

## RESEARCH ARTICLE

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# For better or for worse mental health? The role of family networks in exogamous unions

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## Abstract

This study tests whether being in an exogamous union affects older individual's family networks, and whether associations between exogamy and mental health reported in previous studies operate through changes in family ties and differ by gender. We focus on individuals aged 60 or above in the German Socio-Economic Panel Study between 2002 and 2016. We describe demographic and family characteristics of individuals in different types of union and estimate correlated random effects models on the changes of mental health. Exogamous immigrants have larger family networks than endogamous immigrants due to a higher chance of having in-laws nearby, while exogamous natives have smaller family networks than their endogamous counterparts. Native women in a union with immigrants exhibit worse mental health than endogamous native women, and the same disadvantage is held by immigrant men partnered with native women. Family networks influence mental health but contribute little to observed differences.

## KEYWORDS

aging, exogamy, Germany, mental health, migration

## 1 | INTRODUCTION

Societies have become increasingly heterogeneous due to migration. One salient example is the marriage market, where the share of unions between people of different origins have risen steadily over the past few decades (González-Ferrer, Obućina, Cortina, & Castro-Martín, 2018; Lanzieri, 2012). At the same time, most high-income countries are rapidly aging, and the mental health and well-being of older adults are becoming pressing issues. Taken together, these two phenomena raise the question on whether the experiences of older adults in exogamous and endogamous unions differ by gender and union type. This study examines the differences in mental health among older native and immigrant men and women in endogamous and exogamous unions in Germany.

Exogamous unions, or intimate partnerships between an immigrant and a native, have several implications on family dynamics in a

society. On the one hand, mixed union is believed to be the ultimate sign of migrant integration (Alba & Nee, 2009) and a step toward a pluralist society. On the other hand, from an individuals' perspective marriage or cohabitation with someone of distinctive cultural and religious background can be prone to conflict (Hohmann-Marriott & Amato, 2008) and a higher risk of union dissolution (Kalmijn, de Graaf, & Janssen, 2007), leading to lower life satisfaction and poorer mental health (Kalmijn, 2017), in line with the classical view on the hazard of heterogamy (Kalmijn, 1998).

In the German context, the subjective well-being of individuals in mixed marriages does not seem to vary significantly from those who marry a partner of the same origin in the long run, and the impact of intermarriage affects individuals by gender and nativity (Potarca & Bernardi, 2020). Milewski and Gawron (2019) also found that in exogamous marriages, migrants report lower levels of depression ("migrant gain") and natives report higher levels of depression ("native strain")

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compared to their respective endogamous counterparts. These studies highlight the importance of assessing the cost and benefits for both the immigrant and the native individual in a union, which intuitively raises the question as to why exogamy affects immigrants and natives differently, since the penalty of heterogamy should affect individuals indiscriminately. One pathway through which distinctive directions of effects on mental health can occur for the two groups is via the social capital potentially gained or lost through exogamous union formation. This has been suggested by the latter study but never been empirically tested to our knowledge.

Union formation with a native at the destination country offers an opportunity for immigrants to expand their local family network (Koelet & de Valk, 2016; Koelet, Mol, & de Valk, 2017; Martinovic, van Tubergen, & Maas, 2009). It is a direct invitation into extended family networks in the destination country. The family networks gained through marriage can serve to improve one's social capital, which can transform into other types of capitals (Bourdieu, 2018), such as health. Competing with this hypothesis, having more family members nearby, particularly those of older generations, can also be a source of stress with its toll on mental health. The latter mechanism has been known to disproportionately affect women, who both receive and provide more care (Penning & Wu, 2013). To answer these questions, we investigate the mental health of older adults aged 60 and above, using the German Socioeconomic Panel. We focus our analyses on eight groups of older individuals based on three dimensions: gender, nativity, and union type, namely, male and female endogamous natives (German-born, without migration background), exogamous natives, endogamous immigrants (non-German-born), and exogamous immigrants. Family networks are defined as the proximity of one's own and partner's kin, separated by generations (older, same, younger), inside and outside of the household. We first examine the selection into exogamy by exploring the socio-economic and demographic characteristics of those who enter mixed unions. Then we analyze the family networks of exogamous and endogamous natives and immigrants. Lastly, we estimate correlated random effects models to test the extent to which social networks influence older adults' mental health for the eight groups.

Our results show that exogamy expands immigrants' family networks but contracts natives'. Having younger kin and siblings nearby are beneficial to one's mental health. Living with one's child and having older kin nearby have a negative impact on older adults' mental health. We find that exogamous native women face a persistent mental health disadvantage compared to endogamous native women, while the mental health of exogamous and endogamous native men are similar. The gap in mental health between endogamous natives and endogamous immigrants seems to be largely attributable to selection.

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 family networks of the different groups as a potential mediator to differential mental health,

accounting for panel attrition and union dissolution. Lastly, we use correlated random effects models to address both group-level differences and within-subject changes in mental health over time. This study sheds light on the pathway between mental health and family networks for older individuals in Germany over time.

## 2 | BACKGROUND

European societies are simultaneously graying and rapidly diversifying due to population aging and increasing mobility across borders. 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 increasing from roughly 1.4 million to 1.8 million in France and 0.8 million to 1 million in the United Kingdom from 2009 to 2018 (Eurostat, 2019). In Germany, where the group of older foreign-born individual has grown from 0.7 million to 0.9 million, an increasing number of immigrants across all ages have formed domestic partnership with German natives, changing the family demographics of Germany (Destatis, 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, Mulder, Kibele, & Janssen, 2018), while those of older individuals in mixed unions are even less explored.

### 2.1 | Immigrant mental health advantage or disadvantage?

Findings on the overall health status of older immigrants versus non-immigrants have been contradictory, some of which point to an immigrant health advantage due to the self-selection process of migration, known as the "healthy migrant effect" (Razum, Zeeb, Akgün, & Yilmaz, 1998), while others suggest a disadvantage due to challenges such as institutional barriers (Carnein, Milewski, Doblhammer, & Nusselder, 2015; de Valk, Fokkema, & Apt, 2018; Kristiansen, Razum, Tezcan-Güntekin, & Krasnik, 2016; Reus-Pons et al., 2018). Studies tackle different contextual risk factors to which immigrants and natives are dissimilarly exposed to, leading to distinctive outcomes in a range of diseases and injuries (Kristiansen et al., 2016). For mental health, the literature indicates an immigrant disadvantage (Levecque & Rossem, 2015; Milewski & Doblhammer, 2014; Rechel, Mladovsky, Ingleby, Mackenbach, & McKee, 2013; Reus-Pons et al., 2018) linked to exposures to conditions such as poor labor market prospects (Kogan, 2016), discrimination (Schunck, Reiss, & Razum, 2015), and having limited social capital in the destination country (Johnson, Rostila, Svensson, & Engström, 2017).

Of the studies that focus on immigrants' mental health, few have explored the degree to which family network (Cela & Fokkema, 2016; Van den Broek & Grundy, 2017) mediates the effect of immigrant status on mental health. Family relationships are often characterised by

mutual physical and emotional support across societies, but they might be especially intimately connected to one's well-being for those whose culture heavily emphasises family solidarity (Kagitcibasi, 2017; Mair, 2013) and collectivism (Burholt, Dobbs, & Victor, 2018). For women in particular, despite generally reporting a lower baseline of mental health (Simon, 2002), they are more prone to maintain close ties with friends and family than men, with their mental health particularly responsive to relationship qualities (Campos, Ullman, Aguilera, & Dunkel Schetter, 2014).

When measuring the health disadvantage of older immigrants, a challenge invariably arises: the salmon bias. If unhealthy or aging immigrants reliably return to their country of origin to live out the remainder of their lives, calculation from the destination country can render them "statistically immortal" (Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). There is evidence that less successful immigrants are more prone to return to their country of origin in old age (Yahirun, 2014), which might partly explain the lower mortality of Turkish-origin individuals in Germany compared to ethnic Germans (Razum et al., 1998). This process is less often considered in mental health studies on immigrants but may play a role in the underestimation of immigrant mental health issues.

We draw from a larger body of research on the aging processes of all individuals, which highlights the importance of frequent social contacts on mental health for older adults, and target a specific challenge that immigrants face, namely, having fewer family members in their destination country. To test whether social capital operates through family network in the destination country, and whether the lack thereof matters for immigrants' mental health, we scrutinise a growing phenomenon: exogamous unions between immigrants and natives.

## 2.2 | Exogamy, family network, and mental health

Social interactions with family and friends have been shown to be strongly linked to better mental health for the older population, consistent with the idea of linked lives (Mortimer & Shanahan, 2007). Married or partnered individuals have better mental health in old age compared to their single counterparts (Cramm, van Dijk, & Nieboer, 2013; Dahlberg, Andersson, McKee, & Lennartsson, 2015; Simon, 2002), particularly those who enjoy high-quality spousal relationship (Stokes & Moorman, 2018). 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. Individuals are more likely to lose contact with friends rather than family over time, thus the weight of social networks shifts towards family as individuals age (Shaw, Krause, Liang, & Bennett, 2007). Of all family relationships, parents, siblings, and children are particularly considered indispensable core family members (Komter & Vollebergh, 2002).

The family network of individuals of migration and nonmigration background are likely to differ, due to the event of migration which often entails separation among nuclear, and especially extended, family members. 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 serves as a conduit to local networks.

Having local family ties can potentially mitigate some of the elevated risk factors that immigrants experience. Immigrants often face challenges such as linguistic barrier and poor access to services (Arai, 2005). In combination with discrimination, these immigrant-specific challenges are linked to negative mental health outcomes, such as anxiety and depression (Robila, 2010). Approaching intermarriage as a sign of blurring ethnic and social boundaries for immigrants and the host society is well-established in the literature (Blau, Beeker, & Fitzpatrick, 1984; Blau, Blum, & Schwartz, 1982), but much less attention has been paid to the potential benefits of gaining native family members through marriage.

To understand the relationship between exogamy and mental health at older ages, we focus on a specific outcome of mixed union: family network expansion or contraction. We ask the following questions: First, does the expansion or contraction of family networks through one's spouse mediate the relationship between exogamy and mental health? Second, to what extent can we attribute the differences in mental health between endogamous and exogamous couples to differences in observed and unobserved characteristics? Third, do family members of younger, same, older generation and of one's own or in-laws differ in their effect on mental health? Lastly, does the gain or strain from exogamous union differ between men and women?

Marital homogamy, exemplified by forming a relationship with someone of the same origin, is more commonplace (Qian & Lichter, 2011), hence the selection of those who enter an exogamous union may play a role in mental health in older ages. Exogamous unions are more prone to conflict and dissolution (Milewski & Kulu, 2014; Smith, Maas, & van Tubergen, 2012; Saarela & Finnäs, 2018), which have a negative impact on mental health (Simon, 2002). Interestingly, exogamous natives tend to experience a strain on mental health and exogamous immigrants experience a gain (Milewski & Gawron, 2019), pointing to a possibility that the gain stems from the benefit of social capital through interethnic contacts provided by the native spouse (Martinovic et al., 2009), while the strain may be due to the natives benefitting little as the more endowed, in combination with being perceived as having matched downward (Qian, 2005).

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.

The direction of causality between immigrant integration and exogamy is difficult to establish (Dribe & Lundh, 2008). Immigrants who are more integrated (as expressed, for example, by better language skills (Kulu & Hannemann, 2019), might simultaneously be more likely to marry natives and have better mental health as a result of their high level of integration. Similarly, immigrants who marry natives have been shown to enjoy a wage premium (Dribe & Nystedt, 2015), along with interactions of other benefits brought by social capital (Nyqvist, Forsman, Giuntoli, & Cattani, 2013), which can enhance mental health. Studies that use longitudinal design to examine the mental health of exogamous individuals in old age are far and few in between.

A comprehensive approach to conceptualizing family networks should distinguish between one's own or partner's family, inside or outside of the household, and whether the family member is of older, younger, or same generation. Not all family ties are beneficial for mental health (Birditt, Hartnett, Fingerman, Zarit, & Antonucci, 2015; Guo, Li, Liu, & Sun, 2015), given that in-law relatives may or may not be viewed as close kin and having older family members nearby who require rather than provide care may contribute to more stress than relief (Schmitz & Westphal, 2015; Uccheddu, Gauthier, Steverink, & Emery, 2019). The intergenerational stake hypothesis also stipulates that people tend to be more emotionally attached to their children than to their parents (Birditt et al., 2015), hence having the former nearby is likely to have a more positive effect on one's mental health than having the latter in close proximity. In the German context, having a (potentially adult) child still living in the household can be seen as undesirable for older individuals (Reher, 1998).

Taken together, we formulate the following hypotheses. First, we expect that exogamous immigrants and endogamous natives will have more kin nearby, translating into a mental health advantage over endogamous immigrants and exogamous natives (H1). Taking the characteristics of individuals who enter mixed union into consideration, we hypothesise that the effect of exogamous union is partially derived from differences in these characteristics, and partially due to the expansion of family networks. (H2). Third, in line with the intergenerational stake hypothesis and considering the norms of family systems of Europe (Reher, 1998), we expect having younger and own kin nearby, but not in the same household, will offer higher benefits than having older and in-law kin nearby, while kin of the same generation will fall somewhere in between (H3a). We also hypothesise that individuals will benefit from having their own parents rather than in-laws nearby (H3b) based on prior research that have shown that in-law conflict is often a source of difficulties in a mixed union (Greif & Saviet, 2020). Lastly, we speculate that having younger kin nearby will benefit, and having older kin nearby will penalise, women's mental health more so than men's, due to women's higher levels of interaction and intensity of relationship with family members (H4). Assuming that in-laws are more likely to be around if one is partnered with a native, exogamous immigrant women's mental health might be the poorest of all.

### 3 | DATA

The German Socioeconomic Panel (DIW, 2019) is a representative longitudinal household survey for which data are collected annually since 1984 to the present day. The data, at present 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. For this study, we focus on information obtained through the main personal questionnaire to ensure compatibility across subsamples, that is, we do not draw on any immigrant- or refugee-specific questions.

#### 3.1 | Sample selection and union information

The GSOEP surveys all household members in participating households. This study centers on married or cohabitating individuals aged 60 or older. We use information on the migration background and country of birth to categorise individuals 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 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. We exclude descendants of immigrants (i.e., individuals born in Germany whose parents were not born in Germany) from the analysis as their experiences likely differ from those of first-generation migrants. 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.

For the purpose of this study, we do not distinguish between cohabitating and marital partners. We capture all those who have a partner of opposite sex living within his or her household. We categorise 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 due to the small size of this group.

### 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 (i.e., general health, mental health, pain, vitality, role limitations due to emotional problems, role limitations due to physical problems, social functioning, and 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 et al., 2007). These scores are normalised 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 sub-populations and are widely used in the social and medical sciences (Gebel & Voßemer, 2014; Marcus, 2013; Schunck et al., 2015). 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.

### 3.3 | Family ties

We consider family ties both inside and outside of the household. Ties within the household are operationalised through binary variables indicating (i) coresidence with a (potentially adult) child, (ii) coresidence with a parent, (iii) coresidence with a parent-in-law, (iv) coresidence with a sibling, (v) coresidence with a sibling-in-law, and (vi) coresidence with a grandchild. We operationalise family ties outside the household by taking into account the availability and location of kin of the respondents as well as their partner's living outside of the household. Among kin, we separate family members into one's own parents, “younger kin” (own children or grandchildren), and “siblings,” and those of one's partner'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 1 h driving distance. We do not distinguish between individuals with existing but distant kin and individuals without a certain type of kin.

Family ties within the household are constructed from the recorded IDs within the panel and are therefore available every year.

Information on kin outside the household was only surveyed in 1991, 1996, 2001, 2006, 2011, and 2016. Information on mental health and kin outside the household are only available in 2006 and 2016. Therefore, when analyzing the relationship between mental health and family ties, we impute information on ties outside the household using the last observed value for the years 2002 and 2012. Thus, the final sample for our analysis of the relationship between mental health and family ties covers the years 2002, 2006, 2012, and 2016. In a sensitivity analysis (available on request), we use self-reported health (which is available in every year) as an outcome to examine whether this imputation procedure is likely to affect our results. The results using the imputed data are closely comparable to those using the original, raw data. While the results deviate from those presented in this study, likely due to the inherent differences between self-reported general health and mental health measured by the SF-12, we argue that nonetheless this suggests that the imputation is unlikely to affect our results substantially.

### 3.4 | Covariates

In our models, we control for demographic, socioeconomic, psychosocial, and geographic characteristics of the respondents. We include 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, age squared, gender, and origin. For socioeconomic variables, we look into household income, education, and whether or not respondents are still working. We also control for respondent's age at their first job as well as the occupational prestige of their first job. For psychosocial characteristics, we include indicators of risk aversion, control beliefs and personality traits. 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. In this study, we argue that distinguishing between EU and non-EU immigrants would 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 (including Germany) was a member state of the European Union at the time of the survey, and zero otherwise, is included.

We categorise the age of migration to Germany by younger than the age of 12, 12 to 17, and 18 or older, commonly used cut-offs for age of arrival in migration research (e.g., Choi & Tienda, 2017). Years of education and income, important indicators of socioeconomic status, are known to reliably influence mental health (McBride, 2001). We also consider whether or not an individual is still working and whether or not he or she has experienced divorce or widowhood, both of which can have negative impact on mental health (Simon, 2002). Socioeconomic characteristics such as income or

employment might be influenced by union status. Therefore, we also consider two characteristics from an individual's employment biography. We control for their age at first job as well as the Standard International Occupational Prestige (SIOP) score (Ganzeboom & Treiman, 1996) of their first job.

Psychosocial characteristics and personality traits are often considered to be relatively stable over the life course, and they are relevant predictors of union formation (Lundberg, 2012). Therefore, we include measures of risk aversion, control beliefs, and personality traits in our analysis. For risk aversion, individuals are asked to rate their willingness to take risks on a scale ranging from 0 to 10. Locus of control is assessed using the responses to seven questions, which are aggregated into a single measure following the procedure described by Caliendo, Cobb-Clark, Obst, Seitz, and Uhlendorff (2020). The resulting index measures to which extent individuals perceive themselves to be in control of their lives. Personality traits are measured using a 15-item version of the Big Five Inventory. We follow Anger and Schnitzlein (2017) and aggregate these 15 items into five measures, which express an individual's personality in terms of openness, agreeableness, conscientiousness, neuroticism, and extroversion. Risk aversion was assessed in 2004, 2006, and annually from 2008 onwards. Locus of control was assessed in 1999, 2005, 2010, and 2015, and the Big Five Inventory was included in 2005, 2009, 2013, and 2017. In line with previous studies we assume that these constructs remain largely stable (Anger & Schnitzlein, 2017; Lundberg, 2012), and we therefore use the first available measurement as a time-invariant measure for all respondents.

To account for geography, we add an indicator for respondents living in East Germany and one for those living in rural areas. Individuals living in rural areas might have more limited access to mental health specialists (Koller et al., 2010) and important differences remain in the living conditions and health outcome between east and west Germans (Eibich & Ziebarth, 2014).

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; Qian & Lichter, 2018; Zhang & Van Hook, 2009). There is a high degree of religious homogamy in our sample (over 94% of Muslims marry other Muslims). Consequently, controlling for religious heterogamy does not affect our estimates (results not shown). We therefore exclude it from our final model. For age and education, we construct a variable measuring the differences in age and years of education between the respondent and their partner.

## 4 | METHODS

We conduct our analysis in four steps. First, we examine differences in observable characteristics between natives and immigrants in exogamous and endogamous unions to gain a better understanding of the underlying processes, using the baseline sample of 26,569 person-year observations covering the period 2002–2016. We regress the

indicator for exogamous union on age, the age gap between partners, EU origin, age at migration, years of education, the difference in years of education to the partner, risk aversion, locus of control, personality traits, employment biography, and survey wave dummies. Unfortunately, it is not possible to analyze the initial selection into unions. The GSOEP only started collecting data in 1984. Since we focus on individuals aged 60 and above, it is likely that many unions included in the sample were formed before this date.

Second, we examine differences in family ties by immigrant status and union type by regressing our measures of family ties on a binary indicator for immigrants, a binary indicator for exogamous unions, and an interaction of these two variables. This operationalisation is numerically equivalent to using group indicators. In all models we control for the demographic, socioeconomic and geographic control variables as well as survey year as 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 correlated random effects models (CRE) using the approach developed by Mundlak (1978) to account for the longitudinal structure of the data. 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 CRE model allows us to control for time-invariant unobserved individual characteristics under the assumption that the unobserved characteristics are only correlated with the within-individual means of the covariates and not with the within-person changes. This assumption is more restrictive than the fixed effects model, but it allows us to obtain estimates for time-invariant characteristics, such as migration status. Moreover, we cannot estimate fixed effects models due to a lack of within-person variation in union type for immigrants.

In the third step, we estimate differences in mental health by immigrant status and union type. Using the baseline sample of 35,977 observations covering the period 2002–2016, we regress the SF-12v2 mental health measure on the indicators of immigrant status, exogamy, and the interaction of these two. We estimate CRE models and include our control variables in a stepwise manner, that is, first, we control for demographic differences (including the age gap within the couple), then we include geographic determinants, and finally we control for socioeconomic differences (including our measure of educational homogamy).

In the final step of our analysis, we include our indicators of family networks into the model for mental health in step 3 to examine whether observed differences by immigrant status and union type can be explained by differences in social networks. For this analysis we use the reduced sample of 16,523 observations covering the years 2002, 2006, 2012, and 2016.

Finally, we conduct two additional robustness checks to address 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 immigrant status, exogamy, 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, we examine selective union dissolution (Saarela & Finnäs, 2018). We 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 immigrant status, exogamy, and the interaction. The results of this analysis will allow us to draw conclusions on the direction of any potential bias introduced through this mechanism. All estimations are carried out in STATA 16.

## 5 | RESULTS

### 5.1 | Immigrant-native mental health differentials by age

Before we focus specifically on older couples, we plot the average mental health scores for endogamous and exogamous immigrants and natives aged between 20 and 80. Figure 1 below shows the average mental health scores in 5-year age intervals and a local polynomial fit for each group. We see a reversal of the immigrant-native mental health differential at older ages. Below age 40, endogamous and exogamous immigrants have on average higher mental health scores than endogamous and exogamous Germans. This is in line with the “healthy migrant” effect. Between ages 40 to 60, the average mental health scores in all groups converge, and from age 60 onwards average mental health scores of endogamous Germans increase substantially. The increase is smaller for exogamous Germans and exogamous immigrants, and the average mental health scores of endogamous immigrants remain stable, such that at older ages endogamous Germans have on average better mental health than all other groups.

Figure 1 shows pooled differences, and these trends could therefore either reflect genuine changes over the life course or compositional differences and cohort effects. In either case, this reversal implies that the causes of mental health differences might also differ, and we need to consider potential explanations specific to each age group. In the following, we will therefore focus on older couples aged 60 and above, as older adults are more dependent on social support and might benefit more from family ties.

### 5.2 | Descriptive statistics

The GSOEP includes 50,734 person-year observations for individuals aged 60 and above during the period 2002–2017, 45,516 of which are natives and 5,218 immigrants. Of the natives 68.8% are partnered with another native, 28.5% are unpartnered (i.e., single, divorced, or widowed), and 2.7% are partnered with an immigrant. Among immigrants, 43.0% are partnered with an immigrant from the same country of origin, 25.2% are unpartnered, 24.1% are partnered with a native, and 7.7% are partnered with an immigrant from another country than their own. These figures should not be considered representative of the German population. The GSOEP is a household survey, and we therefore usually observe both partners in a cohabiting couple, which might explain some of the disparities observed in the frequency of exogamous partnerships among natives and immigrants. However, it is reassuring that we observe similar shares of unpartnered individuals in both groups. In the following analyses, we exclude unpartnered individuals as well as immigrants partnered with an immigrant from a different country of origin than their own from the sample.

We observe 6,664 older couples between 2002 and 2016, 516 of which are in exogamous unions (7.7%). Of the 806 individuals in an exogamous union (we do not observe both partners in all unions, for example, because the partner might have declined the personal interview), 404 are immigrants and 402 are natives. While men and

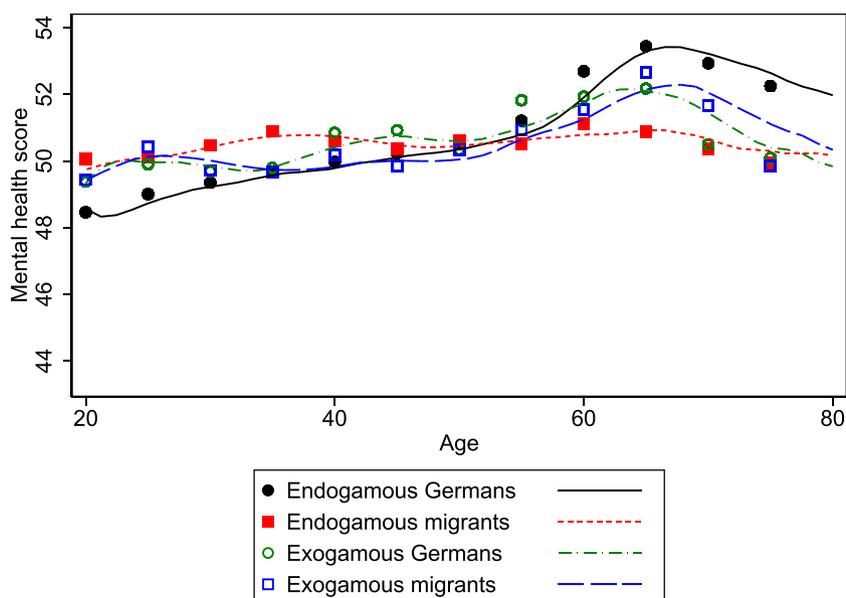


FIGURE 1 Mental health scores by age

women are almost evenly represented among exogamous immigrants (211 men and 193 women), exogamous natives are more frequently male (236 men compared to 166 women).

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. Exogamous immigrants are more likely to be of EU origin (66%) compared to endogamous immigrants (35%). On average, exogamous immigrants are more likely to have come to Germany as children and are more educated than endogamous immigrants (11.7 years of education versus 10.1). A larger proportion of endogamous immigrants are of the lowest income quintile (45%) compared to exogamous immigrants (13%) whereas the proportion of exogamous immigrants in the highest income quintile is higher than that of the endogamous immigrants (15% versus 6%). Endogamous immigrants are more likely to co-reside with a child (at 26% the share is more than twice as high as those of any other group), while coresidence with other kin is uncommon across all groups.

In terms of family ties outside of the household, exogamous immigrants appear to share more similarities with 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 42% of exogamous immigrants having partner's siblings and 15% having

partner's older kin living close by, compared to 22% and 6%, respectively, for endogamous immigrants. Both endogamous and exogamous Germans are more likely to have younger kin living nearby, 69% and 59%, compared to their immigrant counterparts at 68% and 55%, respectively.

Regarding mental health, endogamous Germans are most advantaged on average. Endogamous immigrants have the lowest mental health scores among the four groups, at 50.6 compared to 52.6 for endogamous Germans. Further descriptive statistics on the entire working sample are provided in Table A1 in the appendix.

### 5.3 | Odds of being in exogamous partnership

Table 2 shows the odds ratio of being in an exogamous partnership. Immigrant men from an EU country are more than three times as likely to have a native partner than their non-EU origin counterparts. Younger age at arrival in Germany is highly correlated with the odds of partnership with a native, especially for men. Having been previously married (i.e., being widowed or divorced) is strongly associated with higher odds of being in an exogamous union for all groups. Immigrant female divorcees and widows are 5.8 times more likely to be in an exogamous union than immigrant women who have not experienced

**TABLE 1** Descriptive statistics

	Natives		Immigrants		N Total
	Endogamous	Exogamous	Endogamous	Exogamous	
Mental health (SF-12)	52.62	51.17	50.58	51.21	36,047
Age gap to partner	0.96	2.72	1.47	1.40	33,353
EU origin			0.35	0.66	36,047
Age at arrival in Germany: 0–11			0.01	0.10	35,365
Age at arrival in Germany: 12–17			0.01	0.10	35,365
Years of education	12.06	11.98	10.05	11.74	35,373
Difference in education to partner	0.06	0.13	0.06	−0.11	33,326
<i>Income quintile</i>					
Lowest Quintile	0.12	0.14	0.45	0.13	36,047
Highest Quintile	0.17	0.15	0.06	0.15	36,047
Previously married	0.18	0.29	0.08	0.22	36,030
Parents live nearby	0.12	0.10	0.06	0.08	19,595
Parents-in-law live nearby	0.14	0.08	0.06	0.15	18,630
Siblings live nearby	0.42	0.42	0.22	0.24	19,508
Siblings of the spouse live nearby	0.43	0.21	0.22	0.42	18,555
Younger kin live nearby	0.69	0.59	0.68	0.55	19,294
Coresidence with child	0.10	0.12	0.26	0.12	19,694
Coresidence with a parent	0.00	0.00	0.00	0.00	19,694
Coresidence with parent-in-law	0.00	0.00	0.01	0.01	19,694
Coresidence with sibling	0.00	0.00	0.00	0.00	19,694
Coresidence with sibling (in-law)	0.00	0.00	0.00	0.00	19,694
Coresidence with grandchild	0.00	0.00	0.02	0.00	19,694

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

divorce or widowhood. Immigrant women who are more educated than their partner are less likely to be in an exogamous union. We find little differences by personality traits. Openness is associated with increased odds of exogamy for native women and immigrant men, while agreeableness reduces immigrant women's likelihood to be in an exogamous union. Overall, descriptive statistics from Table 1 and odds ratio for exogamy in Table 2 point to pronounced differences in observable characteristics among exogamous and endogamous individuals. For the following analyses, we exclude psychosocial characteristics and personality traits as well as the employment biography covariates from our list of control variables due to their very limited association with exogamous unions. Moreover, because these characteristics are (presumed to be) time-invariant, their impact on mental health is accounted for in our correlated random effects models.

## 5.4 | Differences in family ties

In Figure 2, we investigate the differences in family ties among the eight groups. The estimates come from a correlated random effects

model controlling for demographic, geographic and socioeconomic differences (see Tables A2–A5 in the appendix for a complete list). All differences are relative to endogamous Germans in this figure. Unsurprisingly, immigrants are less likely to live near their own parents (between 6 to 10 percentage points) or siblings (between 28 to 39 percentage points) compared to natives, and those who are partnered with immigrants are less likely to live close to their in-laws (between 3 and 4 percentage points for parents and 23 and 24 percentage points for siblings) compared to those married to Germans. Endogamous immigrants are between 8 and 15 percentage points more likely to live with at least one child, contributing to overall larger households. Women of all union types are similarly likely to live near parents in-law and younger kin, whereas endogamous native men are more likely to live near parents in-law and younger kin.

In further analyses we also consider alternative definitions of geographical proximity to kin outside the household. Figure A1 in the appendix shows that there are few differences between groups when considering smaller geographic distances, because living in the same house (but not the same household) or the same neighbourhood is uncommon both for natives and immigrants. The dichotomisation

**TABLE 2** Analysis of exogamy

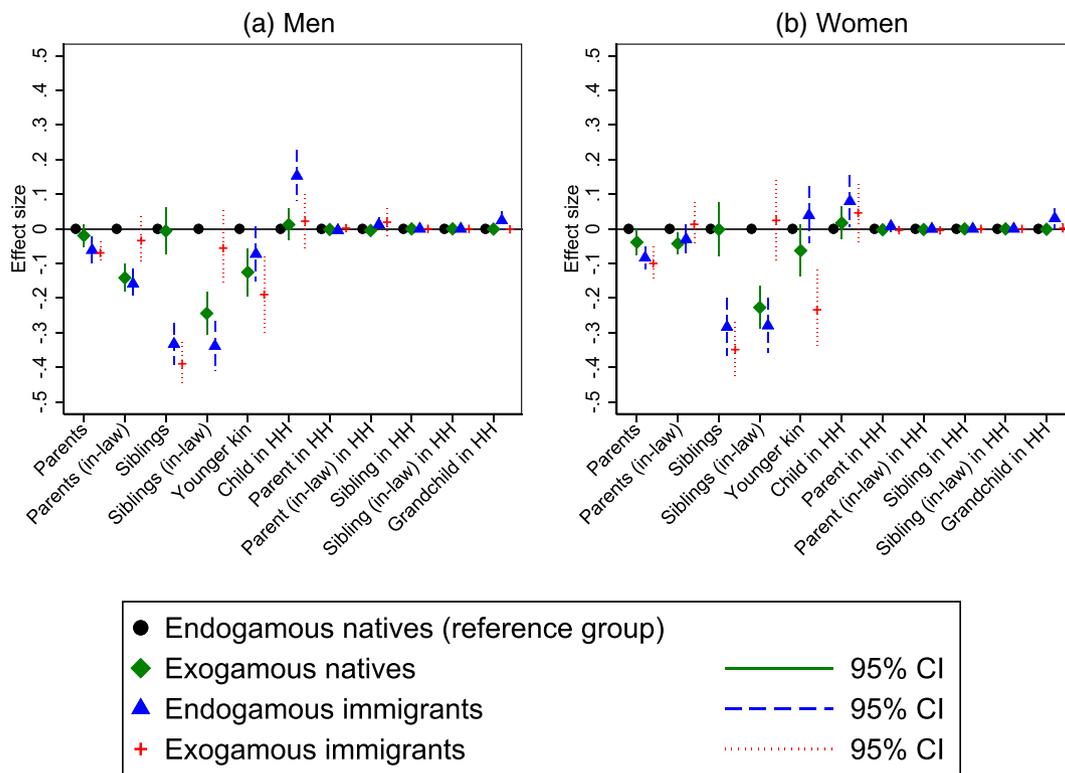
Odds ratios	Dependent variable: Exogamous partnership			
	Germans		Immigrants	
	Men	Women	Men	Women
Age	0.996 (0.013)	1 (0.016)	1.021 (0.030)	1.003 (0.034)
Age gap to partner	1.021 (0.022)	1.041 (0.033)	0.96 (0.038)	1.003 (0.047)
Country of origin in EU			3.028** (1.229)	1.766 (0.715)
Age at arrival in Germany: 0–11			64.470*** (81.000)	16.788 (24.413)
Age at arrival in Germany: 12–17			16.455** (17.542)	7.246* (6.667)
Years of education	0.92 (0.051)	0.905 (0.064)	1.162 (0.162)	1.282 (0.165)
Difference in education to partner	1.062 (0.067)	1.044 (0.052)	0.868 (0.082)	0.813* (0.069)
Previously married	1.988** (0.447)	1.822* (0.454)	6.343*** (2.830)	5.781*** (2.669)
Willingness to take risks	1.038 (0.047)	0.929 (0.048)	1.043 (0.089)	1.168 (0.104)
Locus of control	1.057 (0.150)	0.955 (0.138)	0.728 (0.175)	1.045 (0.313)
Big 5: Openness	1.103 (0.132)	1.396** (0.175)	1.667* (0.412)	0.983 (0.208)
Big 5: Agreeableness	1.061 (0.103)	1.023 (0.131)	1.014 (0.214)	0.555* (0.159)
Big 5: Conscientiousness	0.835 (0.087)	1.061 (0.135)	1.004 (0.169)	1.14 (0.265)
Big 5: Neuroticism	1.171 (0.126)	0.899 (0.109)	1.411 (0.295)	0.727 (0.161)
Big 5: Extroversion	0.883 (0.091)	0.845 (0.094)	1.162 (0.251)	0.735 (0.150)
Age at first job	1.043 (0.038)	0.982 (0.039)	0.996 (0.060)	0.971 (0.028)
SIOP score of first job	0.99 (0.012)	1.013 (0.013)	1.005 (0.022)	1.033 (0.023)
Baseline odds	0.017*** (0.012)	0.043*** (0.037)	0.124 (0.145)	0.051** (0.057)
N	13,650	11,089	1,047	783

Note. Each column presents estimates of odds ratios from a separate logistic regression model. All models include dummy variables for survey year. Standard error in parentheses. Age was centered around 60. Years of education was centered around the group mean. Source: SOEPv34, own calculations.

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .



**FIGURE 2** Differences in social networks by gender

shown above (living less than one hour driving distance apart versus living further apart) seems to capture most major differences across groups. We also consider the exchange of financial support between kin and measure of emotional closeness, but do not find evidence for systematic differences by migrant status or family type (results are available upon request).

### 5.5 | Mental health

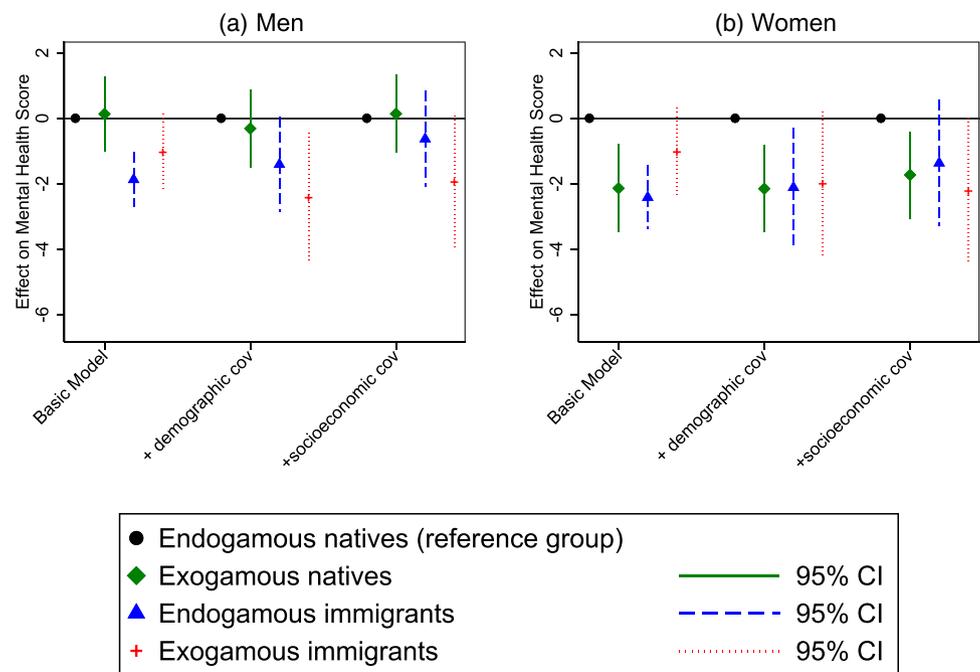
In Figure 3, we show the differences between endogamous and exogamous natives and immigrants in mental health separately by gender, with endogamous men and women as the reference groups. In the basic model without any control variables, we find that endogamous immigrants' mental health is significantly 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 additional covariates and only for men. 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 is approximately two points in all models, which corresponds to 0.2 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 findings do not suggest an “immigrant gain” and “native strain” from an exogamous union, rather a complex, gendered pattern where exogamous immigrant men and exogamous native women suffer poorer mental health.

### 5.6 | Mental health and family ties

We reestimate our CRE model using the restricted sample (covering the years 2002, 2006, 2012, and 2016) including our indicators of family ties as covariates to examine whether they can explain differences in mental health observed between immigrants and natives as well as endogamous and exogamous couples, shown in Figure 4. The estimated coefficients are shown in Table A7 in the appendix. In the restricted sample, the difference between endogamous native men and endogamous immigrant men is never statistically significant. In contrast, exogamous native women have lower mental health than endogamous native women. Taking differences in family networks into account does not seem to affect the estimates in any meaningful way. Looking at the estimated associations between social networks and mental health, we note that having parents nearby is clearly negative (−2.3 points) for mental health of women. A plausible explanation is that middle-aged and older women living close to their parents are often expected to shoulder care responsibilities, which have been

**FIGURE 3** Differences in mental health by gender



shown to negatively affect the caregiver's mental health (Schmitz & Westphal, 2015). This is further supported by negative associations with coresidence of parents or parents-in-law; however, these estimates are not statistically significant (likely due to the small number of cases).

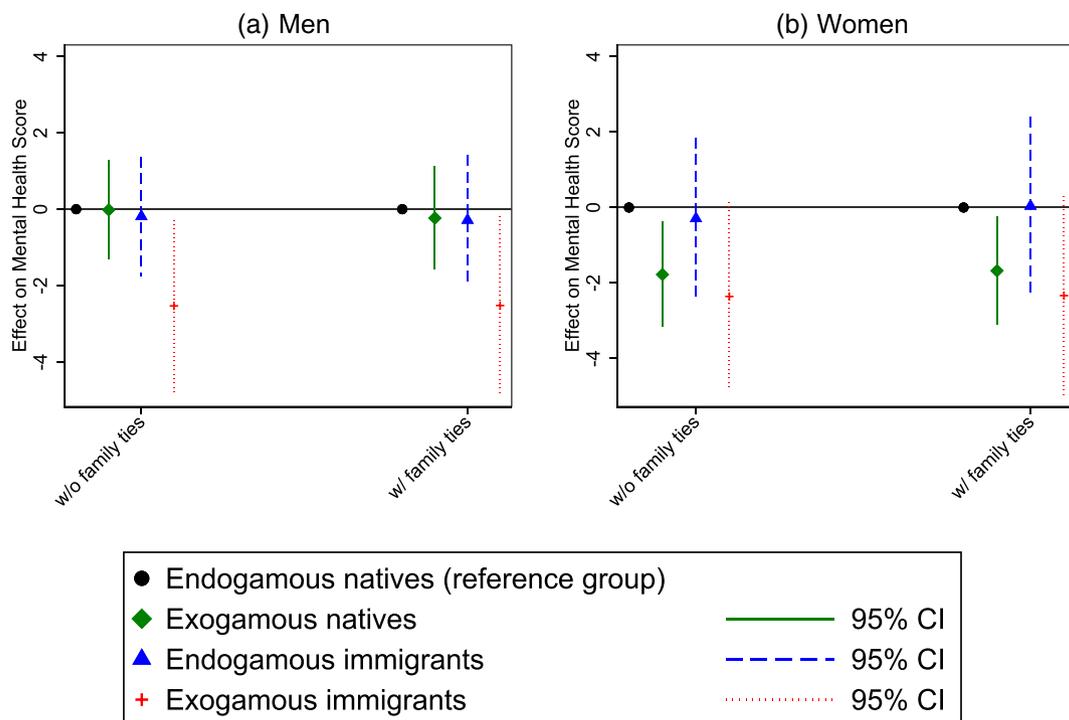
### 5.7 | Heterogeneity by immigrant origin

Immigrants are a highly diverse group. There may be major differences in mental health, family ties and the propensity to form exogamous unions among immigrant groups. Unfortunately, we cannot replicate our analyses for specific countries of origin due to sample size restrictions. The baseline sample used in the analysis for Figure 2 only includes one country of origin, Poland, for which we observe more than 100 observations for immigrants in both endogamous and exogamous unions. For Turkish immigrants—the largest immigrant group in Germany—the sample only includes 19 observations in an exogamous union. Therefore, we use a broader categorisation and distinguish between immigrants from non-EU countries and immigrants from EU countries. We replicate our analyses shown in Figures 2–4 separately for both immigrant groups. Germans in an endogamous union are included in all samples as the reference group, whereas Germans in an exogamous union are included in the sample based on their partner's country of origin. The results are shown in Figures A2–A4 in the appendix. We find few differences in family ties between EU and non-EU immigrants. Figures A3 and A4 show that differences in mental health by immigrant origin largely vanish once we control for differences in socioeconomic characteristics. The results suggest that the negative mental health differences observed for immigrant men and native

women in exogamous unions are driven by EU migrants rather than non-EU migrants. However, it is important to note that point estimates are overall rather similar—the estimates for EU migrants are merely more precisely identified, perhaps in part due to the larger share of individuals in exogamous union.

### 5.8 | Panel attrition and union dissolution

We contextualise 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 comparatively small number of immigrants and exogamous unions in our sample. Table A8 in the appendix shows that immigrants and exogamous natives are both more likely to drop out of the panel and less likely to remain with their current partner. However, once we account for differences in observed characteristics as well as unobserved heterogeneity in our CRE model, we find no significant differences in panel attrition or union dissolution. Similarly, for union dissolution, we find that immigrants and exogamous natives are less likely to remain in their current union than endogamous natives. However, once we account for differences in observed covariates as well as unobserved heterogeneity, these differences disappear, which suggests that bias from panel attrition or selective union dissolution is unlikely to affect our results. Finally, in a sensitivity analysis we reestimated the models presented in Figures 1–3 including survey weights to address selective nonresponse. Our conclusions remain robust once we control for differences in observed and unobserved characteristics (results are available upon request).



**FIGURE 4** Mental health and social networks

## 6 | DISCUSSION

Germany, 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 and 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 mental health compared to ethnic Germans' remains little explored, mainly due to their limited numbers in the past rendering quantitative analyses difficult. A substantial 7% of all partnerships in Germany are between a German and a foreign national (Destatis, 2018), yet few studies have taken a longitudinal approach to disentangle the complexity between mixed unions and mental health in later life stages.

In this study, we focus on the mental health of older individuals in mixed partnerships in Germany. We tested whether the mental health disadvantage reported in previous studies for native Germans who partner with an immigrant and the advantage of immigrants who partner with native Germans operate through changes in family networks by union type. Our findings partially supported our hypotheses. First, exogamous immigrants and endogamous natives are advantaged over their counterparts in other types of union, and the size of family networks differ by union type, as we expected in H1. However, living with or near kin seem to offer limited explanation for the mental health differentials among the eight groups. There is a selection effect for both female and male immigrants who form exogamous unions by observable characteristics, such as earlier arrival in Germany, being of

European origin, and being more educated, all of which are characteristics associated with better mental health. This corroborates with our second hypothesis (H2), which is that the migrant advantage from exogamy is partially attributable to the selection process of entering a mixed union. In line with the intergenerational stake hypothesis and gendered nature of family care work, which guided our third (H3a and H3b) and fourth hypotheses (H4), living near older kin is associated with poorer mental health for women. We do not find sufficient evidence to support the assumption that living near one's own parents or in-law parents made a significant difference (H3b).

There is a clear gender gradient behind the mental health disadvantages for older individuals in exogamous unions, consistent with findings from previous studies (Milewski & Gawron, 2019; Potarca & Bernardi, 2020). We saw a large and persistent difference in the mental health of exogamous native women compared to their endogamous counterparts, despite little evidence for the selection of natives into exogamous unions. On the other hand, exogamous immigrant men suffer poorer mental health compared to all other male groups, corresponding to the Potarca and Bernardi's (2020) findings on individuals of all age groups in Germany. These findings suggest that immigrant men and native women in particular might be negatively affected by experiences attached with either poorer marital quality itself (Kiecolt-Glaser & Newton, 2001), or interethnic union between a native woman and an immigrant man carry a distinct stigma from that between a native man and an immigrant woman (Qian, 2005). The plausibility of status exchange between the majority and minority groups through marriage (Kalmijn, 2010; Merton, 1941), and whether ethnicity is treated as a hierarchical

variable in the marriage market, requires a thorough examination of gender and disaggregated ethnic group power dynamics in the German society.

In line with previous research, we find that family ties have the potential to both promote and strain mental health, especially from a generational perspective. Older individuals tend to benefit more from their proximity to younger kin than older kin (Birditt et al., 2015). Having older kin (own or spouse's) living in the same household or even nearby is associated with poorer mental health, especially for women. Previous literature on family care and interrelationship have shown that women often take on more physical care work and mental load for family members who require attendance than men. For women who are 60 years or older, providing care to even older family members may be deleterious to one's mental health (Schmitz & Westphal, 2015).

Although family networks influence mental health of older individuals, we find little evidence that supports these ties as the main driver behind the relationship between exogamy and mental health. The disparity in mental health between endogamous German women and exogamous German women remains robust even with family networks 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). Under the circumstances of a higher possibility of living near both own parents and in-laws, endogamous native German women still fare better than their exogamous counterparts, who are less likely to live with or near in-laws. Our evidence mainly points to the selection effects of individuals who enter endogamous or exogamous unions on observable characteristics such as marital history and education.

Our approach of using the correlated random effects models treats individual level differences, such as varying levels of baseline subjective well-being (Potarca & Bernardi, 2020) and shows that individual characteristics might play a comparatively more important role in mental health than family networks in older ages. Thus, the present study advances the literature by demonstrating that the associations between mental health and exogamous union in Germany are more multidimensional than the "migrant gain" and "native strain" pattern found in a previous study (Milewski & Gawron, 2019). Instead, a complex, gendered pattern suggests that both immigrant men and native women suffer poorer mental health in mixed unions. Moreover, this is the first study to empirically test family networks as a potential mechanism, which have been proposed in earlier theoretical discussions. Our findings suggest that family networks contribute little to our understanding of mental health differentials, and thus alternative explanations need to be considered in future research.

An important caveat is that we considered a rather broad definition of geographic proximity. It is plausible that family networks matter at closer geographic distances, for example, to provide daily assistance or care. Yet even in this case differences in family networks are unlikely to explain the observed differences in mental health, as our analyses also reveal that at such closer distances there are few differences in the availability of family ties. It is also likely that not

only distance matters but also financial support or emotional closeness, but we found little evidence of systematic differences in these measures by migration status or union type.

In the same vein, 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 preunion. In this scenario, exogamy is only a sign that they have passed the "litmus test" (Alba & Nee, 2009; Qian, Lichter, & Tumin, 2018) of integration, rather than a vehicle to better mental health. Moreover, exogamous marriages are more prone to conflict and dissolution (Milewski & Kulu, 2014; Saarela & Finnäs, 2018) and can in fact challenge relationship quality among family members who may or may not approve of the union (Yahirun & Kroeger, 2019). However, most older people in our sample are unlikely to have only recently formed their union, thus reducing the role of conflict as a negative mediator and possibly introducing survivor's bias. The data considered in this study includes very few individuals switching from endogamous to exogamous union and vice versa. Similarly, although we can in principle follow individuals over time to observe the formation of endogamous and exogamous unions, the duration of the panel does not allow us to follow a sufficiently large share of individuals into older ages at present. Although the correlated random effects models control for time-invariant (observed and unobserved) differences as well as certain time-varying individual characteristics, we are unable to exclude the possibility of unobserved time-varying confounders that affect both the selection into exogamous unions and mental health at older ages. Therefore, we cannot make definitive remarks on the direction of causality between exogamy and mental health.

We only considered heterogeneity across broad immigrant groups by distinguishing between non-EU and EU immigrants due to sample size limitations. Estimates for EU immigrants were more precisely identified, yet the point estimates were overall similar. A more detailed analyses for specific countries of origins may reveal important differences but requires substantially larger samples.

Our analyses excluded individuals born in Germany with migration background, that is, 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 some of the first generation difficulties, such as linguistic barriers and nonrecognition of their qualifications in the labor market. Their mental health risk factors require separate scrutiny and are beyond the scope of this paper.

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. Looking at the linkage between social networks and mental health in old age in various

institutional settings would enhance our understanding of the relationship between the two. Differences in religious affiliation and the degree of involvement in religious activities between individuals in a union should also be explored in the context of mental health in later life. We also recommend future research to consider a wider range of social contacts, in addition to friends and family, such as neighbours or social workers and their roles in facilitating healthy aging.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the German Institute for Economic Research (DIW Berlin). Restrictions apply to the availability of these data, which were used under license for this study. Data are available with the permission of DIW Berlin.

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#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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## APPENDIX A.

**TABLE A1** Descriptive statistics

	Mean	SD	Min	Max	N
<i>A. Health</i>					
Mental health (SF-12)	52.40	10.03	4.83	79.33	36,047
<i>B. Demographic characteristics</i>					
Immigrant status	0.10	0.30	0	1	36,047
Exogamy	0.07	0.25	0	1	35,977
Age	69.32	6.49	60.00	99.25	34,490
Age gap to partner	1.07	5.41	-25.58	50.25	33,353
Female	0.45	0.50	0	1	36,047
EU origin	0.95	0.22	0	1	36,047
Age at arrival in Germany: 0-11	0.00	0.05	0	1	35,365
Age at arrival in Germany: 12-17	0.00	0.05	0	1	35,365
<i>C. Geographic characteristics</i>					
Living in East Germany	0.24	0.43	0	1	36,047
Living in rural area	0.35	0.48	0	1	36,047
<i>D. Socioeconomic characteristics</i>					
Working	0.14	0.34	0	1	36,047
Years of education	11.93	2.76	7	18	35,373
Difference in years of education to partner	0.06	2.62	-11	11	33,326
<i>Income quintile</i>					
1	0.14	0.35	0	1	36,047
2	0.28	0.45	0	1	36,047
3	0.21	0.41	0	1	36,047
4	0.15	0.36	0	1	36,047
5	0.16	0.37	0	1	36,047
Previously married	0.18	0.38	0	1	36,030
<i>E. Personality Traits</i>					
Willingness to take risks	4.10	2.36	0	10	35,492
Locus of control	0.03	0.83	-3.23	1.88	33,732
Big 5: Openness	-0.02	1.04	-3.10	2.13	33,669
Big 5: Agreeableness	0.03	1.00	-4.55	1.69	33,758
Big 5: Conscientiousness	0.12	0.95	-5.21	1.27	33,653
Big 5: Neuroticism	0.05	1.00	-2.42	2.65	33,756
Big 5: Extroversion	-0.09	0.97	-3.36	1.95	33,746
<i>F. Biography</i>					
Age at first job	40.35	12.10	15	78	32,241
SIOP score first job	19.21	3.93	8	65	35,044
<i>G. Family ties</i>					
Parents live nearby	0.11	0.31	0	1	19,595
Parents of the spouse live nearby	0.13	0.34	0	1	18,630
Siblings live nearby	0.40	0.49	0	1	19,508
Siblings of the spouse live nearby	0.40	0.49	0	1	18,555
Younger kin live nearby	0.68	0.46	0	1	19,294
Coresidence with child	0.11	0.31	0	1	19,694
Coresidence with a parent	0.00	0.06	0	1	19,694

(Continues)

**TABLE A1** (Continued)

	Mean	SD	Min	Max	N
Coresidence with a parent-in-law	0.00	0.06	0	1	19,694
Coresidence with a sibling	0.00	0.03	0	1	19,694
Coresidence with a sibling-in-law	0.00	0.03	0	1	19,694
Coresidence with a grandchild	0.00	0.05	0	1	19,694

Source: SOEPv34, own calculations.

**TABLE A2** Analysis of family ties inside the household - Men

	Coresidence child	Coresidence parent	Coresidence parent (in-law)	Coresidence sibling	Coresidence sibling (in-law)	Coresidence grandchild
Immigrant	0.079* (0.039)	0 (0.001)	0.01 (0.010)	-0.003 (0.002)	-0.003 (0.002)	0.004 (0.004)
Exogamy	0.017 (0.033)	-0.001* (0.000)	-0.002*** (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Immigrant x Exogamy	-0.119* (0.054)	-0.001 (0.002)	-0.004 (0.007)	0.003 (0.002)	0.003 (0.002)	-0.004 (0.003)
Age	-0.051*** (0.011)	-0.002 (0.002)	-0.003 (0.002)	0 (0.001)	0 (0.001)	0 (0.001)
Age squared	0.000*** (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
Age gap to partner	-0.028 (0.026)	0.001 (0.001)	0.001 (0.001)	0 (0.000)	0 (0.000)	0.001 (0.000)
EU origin	0.047(0.069)	0.006* (0.003)	0.008** (0.003)	0.002 (0.002)	0.002 (0.002)	0.004 (0.003)
Age at arrival in Germany: 0-11	-0.083(0.060)	0.001 (0.001)	-0.007 (0.004)	0.002 (0.002)	0.002 (0.002)	-0.001 (0.003)
Age at arrival in Germany: 12-17	0.013(0.107)	0 (0.001)	-0.007 (0.004)	0.001 (0.001)	0.001 (0.001)	-0.002 (0.002)
Living in East Germany	0.184*(0.092)	0.002 (0.002)	0.003 (0.003)	-0.002 (0.002)	-0.002 (0.002)	0.002 (0.002)
Living in a rural area	-0.027(0.089)	0.003 (0.002)	0.006 (0.004)	0.004 (0.003)	0.004 (0.003)	0.001 (0.002)
Working	0.029(0.024)	0.003 (0.005)	0.004 (0.006)	0 (0.004)	0 (0.004)	-0.003 (0.002)
Years of education	-0.015*** (0.003)	0 (0.000)	-0.001* (0.000)	0 (0.000)	0 (0.000)	-0.001 (0.001)
Difference in education to partner	-0.001(0.011)	-0.001 (0.001)	-0.003 (0.002)	-0.002 (0.001)	-0.002 (0.001)	0.001 (0.001)
Income: 2nd quintile	0.008(0.016)	0 (0.001)	0 (0.002)	0.002 (0.001)	0.002 (0.001)	0 (0.002)
Income: 3rd quintile	0.040* (0.020)	0 (0.002)	0.001 (0.004)	0.003 (0.004)	0.003 (0.004)	0.006 (0.004)
Income: 4th quintile	0.110*** (0.029)	0.003 (0.004)	0.002 (0.004)	-0.001 (0.003)	-0.001 (0.003)	0.01 (0.006)
Income: 5th quintile	0.128*** (0.037)	0.005 (0.005)	0.011 (0.008)	0 (0.002)	0 (0.002)	0.012 (0.006)
Previously married	0.062 (0.039)	0.002 (0.001)	0.002 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Constant	2.350*** (0.616)	-0.029 (0.036)	0.04 (0.054)	-0.154 (0.107)	-0.154 (0.107)	0.055 (0.052)
N	8,818	8,818	8,818	8,818	8,818	8,818

Note. Estimates come from a correlated random effects model. Estimated effects for the Mundlak means and survey year are not shown but are available upon request. Standard errors are clustered on the individual level. Source: SOEPv34, own calculations.  $p < 0.1$ .

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .

**TABLE A3** Analysis of family ties outside the household—Men

	Parents nearby	Parents (in-law) nearby	Siblings	Siblings (in-law)	Younger kin
Immigrant	−0.047** (0.017)	−0.094*** (0.025)	−0.238*** (0.044)	−0.356*** (0.049)	0.079 (0.046)
Exogamy	−0.007 (0.022)	−0.087*** (0.021)	−0.005 (0.043)	−0.203*** (0.040)	−0.108* (0.048)
Immigrant x Exogamy	−0.005 (0.027)	0.151*** (0.041)	−0.121 (0.063)	0.497*** (0.085)	−0.026 (0.087)
Age	−0.072*** (0.009)	−0.071*** (0.010)	0.003 (0.020)	0.02 (0.021)	0.017 (0.020)
Age squared	0.000*** (0.000)	0.000*** (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
Age gap to partner	0.020*** (0.005)	0.027*** (0.005)	0.047*** (0.008)	0.048** (0.015)	−0.044*** (0.013)
EU origin	0.084*** (0.016)	−0.017 (0.083)	−0.003 (0.082)	−0.141 (0.089)	0.093 (0.159)
Age at arrival in Germany: 0–11	0.089 (0.142)	0.086 (0.161)	0.243 (0.133)	0.154 (0.196)	−0.104 (0.179)
Age at arrival in Germany: 12–17	0.256 (0.189)	−0.087 (0.075)	0.455** (0.153)	0.141 (0.137)	0.045 (0.152)
Living in East Germany	−0.011 (0.069)	0.18 (0.138)	−0.075 (0.172)	0.29 (0.198)	−0.161 (0.250)
Living in a rural area	0.022 (0.048)	−0.194 (0.169)	−0.107 (0.159)	−0.074 (0.152)	0.202* (0.100)
Working	0.016 (0.021)	0.017 (0.022)	−0.019 (0.029)	−0.035 (0.031)	−0.04 (0.031)
Years of education	0.001 (0.002)	0 (0.003)	−0.034*** (0.004)	−0.032*** (0.004)	−0.027*** (0.005)
Difference in education to partner	−0.001 (0.010)	0.015 (0.010)	0.021 (0.015)	0.017 (0.015)	0.005 (0.014)
Income: 2nd quintile	−0.013 (0.015)	−0.006 (0.018)	0.001 (0.027)	−0.022 (0.026)	0.006 (0.024)
Income: 3rd quintile	−0.013 (0.024)	0.007 (0.023)	0.066* (0.031)	−0.014 (0.032)	0.007 (0.028)
Income: 4th quintile	−0.039 (0.027)	−0.038 (0.024)	0.055 (0.038)	0.014 (0.037)	−0.016 (0.036)
Income: 5th quintile	−0.035 (0.027)	−0.02 (0.027)	0.102* (0.043)	0.072 (0.041)	−0.062 (0.046)
Previously married	−0.065 (0.062)	0.089*** (0.021)	−0.051 (0.090)	0.19 (0.117)	−0.146 (0.094)
Constant	3.501*** (0.436)	2.767*** (0.560)	−0.186 (1.027)	0.038 (1.111)	−1.448 (1.066)
N	8,818	8,818	8,818	8,818	8,818

Note. Estimates come from a correlated random effects model. Estimated effects for the Mundlak means and survey year are not shown but are available upon request. Standard errors are clustered on the individual level. Source: SOEPv34, own calculations.  $p < 0.1$ .

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .

**TABLE A4** Analysis of family ties inside the household—Women

	Coreidence child	Coreidence parent	Coreidence parent (in-law)	Coreidence sibling	Coreidence sibling (in-law)	Coreidence grandchild
Immigrant	−0.003 (0.052)	0.009 (0.007)	0 (0.001)	−0.003 (0.002)	−0.003 (0.002)	0.005 (0.005)
Exogamy	0.001 (0.027)	−0.001* (0.000)	−0.001 (0.001)	−0.002 (0.001)	−0.002 (0.001)	−0.001 (0.001)
Immigrant x Exogamy	0.021 (0.079)	−0.01 (0.008)	−0.001 (0.002)	0.003 (0.002)	0.003 (0.002)	−0.005 (0.003)
Age	−0.042** (0.013)	−0.004* (0.002)	−0.004 (0.003)	0.001 (0.001)	0.001 (0.001)	−0.001 (0.001)
Age squared	0.000** (0.000)	0.000* (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
Age gap to partner	−0.01 (0.011)	−0.001 (0.003)	−0.002 (0.003)	−0.002 (0.003)	−0.002 (0.003)	−0.002 (0.002)
EU origin	0.053 (0.030)	0.004* (0.002)	0.005 (0.003)	0 (0.001)	0 (0.001)	0.001 (0.004)
Age at arrival in Germany: 0–11	−0.111** (0.041)	0 (0.002)	0 (0.001)	0.001 (0.001)	0.001 (0.001)	−0.004 (0.005)
Age at arrival in Germany: 12–17	−0.025 (0.060)	0.031 (0.031)	0 (0.001)	0.001 (0.001)	0.001 (0.001)	−0.001 (0.003)
Living in East Germany	0.034 (0.057)	0.001 (0.002)	0.002 (0.002)	−0.002 (0.002)	−0.002 (0.002)	0.002 (0.002)
Living in a rural area	0.025 (0.049)	0.001 (0.001)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0 (0.002)
Working	−0.036 (0.021)	0.001 (0.004)	−0.005 (0.003)	0.001 (0.001)	0.001 (0.001)	−0.002 (0.002)
Years of education	−0.020*** (0.003)	−0.000* (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	−0.002 (0.001)

(Continues)

**TABLE A4** (Continued)

	Coresidence child	Coresidence parent	Coresidence parent (in-law)	Coresidence sibling	Coresidence sibling (in-law)	Coresidence grandchild
Difference in education to partner	0.012 (0.010)	0 (0.000)	0.003 (0.003)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Income: 2nd quintile	0.006 (0.012)	0.002 (0.002)	0 (0.001)	0.002 (0.001)	0.002 (0.001)	-0.001 (0.002)
Income: 3rd quintile	0.007 (0.016)	0.007 (0.004)	0.004 (0.002)	0.002 (0.003)	0.002 (0.003)	0.004 (0.004)
Income: 4th quintile	0.041 (0.026)	0.007 (0.004)	0.008 (0.005)	-0.002 (0.004)	-0.002 (0.004)	0.012 (0.009)
Income: 5th quintile	0.081* (0.033)	0.006 (0.006)	0.012 (0.009)	-0.001 (0.003)	-0.001 (0.003)	0.012 (0.008)
Previously married	0.049** (0.016)	0.002 (0.002)	0.004 (0.003)	0 (0.001)	0 (0.001)	0.003 (0.003)
Constant	3.505*** (0.643)	0.075 (0.062)	-0.004 (0.031)	-0.099 (0.083)	-0.099 (0.083)	-0.013 (0.052)
N	7,182	7,182	7,182	7,182	7,182	7,182

Note. Estimates come from a correlated random effects model. Estimated effects for the Mundlak means and survey year are not shown but are available upon request. Standard errors are clustered on the individual level. Source: SOEPv34, own calculations.  $p < 0.1$ ,

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .

**TABLE A5** Analysis of family ties outside the household—Women

	Parents nearby	Parents (in-law) nearby	Siblings	Siblings (in-law)	Younger kin
Immigrant	-0.058** (0.022)	-0.038 (0.022)	-0.307*** (0.048)	-0.247*** (0.055)	0.143*** (0.043)
Exogamy	-0.017 (0.020)	-0.036* (0.016)	-0.004 (0.045)	-0.249*** (0.035)	-0.090 (0.049)
Immigrant x Exogamy	-0.024 (0.030)	0.082* (0.037)	-0.064 (0.068)	0.486*** (0.083)	-0.254** (0.085)
Age	-0.068*** (0.010)	-0.056*** (0.010)	0.043 (0.025)	0.028 (0.022)	0.034 (0.022)
Age squared	0.000*** (0.000)	0.000*** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)
Age gap to partner	0.021 (0.012)	0.019 (0.015)	0.859*** (0.026)	0.115*** (0.028)	-0.028 (0.020)
EU origin	-0.061 (0.075)	0.028 (0.027)	-0.009 (0.071)	0.025 (0.100)	-0.075 (0.091)
Age at arrival in Germany: 0–11	0.334 (0.218)	-0.02 (0.057)	0.623*** (0.187)	0.123 (0.166)	0.213 (0.156)
Age at arrival in Germany: 12–17	0.029 (0.043)	-0.104** (0.035)	0.127 (0.137)	-0.015 (0.159)	0.151 (0.108)
Living in East Germany	0.146 (0.127)	-0.081 (0.050)	0.358 (0.188)	0.004 (0.203)	0.148 (0.187)
Living in a rural area	-0.202 (0.161)	0.03 (0.024)	-0.222 (0.151)	-0.178 (0.151)	0.031 (0.171)
Working	0.048 (0.035)	-0.001 (0.025)	-0.07 (0.045)	-0.01 (0.056)	-0.084 (0.046)
Years of education	0.002 (0.002)	-0.002 (0.002)	-0.028*** (0.005)	-0.035*** (0.004)	-0.027*** (0.005)
Difference in education to partner	-0.008 (0.005)	-0.009 (0.010)	0.005 (0.017)	0.023 (0.015)	0.027* (0.013)
Income: 2nd quintile	-0.009 (0.014)	-0.014 (0.012)	-0.043 (0.028)	0.018 (0.029)	0.028 (0.023)
Income: 3rd quintile	-0.011 (0.016)	-0.003 (0.019)	-0.035 (0.036)	0.089* (0.035)	0.037 (0.027)
Income: 4th quintile	-0.044* (0.018)	-0.01 (0.020)	0.028 (0.042)	0.083* (0.041)	0.038 (0.037)
Income: 5th quintile	-0.007 (0.026)	-0.026 (0.026)	0.073 (0.050)	0.092 (0.048)	-0.029 (0.045)
Previously married	-0.068 (0.067)	-0.015 (0.044)	-0.253 (0.140)	-0.097 (0.095)	0.022 (0.039)
Constant	3.203*** (0.610)	2.316*** (0.530)	1.253 (1.430)	1.781 (1.222)	-0.503 (1.318)
N	7,182	7,182	7,182	7,182	7,182

Note. Estimates come from a correlated random effects model. Estimated effects for the Mundlak means and survey year are not shown but are available upon request. Standard errors are clustered on the individual level. Source: SOEPv34, own calculations.  $p < 0.1$ .

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .

**TABLE A6** Analysis of mental health by gender

	Basic model		+ demographic and geographic covariates		+ socioeconomic covariates	
	Men	Women	Men	Women	Men	Women
Immigrant	-1.878*** (0.424)	-2.420*** (0.498)	-1.414 (0.740)	-2.119* (0.935)	-0.632 (0.747)	-1.37 (0.987)
Exogamy	0.129 (0.582)	-2.141** (0.685)	-0.315 (0.610)	-2.152** (0.676)	0.138 (0.610)	-1.733* (0.678)
Immigrant x Exogamy	0.707 (0.919)	3.530*** (1.073)	-0.699 (1.223)	2.266 (1.376)	-1.457 (1.232)	0.878 (1.390)
Age			2.535*** (0.271)	2.270*** (0.343)	2.308*** (0.287)	2.190*** (0.358)
Age squared			-0.021*** (0.002)	-0.020*** (0.002)	-0.020*** (0.002)	-0.019*** (0.003)
Age gap to partner			-0.167 (0.177)	3.797*** (1.088)	-0.053 (0.200)	4.188*** (0.969)
EU origin			0.86 (1.385)	0.15 (0.952)	0.819 (1.399)	0.26 (0.969)
Age at arrival in Germany: 0-11			2.995 (2.090)	1.559 (3.073)	2.914 (1.955)	1.691 (3.194)
Age at arrival in Germany: 12-17			2.437 (2.491)	1.856 (1.966)	1.9 (2.527)	1.953 (2.025)
Living in East Germany			-0.842 (1.418)	1.668 (2.698)	-0.568 (1.410)	1.333 (2.759)
Living in a rural area			-1.729 (1.138)	-1.752 (1.983)	-2.129 (1.160)	-1.929 (1.979)
Working					-1.246*** (0.276)	-0.56 (0.409)
Years of education					-0.336 (0.248)	0.056 (0.480)
Difference in education to partner					0.067 (0.057)	0.041 (0.059)
Income: 2nd quintile					0.303 (0.277)	-0.615 (0.333)
Income: 3rd quintile					0.081 (0.329)	-0.307 (0.374)
Income: 4th quintile					0.732* (0.368)	-0.059 (0.440)
Income: 5th quintile					0.635 (0.407)	0.131 (0.519)
Previously married					-2.664** (1.007)	-2.813** (0.890)
Constant	53.682*** (0.196)	51.505*** (0.234)	-39.195** (14.807)	-27.1 (19.383)	-58.471*** (16.261)	-46.582* (19.739)
N	19,916	16,061	18,111	14,616	17,243	14,038

Note. Estimates come from a correlated random effects model using the years 2002-2016. Estimated effects for the Mundlak means and survey years are not shown but are available upon request. Standard errors are clustered on the individual level. Source: SOEPv34, own calculations.  $p < 0.1$ .

\* $p < 0.05$ .

\*\* $p < 0.01$ .

\*\*\* $p < 0.001$ .

**TABLE A7** Mental health and social networks by gender

	Men		Women	
	CRE w/o social networks	CRE w/social networks	CRE w/o social networks	CRE w/social networks
Immigrant	-0.188 (0.797)	-0.286 (0.870)	-0.293 (1.093)	0.036 (1.204)
Exogamy	-0.019 (0.662)	-0.232 (0.689)	-1.775* (0.712)	-1.675* (0.731)
Immigrant x Exogamy	-2.325. (1.333)	-2.004 (1.407)	-0.289 (1.550)	-0.695 (1.630)
Age	1.805*** (0.362)	1.588*** (0.404)	1.634*** (0.456)	1.102* (0.516)
Age squared	-0.016*** (0.003)	-0.014*** (0.003)	-0.015*** (0.003)	-0.011** (0.004)
Age gap to partner	-0.023 (0.259)	0.168 (0.256)	1.524 (2.508)	-1.857 (1.896)
EU origin	-1.043 (2.503)	-0.959 (2.879)	0.325 (1.575)	0.797 (1.592)
Age at arrival in Germany: 0-11	4.156. (2.391)	5.758** (2.087)	-0.099 (3.627)	-2.063 (4.525)
Age at arrival in Germany: 12-17	1.418 (3.200)	1.288 (3.430)	3.516 (2.168)	3.333 (2.209)
Living in East Germany	-2.23 (2.101)	-2.797 (2.299)	-1.016 (4.014)	-3.503 (3.502)
Living in a rural area	-2.555 (1.668)	-1.497 (1.750)	-1.945 (2.738)	-2.233 (2.848)
Working	-1.497*** (0.393)	-1.796*** (0.435)	-0.809 (0.597)	-0.492 (0.701)
Years of education	-0.475 (0.510)	-0.782 (0.667)	-0.656 (0.610)	-1.316. (0.756)
Difference in education to partner	0.122 (0.462)	0.359 (0.598)	1.015** (0.366)	1.100* (0.433)
Income: 2nd quintile	-0.077 (0.403)	-0.154 (0.427)	-0.243 (0.474)	-0.086 (0.515)
Income: 3rd quintile	-0.046 (0.481)	-0.084 (0.516)	-0.203 (0.543)	-0.118 (0.585)
Income: 4th quintile	0.869 (0.563)	1.106. (0.608)	0.387 (0.644)	0.553 (0.702)
Income: 5th quintile	1.151. (0.622)	1.354* (0.688)	0.146 (0.745)	0.431 (0.815)
Previously married	-1.925 (1.303)	-3.288* (1.397)	-2.501* (1.224)	-2.205. (1.282)
Parents nearby		-0.387 (0.717)		-2.372** (0.797)
Parents (in-law) nearby		-0.682 (0.550)		-0.237 (0.838)
Sibling		-0.205 (0.433)		-0.119 (0.480)
Sibling (in-law)		0.147 (0.433)		-0.366 (0.493)
Younger kin		-0.397 (0.444)		1.136. (0.598)
Coresidence child		-0.808 (0.608)		0.644 (0.998)
Coresidence parent		-3.784 (2.672)		-4.301. (2.396)
Coresidence parent (in-law)		-0.099 (2.392)		-6.638. (3.940)
Coresidence sibling		3.551 (3.925)		0.497 (3.376)
Coresidence sibling (in-law)	<i>dropped due to collinearity</i>			
Coresidence grandchild		-4.361 (4.020)		-12.966** (4.237)
Constant	-70.048*** (18.740)	-56.141** (20.573)	-33.702 (22.390)	-23.235 (25.609)
N	8,769	7,754	7,131	6,304

Note. Standard errors are clustered on the individual level Mundlak means for the time-varying covariates and estimates for survey year are not shown.

Source: SOEPv34, own calculations.  $p < 0.1$ .

\* $p < 0.05$ .

\*\* $p < 0.01$ .

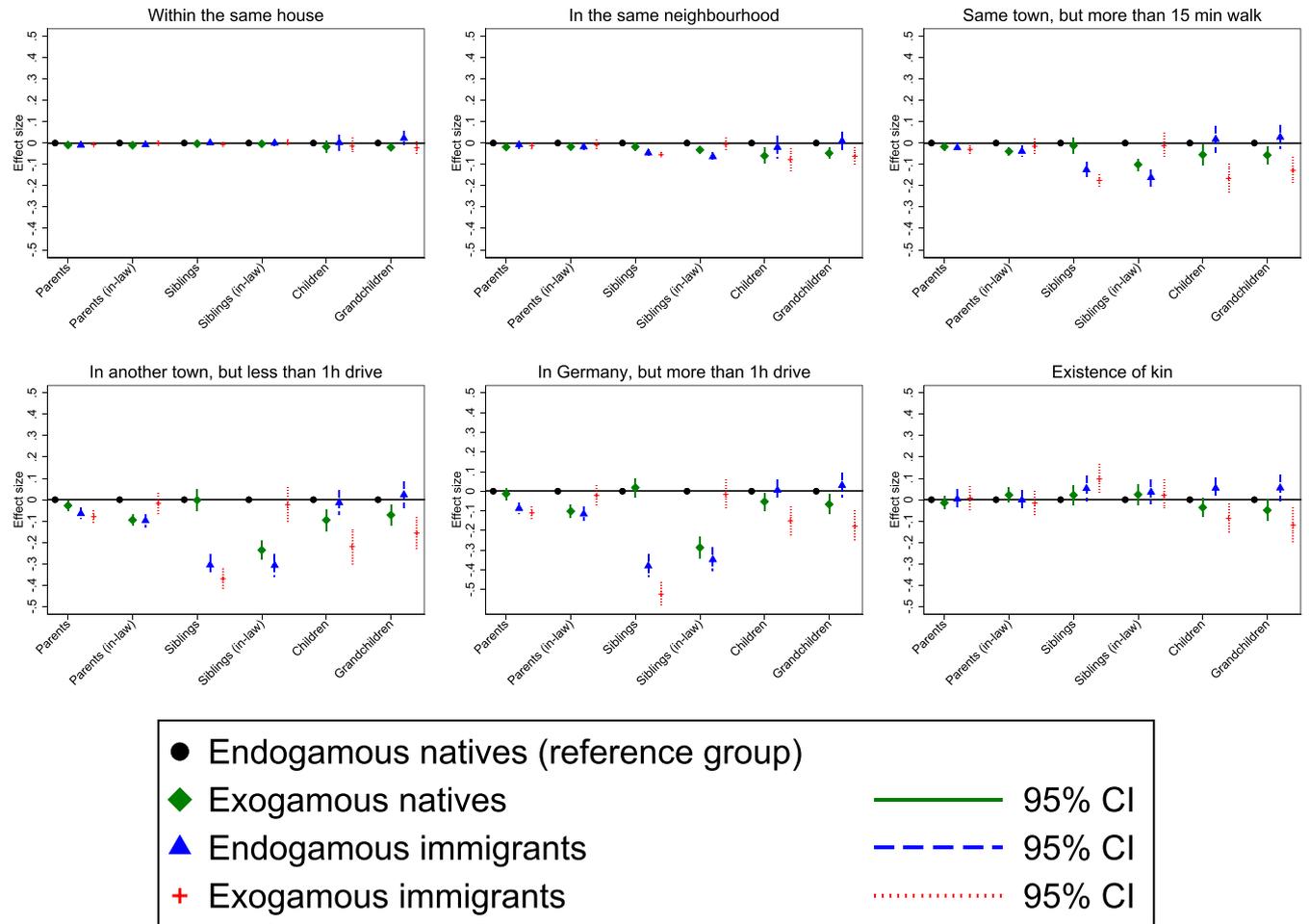
\*\*\* $p < 0.001$ .

**TABLE A8** Panel attrition and union dissolution

	Remains in sample in t + 1			Same partner in t + 1		
	1	2	3	1	2	3
Immigrant	-0.056*** (0.011)	-0.068*** (0.018)	-0.003 (0.015)	-0.062*** (0.011)	-0.064*** (0.019)	-0.011 (0.018)
Exogamy	-0.014 (0.015)	-0.008 (0.014)	-0.018 (0.012)	-0.024 (0.016)	-0.018 (0.016)	-0.031* (0.016)
Immigrant x Exogamy	0.056* (0.023)	0.054* (0.026)	0.016 (0.023)	0.073** (0.025)	0.080** (0.029)	0.053 (0.028)
Constant	0.817*** (0.006)	-0.437 (0.248)	-6.062*** (0.359)	0.807*** (0.006)	-0.401 (0.255)	-4.271*** (0.390)
N	35,977	33,346	31,769	35,977	33,346	31,769
Random effects	yes	yes	yes	yes	yes	yes
Covariates	no	yes	yes	no	yes	yes
Mundlak means	no	no	yes	no	no	yes

Note. Model 1 presents estimates from a random effects model controlling only for survey year. Model 2 additionally includes controls for age, squared age, gender, EU origin, age at arrival in Germany, East Germany, rural area, working status, education in years, income in quintiles, and an indicator for being previously married. 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. Source: SOEPv34, own calculations. Significance: p < 0.1.

\*p < 0.05.  
 \*\*p < 0.01.  
 \*\*\*p < 0.001.



**FIGURE A1** Alternative definitions of geographical proximity

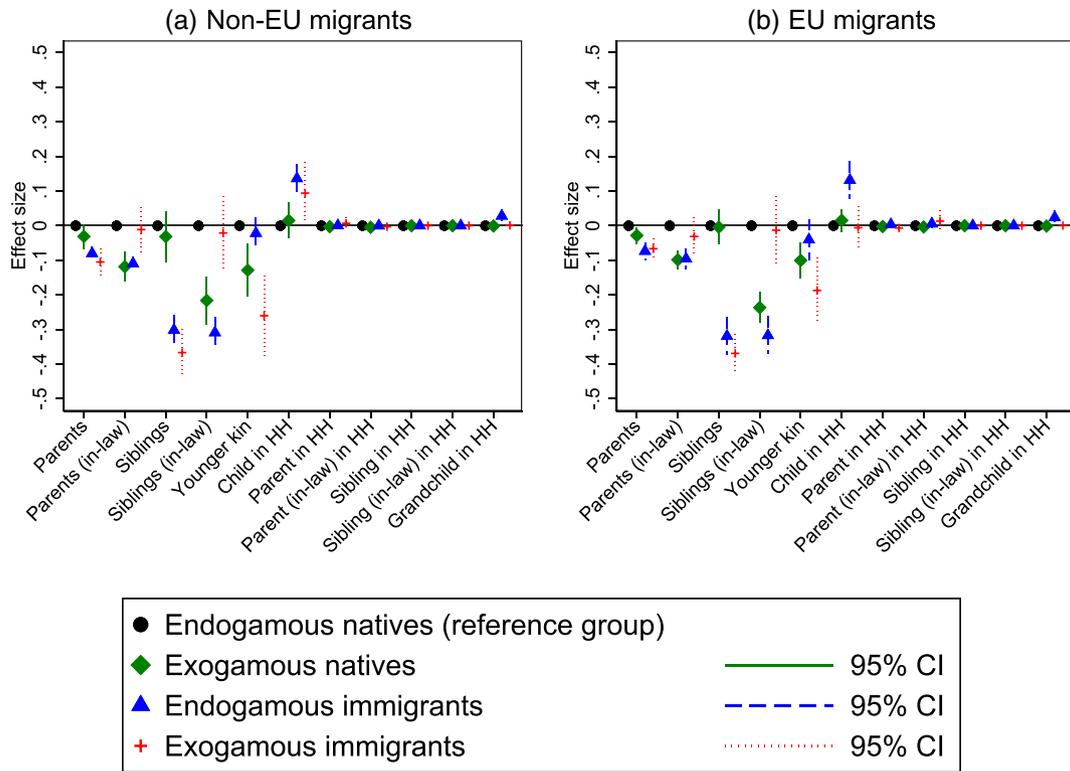


FIGURE A2 Differences in social networks by gender and immigrant origin

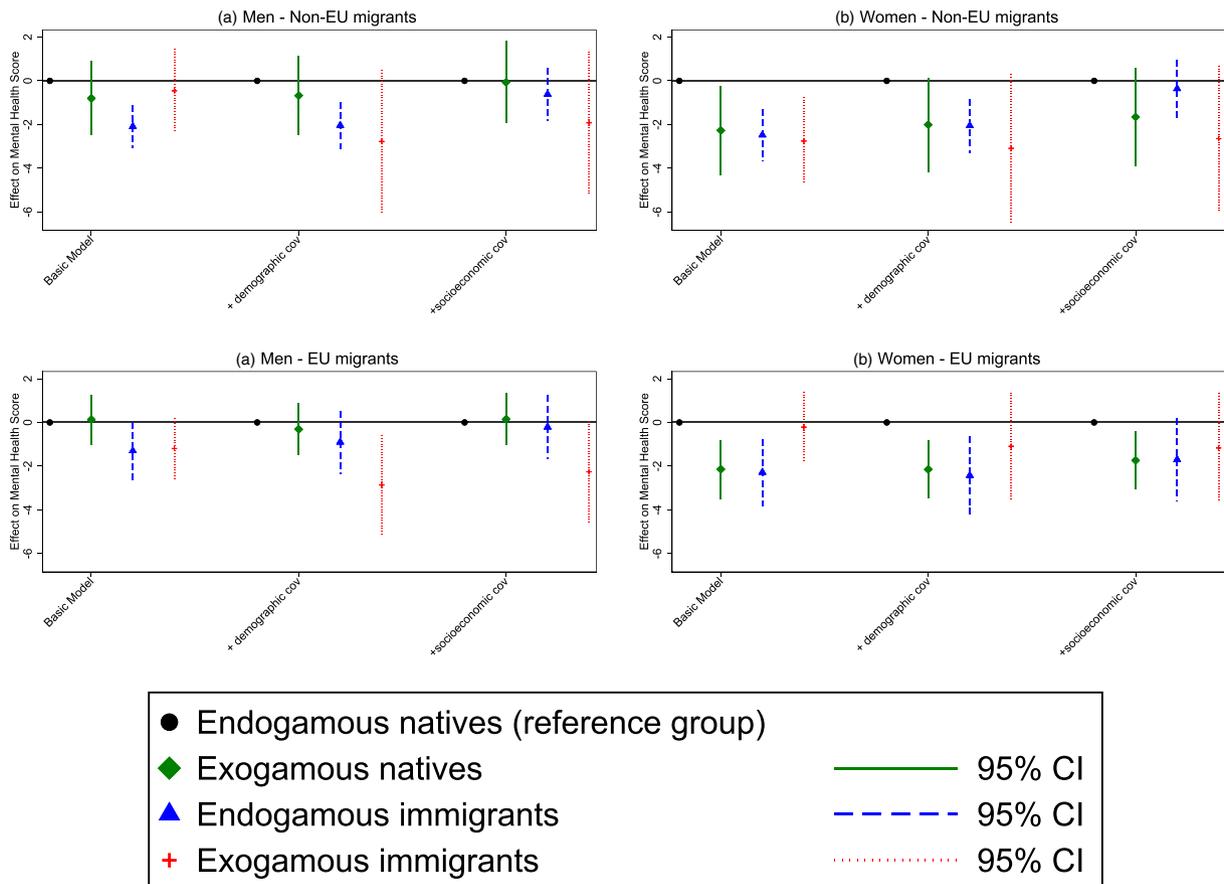
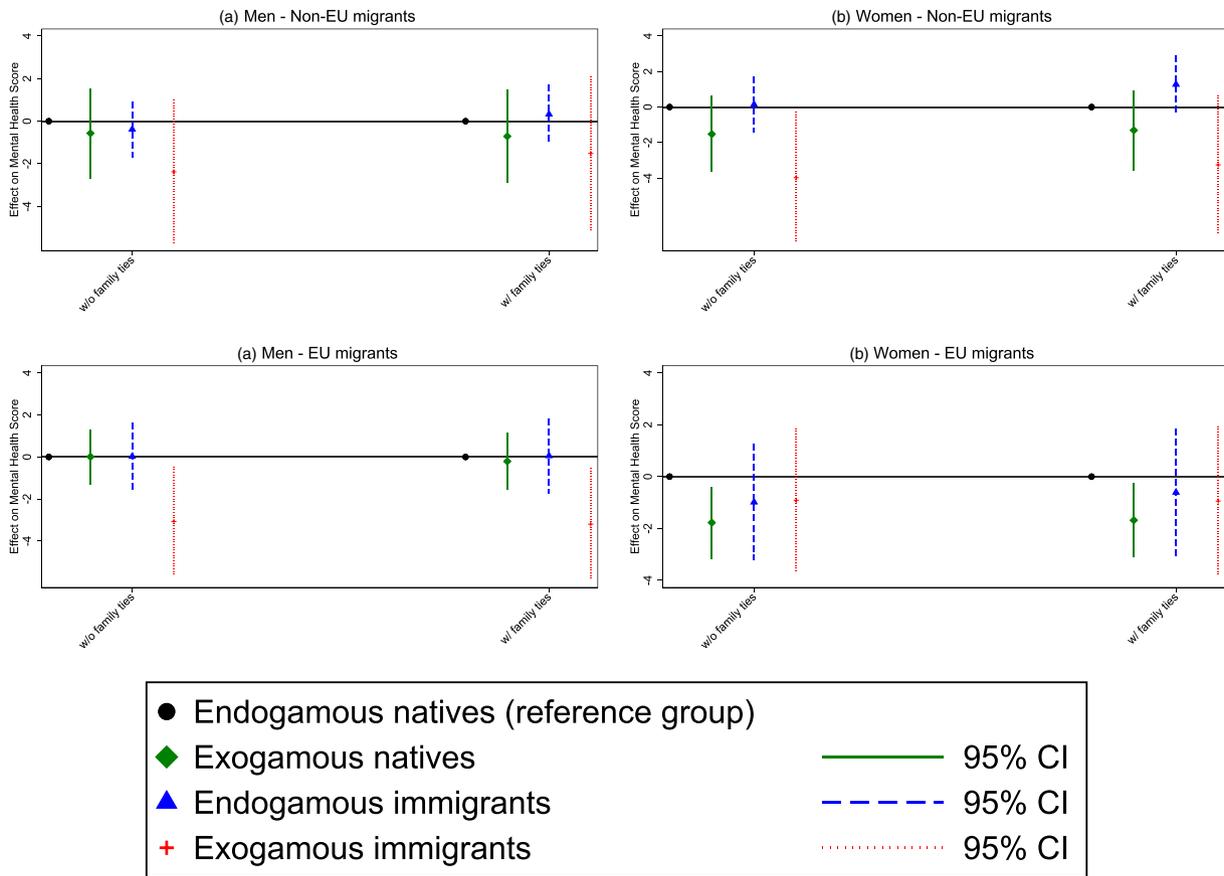


FIGURE A3 Differences in mental health by gender and immigrant origin



**FIGURE A4** Mental health and social networks by immigrant origin