-0.016*** (0.003)	-0.013*** (0.002)	-0.014*** (0.003)
Age gap to partner	0.024 (0.028)	0.037 (0.238)	0.052* (0.030)	0.185 (0.357)
EU origin	-0.523 (0.819)	-0.94 (1.652)	-1.16 (0.887)	-1.419 (1.930)
Proportion of life spent in Germany	-0.027 (1.792)	-17.258 (13.479)	0.357 (1.985)	-16.066 (16.715)
Living in East Germany	-1.711*** (0.544)	-0.884 (2.499)	-1.518*** (0.554)	2.119 (3.238)
Living in a rural area	-0.188 (0.340)	-2.25 (2.022)	-0.385 (0.361)	-0.623 (2.111)
East Germany x Rural area	0.103 (0.679)	-2.378 (3.095)	0.431 (0.702)	-4.94 (3.735)
Working	-0.559* (0.305)	-1.616*** (0.394)	-0.532 (0.345)	-1.935*** (0.441)
Years of education	0.152** (0.061)	-0.414 (0.494)	0.127** (0.065)	-1.223* (0.646)
Difference in education to partner	0.01 (0.063)	0.174 (0.446)	0.011 (0.066)	0.924 (0.572)
Income: 2nd quintile	0.375 (0.284)	0.297 (0.352)	0.501 (0.308)	0.389 (0.384)
Income: 3rd quintile	0.881*** (0.331)	0.682 (0.448)	1.130*** (0.356)	0.968** (0.487)
Income: 4th quintile	1.484*** (0.377)	1.450*** (0.540)	1.889*** (0.408)	1.986*** (0.600)
Income: 5th quintile	1.950*** (0.387)	1.448** (0.592)	2.524*** (0.423)	2.176*** (0.652)
Previously divorced	0.028 (0.340)	-1.325 (1.312)	0.096 (0.356)	-1.244 (1.555)

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Close friends			0.105***	0.012
			(0.026)	(0.034)
Older kin close			-0.686	-0.303
			(0.450)	(0.730)
Partner's older kin close			-0.589*	-0.901
			(0.347)	(0.554)
Siblings close			-0.021	-0.355
			(0.259)	(0.441)
Partner's siblings close			0.488*	0.323
			(0.254)	(0.447)
Younger kin close			-0.165	-0.34
			(0.268)	(0.454)
Household size			-0.649*	0.531
			(0.378)	(0.740)
Co-residence with child			-0.652	-1.366
			(0.621)	(1.016)
Constant	-21.044**	-49.767***	-6.569	-30.02
	(10.685)	(18.618)	(12.288)	(21.254)
<i>N</i>	8,935	8,935	7,298	7,298

Source: SOEPv34, own calculations. Estimates come from a random effects model (RE) or a correlated random effects model using the Mundlak approach. For time-varying covariates, the coefficient estimates for the CRE model refer to the within-individual variation. Coefficient estimates for the Mundlak means are not shown (available upon request). Standard errors are clustered on the individual-level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table A.10: Mental health and social networks - Women**

	<b>RE w/o social networks</b>	<b>CRE w/o social networks</b>	<b>RE w/ social networks</b>	<b>CRE w/ social networks</b>
Immigrant	-1.552 (1.348)	-0.827 (1.381)	-1.237 (1.424)	-0.757 (1.475)
Exogamy	-1.912*** (0.708)	-1.763** (0.707)	-2.203*** (0.760)	-2.037*** (0.758)
Immigrant x Exogamy	2.271 (1.419)	1.434 (1.429)	1.644 (1.512)	0.929 (1.542)
Age	1.731*** (0.378)	2.125*** (0.457)	0.934** (0.441)	1.197** (0.534)
Age squared	-0.013*** (0.003)	-0.017*** (0.003)	-0.007** (0.003)	-0.010*** (0.004)
Age gap to partner	-0.080** (0.033)	1.585 (2.226)	-0.060* (0.035)	-1.751 (2.136)
EU origin	1.319 (0.975)	1.097 (1.387)	1.538 (1.068)	0.203 (1.491)
Proportion of life spent in Germany	-2.091 (2.200)	-3.562 (13.897)	-3.293 (2.347)	13.536 (16.049)
Living in East Germany	0.25 (0.576)	6.447 (5.660)	0.517 (0.591)	5.949 (5.882)
Living in a rural area	-0.349 (0.380)	-1.351 (2.858)	-0.638 (0.405)	-0.515 (3.120)
East Germany x Rural area	-1.507** (0.732)	-8.535 (5.790)	-1.016 (0.762)	-10.795* (6.108)
Working	0.059 (0.416)	-1.212** (0.598)	0.261 (0.466)	-1.079 (0.676)
Years of education	0.212*** (0.071)	-0.591 (0.619)	0.132* (0.078)	-1.591* (0.823)
Difference in education to partner	-0.006 (0.063)	0.792** (0.380)	0.014 (0.068)	1.359*** (0.489)
Income: 2nd quintile	0.314 (0.323)	-0.1 (0.407)	0.544 (0.357)	0.137 (0.465)
Income: 3rd quintile	1.745*** (0.370)	1.604*** (0.518)	1.971*** (0.399)	1.947*** (0.559)
Income: 4th quintile	2.186*** (0.438)	2.035*** (0.638)	2.529*** (0.485)	2.440*** (0.728)
Income: 5th quintile	2.613*** (0.479)	1.717** (0.735)	3.291*** (0.533)	2.482*** (0.850)
Previously divorced	-1.018** (0.400)	-2.955** (1.219)	-0.747* (0.425)	-1.099 (1.570)

*...continued on next page*



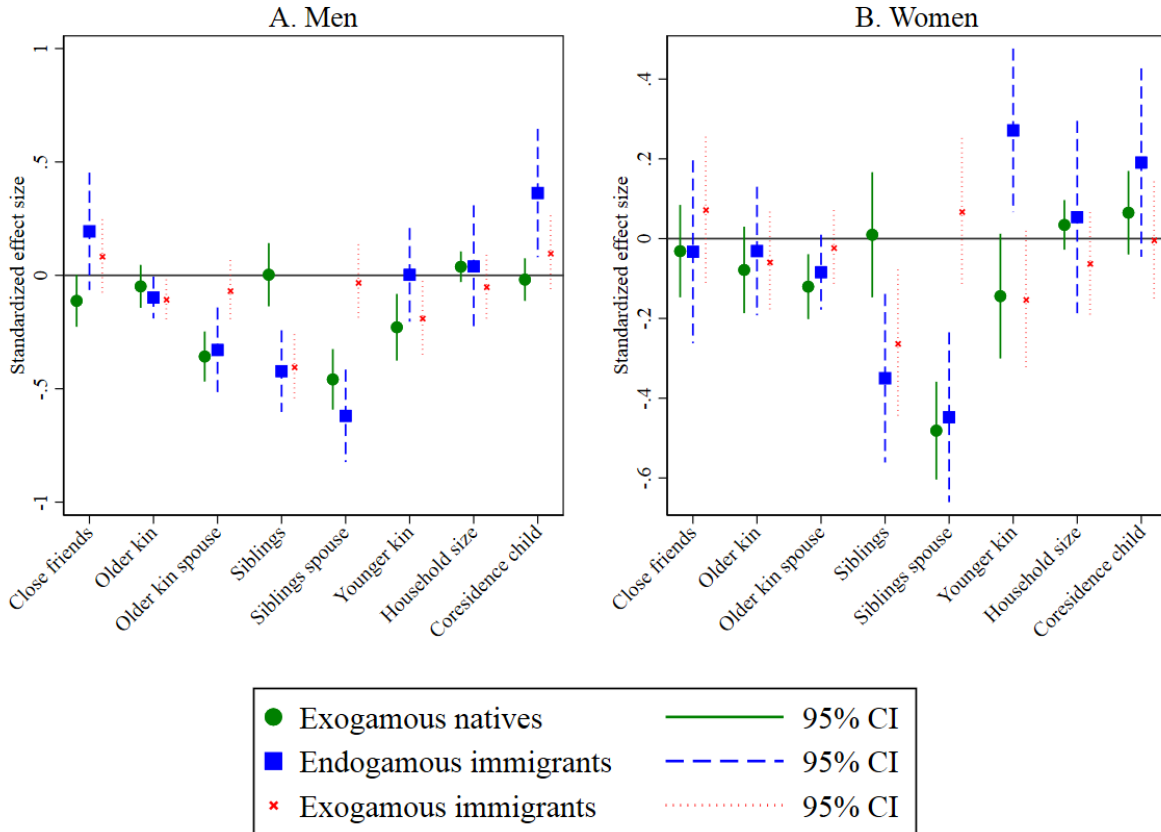
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Close friends			0.179*** (0.036)	0.081 (0.053)
Older kin close			-1.493*** (0.473)	-3.224*** (0.752)
Partner's older kin close			-0.695 (0.567)	-0.388 (0.868)
Siblings close			0.669** (0.281)	-0.026 (0.491)
Partner's siblings close			0.105 (0.287)	-0.504 (0.524)
Younger kin close			0.485 (0.328)	0.887 (0.596)
Household size			-0.99 (0.645)	-1.397 (0.921)
Co-residence with child			-0.935 (0.945)	1.622 (1.380)
Constant	-8.576 (13.346)	0.922 (22.464)	22.312 (15.681)	21.221 (26.701)
<i>N</i>	7,277	7,277	5,919	5,919

Source: SOEPv34, own calculations. Estimates come from a random effects model (RE) or a correlated random effects model using the Mundlak approach. For time-varying covariates, the coefficient estimates for the CRE model refer to the within-individual variation. Coefficient estimates for the Mundlak means are not shown (available upon request). Standard errors are clustered on the individual-level. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

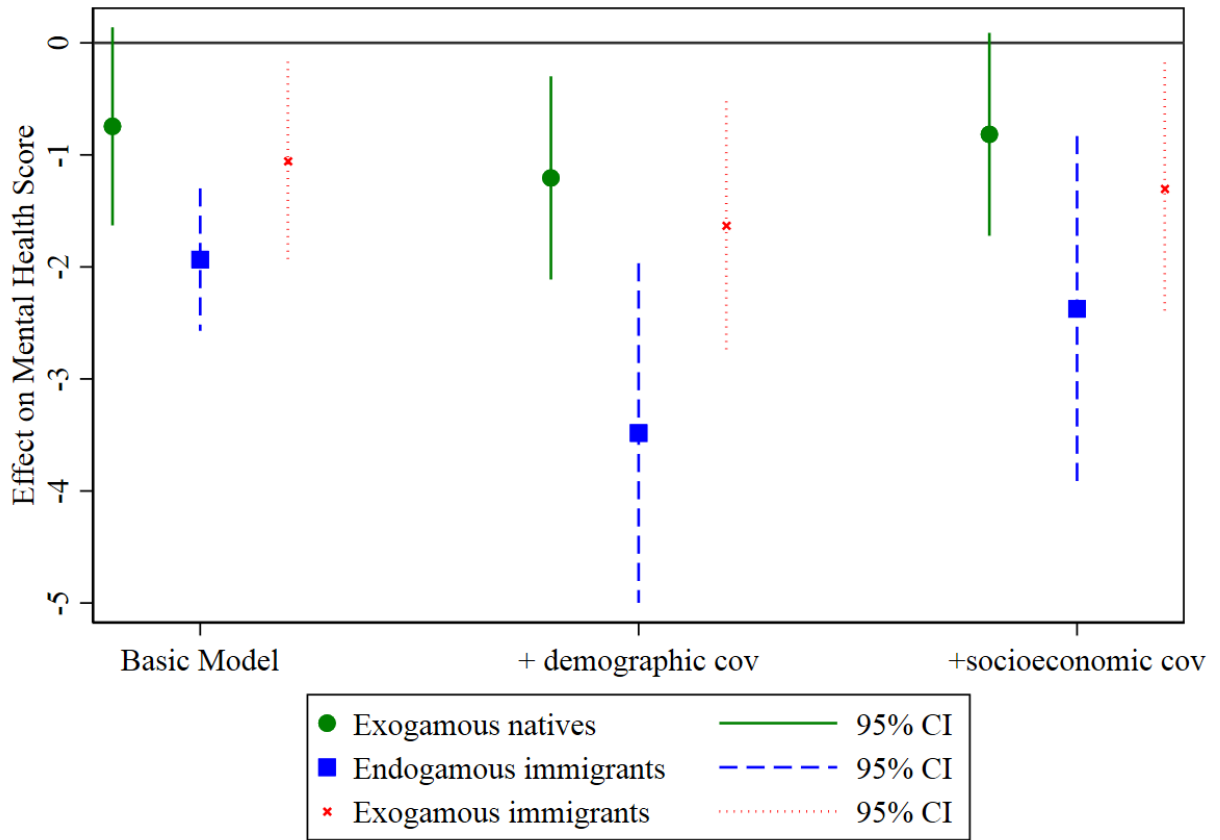
## Additional Figures

**Figure A.1 Differences in social networks by gender**



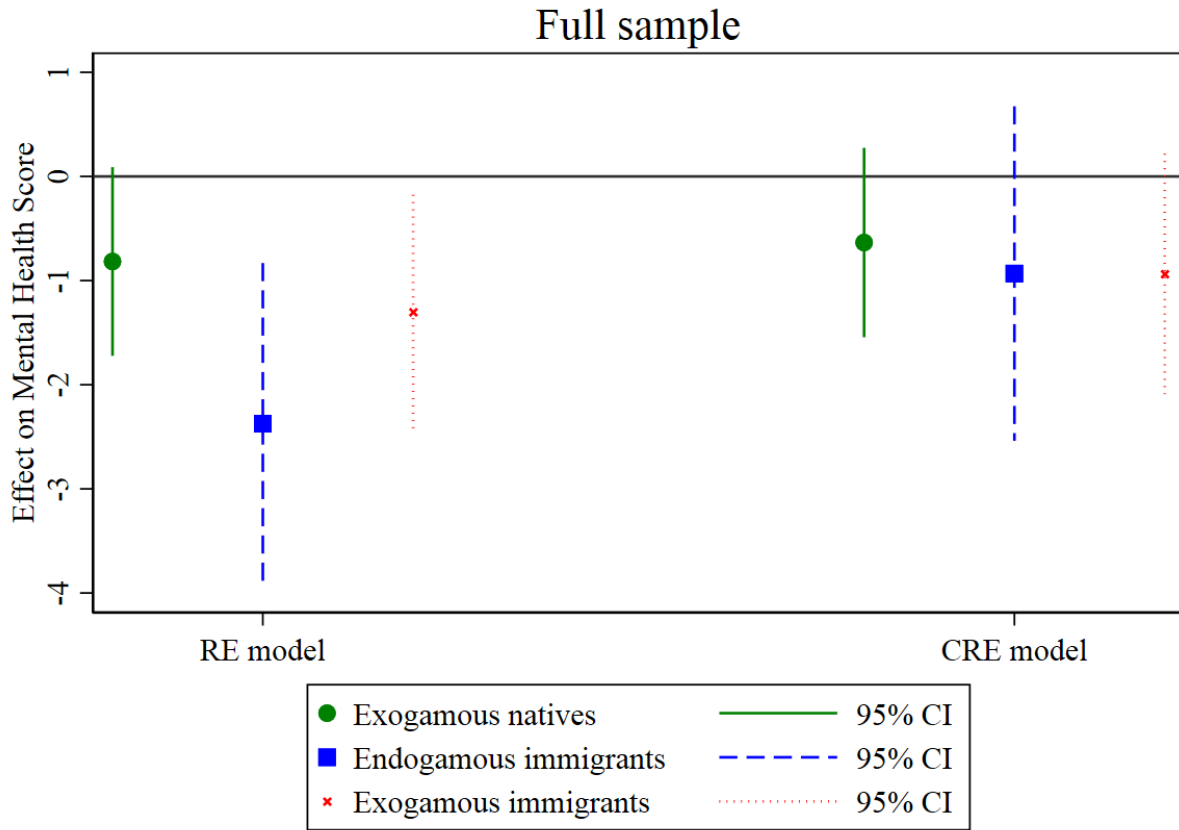
Source: SOEPv34, own calculations. Estimates come from a random effects regression model controlling for demographic, geographic and socioeconomic characteristics as shown in Table A.3 and A.4. All outcomes were standardized.

Figure A.2 Differences in mental health – full sample



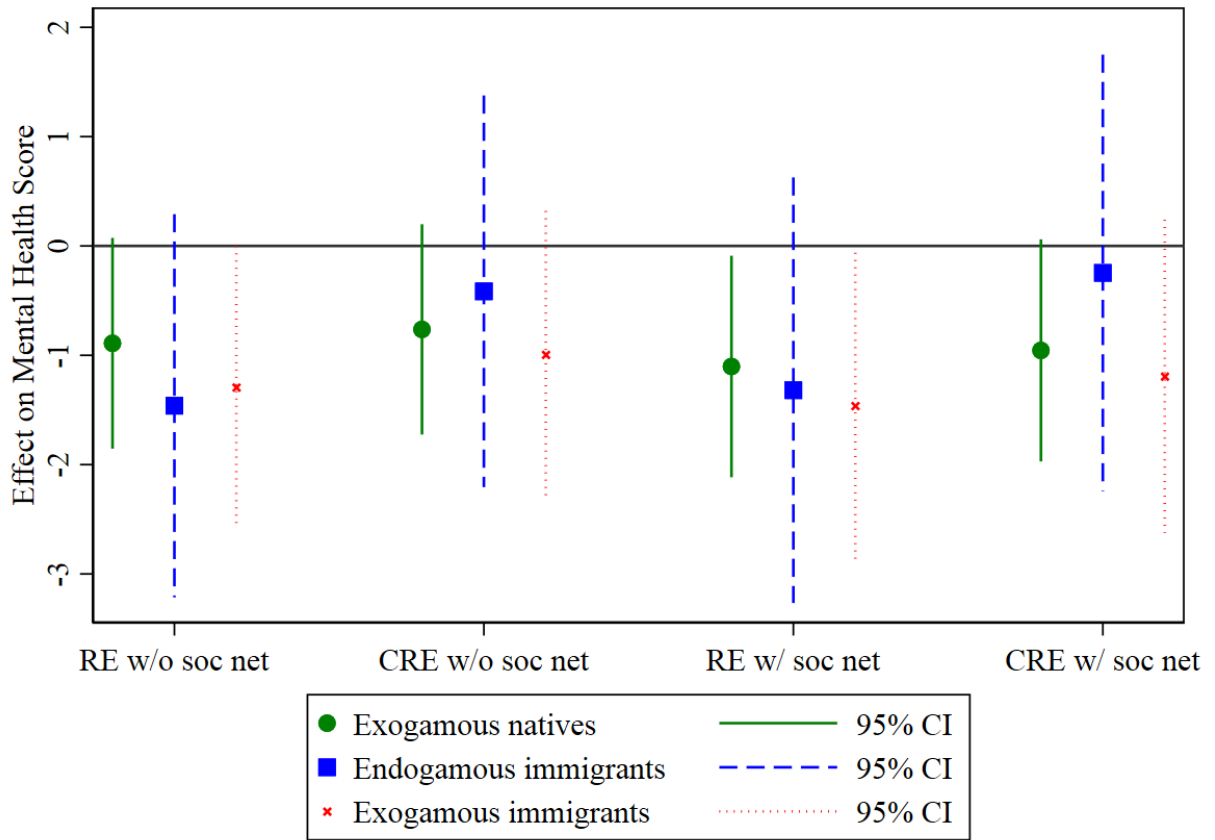
Source: SOEPv34, own calculations. Estimates come from a random effects regression model controlling for covariates as shown in Table A.5 in the appendix..

Figure A.3 Model comparison



Source: SOEPv34, own calculations. All models include a full set of covariates as shown in Table A.7 in the appendix. The correlated random effects model (CRE) follows the Mundlak approach and includes within-person means for time-varying characteristics.

**Figure A.4 Mental health and social networks**



Source: SOEPv34, own calculations. All models include a full set of covariates as shown in Table A.8 in the appendix. The correlated random effects model (CRE) follows the Mundlak approach and includes within-person means for time-varying characteristics.