



The isolation paradox: A comparative study of social support and health across migrant generations in the U.S.

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ABSTRACT

Social isolation and international migration have potentially adverse effects on physical and mental health, and may compound each other when migrants have limited access to supportive social networks. This problem may be particularly serious in older age groups, who are more vulnerable to illness and isolation. We analyze population representative data from a detailed survey of social networks and health in the San Francisco Bay Area, U.S., to compare access to different types of social support and health outcomes among first-generation migrants, second-generation migrants, and nonmigrants between 50 and 70 years old (N = 674). We find that first-generation migrants report systematically lower levels of social support and poorer self-rated health compared to nonmigrants, even after controlling for sociodemographic characteristics. While social support is strongly and positively associated with health in the general population, this relationship is null or, in some cases, reversed among migrants in the first and second generations. These results provide further evidence that migration operates as an adverse social determinant of health, and suggest an isolation paradox: migrants are healthier than nonmigrants only at very low levels of social support, and they do not experience the same beneficial health effects of social support as nonmigrants.

1. Introduction

Social isolation, lack of social support and loneliness are considered major threats to physical and mental health in Western countries (de Jong Gierveld et al., 2006; Parigi and Henson, 2014), particularly among older (Fakoya et al., 2020) and more vulnerable segments of the population (Verderby and Campbell, 2019). With growing and changing migratory trends in the U.S. and Europe, migration is also increasingly recognized as a potentially adverse social determinant of health, due to several mechanisms exposing migrants to negative health impacts – such as barriers in access to healthcare, poor occupational conditions, racial/ethnic discrimination, and neighborhood segregation (Abubakar et al., 2018; Castañeda et al., 2015). Social isolation and migration may intersect and compound each other in the production of health disadvantages among first- and second-generation migrants (Menjívar, 2000). This article examines social isolation and migration as two interacting factors that shape individual health in different migrant generations. Analyzing population representative survey data for the San Francisco Bay Area in the U.S., we compare social support and health among

50-to-70 years old first-generation migrants, second-generation migrants, and nonmigrants. We find that the often-assumed protective effects of support networks on health apply to nonmigrants, but do not take place as strongly, or at all, among migrants and their descendants. Instead, older adult migrants are healthier than expected when socially isolated, but less healthy than anticipated when surrounded by numerous and supportive ties, even after controlling for common sociodemographic factors.

It is widely acknowledged that migrants tend to be healthier than nonmigrants with similar sociodemographic characteristics, in both countries of emigration and immigration, particularly during the initial years after migration and even at low levels of socioeconomic status (SES) (Dubowitz et al., 2010; Kennedy et al., 2015). Termed as the “healthy immigrant paradox” or “Latino health paradox”, this pattern is often attributed to the beneficial effects of migrants’ presumed stronger social networks, particularly with coethnics (Almeida et al., 2009). However, the association between social support and health in migrant populations may be less obvious than assumed (Dubowitz et al., 2010; Viruell-Fuentes and Schulz, 2009). When people migrate, some of their

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supportive personal ties are left behind in the countries of origin (Faist and Bilecen, 2019; Vacca et al., 2018) while new ties are formed in destination communities (Bilecen et al., 2018; Lubbers et al., 2010). The resulting geographical dispersion of personal networks may limit migrants' access to social support, such as emotional, material, and emergency assistance. However, while recent research has found significant stratification in access to social support in the U.S. by race/ethnicity, SES, and other sociodemographic factors (Verdey and Campbell, 2019), there is little research about stratification in social support by migration status. Such stratification may have an important impact on migrants' health, considering the well-documented positive effects of actual and perceived social support for individual health (Berkman et al., 2000; House et al., 1988).

Recent literature on migration and social support indicates that support varies with certain individual characteristics of the migrant, the social relationship, the overall social context, and the domain of support (Bilecen and Cardona, 2018; Vacca et al., 2021). Migrants in the U.S., in particular, are a heterogeneous population with respect to migrant generation, age at migration, length of stay, and socioeconomic background, all characteristics that appear to have significant implications for social support (Harley and Eskenazi, 2014). The comparative approach we propose aims to develop a more nuanced understanding of social support and health across migrant generations, departing from simplistic assumptions that supportive ties are always present in migrant communities and necessarily conducive to better health.

This study focuses on migrants and nonmigrants in a particular age group – 50-to-70 years old – for three main reasons. First, older age groups are considered as a vulnerable group because they are more prone to health risks (Fakoya et al., 2020). Second, supportive personal ties become more important in older age (among both migrants and nonmigrants) for the mobilization of resources to mitigate potential and existing health risks (Wong et al., 2007). Among migrants in particular, certain literature contends that residence in ethnically homogenous neighborhoods has health protective effects especially in older age groups (Eschbach et al., 2004). Third, as discussed in section 3 below, the survey data and health measures used in our analyses are of higher quality and more reliable for older adult respondents.

2. Theoretical background and hypotheses

2.1. Migration, migrant generation, and social networks

Social support refers to the different types of assistance provided by social relationships in a variety of dimensions, such as emotional, instrumental, informational, and appraisal (Berkman and Krishna, 2014; House et al., 1988; Wellman and Wortley, 1990). Such assistance has often been studied as produced and exchanged within personal or egocentric networks (Perry et al., 2018; MMcCarty et al., 2019; Vacca et al., 2020) consisting of the social ties between a focal individual (the *ego*, typically the support recipient), and the family, friends and acquaintances that individual is connected to (the *alters*, typically the support providers). We investigate both potential and actually accessed social support (Gottlieb and Bergen, 2010). Potential support is operationalized considering both the *total personal network* that the ego could draw on when in need, and three subsets of this network: social ties to whom the ego *feels especially close*; the *local ties* who are spatially closer and therefore more accessible to the ego; and the contacts who could provide the ego with *health-related* support in hypothetical emergency situations. Furthermore, we consider two types of actually accessed support: the *emotional* support provided by contacts in whom individuals confide about personal issues involving their relationships, important things in their lives, and difficult experiences; and the *practical* support obtained from contacts who usually help the ego with daily activities and errands such as moving furniture, doing repairs, or looking after children.

Not only the type and level of support, also the characteristics of the

people who provide it can vary substantially, with different types of social contacts “specializing” in different types of support (Wellman and Wortley, 1990; Vacca, 2018). For instance, one might prefer to go to concerts with their friends, seek job-related information from colleagues, but ask parents for help with childcare. Migrants are no exception to this differentiation of supportive resources, in that they maintain multiple and specialized ties they can rely on for support in different domains (Bilecen and Sienkiewicz, 2015; Bilecen and Cardona, 2018; Lubbers et al., 2010; Menjivar, 2000; Vacca et al., 2021).

Considering the frequent differentiation and specialization of support providers, a common argument is that individuals with larger personal networks (i.e., more social ties) tend to receive more and better support (Wellman and Gulia, 1999). Migration may significantly impact personal network size. On the one hand, the spatial dispersion of international migrants' relationships may lead to larger personal networks, and studies of migrant transnationalism have suggested that some migrants maintain significant ties in sending communities (Bilecen and Lubbers, 2021; Faist and Bilecen, 2019). On the other hand, there is evidence that as migrants spend more years in countries of immigration, some of their personal relationships in origin countries dissolve, while new relationships in destination contexts may be hard to develop (Lubbers et al., 2010). While social ties may dissolve in time among nonmigrants too, for example as a consequence of spatial mobility (Wellman and Haythornthwaite, 2002), the native-born tend to experience lower barriers than migrants in forming new ties. Indeed, there is evidence that first-generation migrants tend to have smaller personal networks than native-born individuals (Volker et al., 2008) and the second generation (van Tubergen, 2013) in European contexts. This difference may be due to various mechanisms, including the gradual dissolution of transnational ties, cultural barriers to the formation of new ties after migration, and the fact that first-generation migrants tend to have fewer social settings to form new relationships. By contrast, second-generation migrants and nonmigrants, who were born and raised in the same country where they currently live, may have more opportunities to develop relationships and large networks in different settings and stages of their life course. These arguments lead us to a first hypothesis (Fig. 1):

H1: First-generation migrants perceive and access lower levels of social support in comparison to native-born individuals and the second generation.

2.2. Social support and health among migrants

Immigration is linked to different social and psychological factors that negatively impact overall health, including poorer occupational conditions, barriers to healthcare access, and racial/ethnic discrimination (Castañeda et al., 2015; Lubbers and Gijbels, 2019). These factors help to explain existing evidence that, although first-generation migrants experience better health than nonmigrants in the first years after

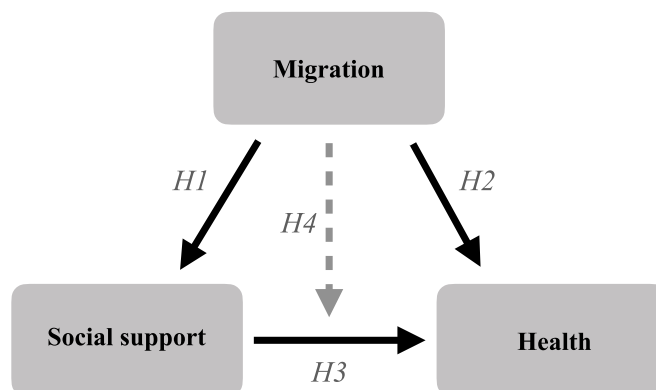


Fig. 1. Main variables and hypotheses in the study.

migration, their health deteriorates over time in parallel with “assimilation” to receiving societies (Nielsen and Krasnik, 2010). As a result, migrants usually report lower self-rated health in comparison to their native-born counterparts, both in European and U.S. contexts (Nielsen and Krasnik, 2010; Cooper, 2002). This motivates our second hypothesis:

H2: Overall health is poorer among first-generation migrants in comparison to second-generation migrants and nonmigrants.

As research in mainstream, nonmigrant populations has repeatedly reported in the past few decades, social support has a positive effect on health outcomes in different countries and contexts (Berkman et al., 2000; House et al., 1988). We expect to confirm this association:

H3: Greater levels of perceived and accessed social support are associated with better health in the nonmigrant population.

Studies on migrants also generally suggest a positive relationship between social support and health. In the U.S., nationally representative survey data show that social support, especially from family members, is associated with better self-rated health among Latino migrants (Mullaney-Day et al., 2007), although the effect is less consistent for other ethnic groups (Kimbro et al., 2012). In the Californian context in particular, similar data demonstrate a positive effect of social support on physical health among Mexican-origin migrants (Finch and Vega, 2003). Based on this evidence, we do not expect the association between social support and health to be substantially different between migrants and nonmigrants:

H4: Social support has similar beneficial health effects among both migrants and nonmigrants.

2.3. Context and contribution of this study

This study analyzes data from the UC Berkeley Social Networks survey (UCNets), which collected extremely detailed information on personal networks and health in a representative sample of residents in the San Francisco Bay (SFB) Area, California (Fischer, 2018). Using multiple measures of health and social networks, we investigate to what extent older adults in different migrant generations differ in terms of physical and mental health, social support, and the relationship between support and health. The SFB Area population is particularly diverse in terms of migration status and ethnicity. About a third (32%) of SFB residents are first-generation migrants; 56% are White, 30% Asian and 6% African American, with 29% also identifying as Hispanic (Census Bureau, 2019). This is a rather young and well-educated, urban population: 20% of the SFB residents are under 18 years old, 66% are between 19 and 64 years old, and 14% are 65 and above; half of the residents over 25 years old have at least Bachelor's degrees, while 88% have at least high school diplomas.

Our study makes three major contributions. First, studies on social support and health in migrant communities rarely compare different migrant generations and nonmigrants. Through such comparison, we provide a more comprehensive and nuanced picture of social support and health inequalities in relationship to migration. Second, we add further evidence to theories about international migration as an adverse social determinant of health, underscoring that social support may *not* protect migrants against health disadvantages to the extent that certain migration literature suggests. Third, we find that the well-known, positive relationship between social support and health is weaker or even reversed among migrants. Controlling for a number of sociodemographic characteristics, migrants with high levels of social isolation (low social support) are unexpectedly healthier than similarly isolated nonmigrants, while migrants embedded in larger and potentially more supportive networks are less healthy than their nonmigrant counterparts. We introduce the term “isolation paradox” to describe this pattern.

3. Data, measures and methods

3.1. Data and social network measures

We use cross-sectional data from the first wave of the UCNets survey (Fischer, 2018), which was conducted in 2015–2016 with 1159 respondents selected among young adults (21-to-30 years old) and late middle-age adults (50-to-70 years old). Stratified random address-based sampling (ABS) was adopted to select all the older adults and a half of the young adults, with the other half of the young cohort being recruited via Facebook advertisements. We conducted analyses separately for the two age cohorts and focus on the older adult cohort ($N = 674$) in the main article, while the results for the young cohort ($N = 485$) are provided in the Supplementary Materials. In addition to the already discussed substantive reasons, two methodological reasons justify our focus on the older adult cohort: first, self-rated health – one of the three health measures we adopt – is known to be more effective and reliable for older populations as a comprehensive health index (Jylhä, 2009); second, the UCNets older adult sample is a full probability sample recruited via standard ABS methods, while half of the young sample (the part recruited via Facebook advertisements) is non-probability. Thus, we believe our results for the older cohort to be generally more reliable than those for the young adults in the data.

Only people who spoke English or Spanish were eligible to participate in the survey, with selected respondents being randomly assigned to face-to-face (75% of cases) or web (25%) survey modes. The cumulative survey response rate for the ABS sample was estimated at 3%, a level comparable to other large-scale panel surveys (Fischer and Lawton, 2020). Fischer and Lawton (2020) provide more details about the respondent recruitment procedure, its different steps and their potential impacts on the response rate. The relatively low response rate compared to standard surveys may also be explained by the panel nature of the UCNets survey and the higher respondent burden implied by its personal network instruments (Fischer and Bayham, 2019). All analyses in this article use post-stratification sample weights (with a 95% trim) designed to reflect the distributions of age, gender, race/ethnicity, marital status and education in the greater SFB Area (Child and Lawton, 2020; Fischer and Lawton, 2020).

The UCNets questionnaire contained a variety of items regarding social network characteristics, and health outcomes and behaviors. Network characteristics include the amount of social support perceived and accessed by an individual (our main focus) and the closeness or strength of social relationships. *Social* support is first treated as a dependent variable predicted by migration status, then incorporated in models for health outcomes as an explanatory variable. The respondents (egos) were asked to list their social contacts (alters) in different contexts or roles: responses to these questions (see Table S1 in the Supplementary Materials) generate our social support measures. Count measures were used for each of the different support dimensions of interest:

- a) Total potential support: The count of *all social contacts* named by the respondent (i.e., personal network size), including family, friends, and acquaintances from different social contexts (work, neighborhood, church, etc.).
- b) Emotional support: The count of social contacts that the respondent named as *confidants* about personal matters, including relationships and difficult experiences.
- c) Everyday/practical support: The count of contacts named by the respondent as *providers of practical support*, who have helped the ego with practical needs (e.g., moving furniture, doing repairs) in the previous few months.
- d) Emergency, health-related support: The count of contacts named by the respondent as *providers of support with emergency health problems*, who could potentially offer material help (e.g., preparing meals or getting around) in case of health-related emergencies.

- e) Close ties: The count of social ties to whom the respondent “feels especially close.”
- f) Local ties: The count of social ties who live an hour’s drive away or less from the respondent.

Finally, we conceptualize social network closeness as the degree to which, independently of network size, individuals are spatially close to their social ties and are embedded in networks of strong, personally close relationship. Two variables are used to measure these concepts, based on the definitions provided above: the proportion of close ties, and the proportion of local ties in one’s personal network.

3.2. Health measures

Our second set of dependent variables refer to health outcomes. For self-rated health we use a standard ordinal measure based on the question, “Would you say your health is excellent, very good, good, fair, or poor?” The smaller Fair and Poor categories were aggregated. Self-rated health is a subjective measure widely used to approximate overall health status (Fayers and Hays, 2005), including in migrant health studies (Kimbrow et al., 2012; Lubbers and Gijsberts, 2019). It encompasses different aspects of physical and mental health and is closely associated with numerous other health measures (Jylhä, 2009).

We also consider two less subjective measures of overall physical and mental health. The first consists of a binary indicator of whether the respondent had any serious illness in the previous year. This measure aggregates responses to four questions asking if the respondent was “diagnosed with a serious illness”, “disabled by an illness or injury”, “hospitalized”, or had “another serious health issue” in the last year (1 if the respondent had no serious physical health issue, 0 otherwise). We also refer to this outcome as “no recent illness”. The second measure is a binary indicator of whether the respondent has ever been diagnosed with “depression or another psychological problem”, with 1 indicating no mental illness diagnosis (henceforth referred to as “no mental illness experience”).

Previous research has shown that self-rated health captures similar objective health dimensions in different migrant ethnic groups (Kimbrow et al., 2012). Consistent with this finding, self-rated health is a very good predictor of a number of physical and mental health measures in the UCNets older adult data. For instance, the probability that an older adult has had no serious illness in the previous year increases monotonically with each better self-rated health category, from 0.30 in the worst category (Fair/Poor) to 0.84 in the best one (Excellent); and a one-category increase in self-rated health is associated with a 123% increase in the odds of having had no illness in the previous year. Similarly, the probability of having had no experience of mental illness in life increases monotonically, from 0.58 in the worst self-rated health category to 0.84 in the best, amounting to a 68% increase in the odds of no mental illness experience, on average, with each better self-rated health category. A battery of other health measures in the UCNets survey exhibit similarly strong associations with self-rated health (results not shown), including whether one has ever been diagnosed with any heart disease, diabetes, high blood pressure or hypertension, asthma or other breathing issue, and arthritis or rheumatism; as well as whether one was hospitalized in the past year.

3.3. Migration and control variables

Our central explanatory variable is migration status, distinguishing between three migrant generations (Rumbaut, 2002):

- a) First-generation migrant: an individual who was not born in the U.S.
- b) Second-generation migrant: an individual who was born in the U.S. and has at least one parent who was not. We also refer to this group as descendants of first-generation migrants.

- c) Nonmigrant: an individual who was born in the U.S. and whose parents are also both native-born. We sometimes refer to this group as native-born individuals.

In addition to migration status, our analyses control for a number of sociodemographic characteristics which may influence levels of social support and health according to existing literature (Bird et al., 2010; Verdery and Campbell, 2019): Age (in years), Adjusted household income, Gender, Marital status, Race/ethnicity, Education, and Survey mode (Face-to-face or Web). To capture individual SES, adjusted household income is measured as a continuous variable indicating brackets of a person’s yearly household income (from 1 = Under \$15,000, to 13 = \$500,000 or more), divided by the square root of the person’s household size. Categories and descriptive statistics for all explanatory variables are shown in Table 1.

3.4. Methods

We start by examining bivariate distributions of social support and health outcomes by migration status. Negative binomial regression is then used to model social support as a function of migration status while controlling for sociodemographic characteristics and survey mode. Exponentiated coefficient estimates for migration groups in these models are interpreted as multiplicative change in predicted counts of social contacts: that is, the ratio between the predicted count in the category of interest (first- or second-generation migrants) and in the reference category (nonmigrants).

In the second part of the analysis, we estimate models for health

Table 1
Descriptive statistics of sociodemographic variables by migration status (older adult cohort). * p-value < .05 in test for difference between migration status groups (Kruskal-Wallis test for continuous variables, chi-squared test for categorical variables).

	1st generation	2nd generation	Nonmigrants	Total
N (%)	138 (21)	110 (16)	418 (63)	666 (100)
	N (column %) or Mean (SD)	N (column %) or Mean (SD)	N (column %) or Mean (SD)	N (column %) or Mean (SD)
Gender				
Male	60 (43)	46 (42)	209 (50)	314 (47)
Female	79 (57)	64 (58)	209 (50)	352 (53)
Race/ethnicity *				
White	28 (21)	43 (39)	300 (72)	372 (56)
African American	0 (0)	0 (0)	43 (10)	43 (7)
Asian	72 (52)	27 (24)	19 (5)	118 (18)
Hispanic, White	8 (5)	10 (9)	23 (5)	40 (6)
Hispanic, Non White	16 (12)	18 (16)	16 (4)	50 (8)
Multi/Other	14 (10)	12 (11)	16 (4)	43 (6)
Marital status *				
Not married	38 (27)	44 (40)	188 (45)	270 (41)
Married	100 (73)	66 (60)	230 (55)	396 (59)
Education *				
High school or less	16 (12)	4 (3)	52 (12)	71 (11)
Some college	15 (11)	30 (27)	131 (31)	176 (27)
College degree	65 (48)	56 (51)	160 (38)	280 (42)
More than college	38 (29)	21 (19)	75 (18)	133 (20)
Age	58.5 (6.2)	58.4 (6.7)	60 (5.8)	59.4 (6.1)
Income bracket	4.7 (2.2)	5 (2.3)	4.8 (2.4)	4.8 (2.3)

outcomes as a function of migration status and social support, controlling for sociodemographics and survey mode. We use standard logistic models for the binary health outcomes (No recent illness and No mental illness experience) and ordered logit models for self-rated health. For a generic explanatory variable x_i , the exponentiated ordered logit coefficient is interpreted as the usual odds ratio, or the multiplicative change in the odds of being in a *better* health category when x_i increases by one unit. The proportional odds assumption of all ordered logit models is realistic for our data based on standard Brant tests (results not shown).

In addition to coefficient estimates, we calculate the predicted probability of specific health outcomes as a function of migration status and social support. In line with recent recommendations about significance testing (Wasserstein et al., 2019), to assess significance we favor confidence intervals and predicted probabilities over conventional p-value thresholds for coefficient estimates. In particular, we use Discrete Changes at the Mean (DCM) in predicted probabilities (Long and Mustillo, 2019) to evaluate predictor effects between different migration status groups, because group comparisons based on logistic regression coefficients or odds ratios may be misleading in case of unobserved heterogeneity between groups (Allison, 1999).

4. Results

4.1. Sociodemographic characteristics of migrants

Migration groups are significantly different in terms of race/ethnicity, marital status and education, but comparable in terms of gender, age and income distribution (Table 1). First-generation migrants are predominantly Asian (52%), non-Hispanic White (21%) and Hispanic (17%); married (73%); and highly educated (77% with college degree or higher). They were mostly born in Asian countries (57%), in Canada and Western Europe (15% in total), and in a variety of other countries in Latin America and Eastern Europe. Second-generation migrants are prevalently White (39%), with almost equal proportions of Asians and Hispanics (about 25%). Compared to the first generation, they are less likely to be married and slightly less educated. In comparison with both migrant generations, nonmigrants are less ethnically diverse, with White (72%) and African Americans (10%) being the most frequent ethnicities in this group. They have similar average age and income level as migrants in both generations, but are less likely to be married (55%) and less educated (just 56% have college-level education or higher).

4.2. Social support by migration status

Respondents nominated between 1 and 25 social ties overall, with an average of almost 9.5 contacts, of which 7.5 are local and 4.5 are close ties (Table 2). Counts of social ties in specific support domains are lower by survey design (respondents could nominate a maximum of 6 support providers per domain). Everyday practical support is the most limited, with less than 2 support providers nominated on average, while about 3 confidants and 3 providers of health-related support were nominated by the average respondent. The levels of social support vary significantly between migration groups. First-generation migrants have significantly smaller personal networks overall (8.7 contacts on average), the smallest local networks (mean = 6.8 contacts), and the lowest number of confidants (mean = 2.2). Compared to the two other groups, they also nominate slightly fewer close ties and providers of practical and health-related support (although between-group differences are not statistically significant in these dimensions). By contrast, second-generation migrants tend to have the largest networks overall and the most local ties. Nonmigrants report slightly more providers of practical and health-related support, as well as more close ties, but differences between groups are not statistically significant in these domains.

Bivariate variations of social support levels by migration group may derive from sociodemographic differences, particularly in terms of race/

Table 2

Descriptive statistics for network and health characteristics by migration status (older adult cohort). * p-value < .05 in test for difference between migration status groups (anova test, Kruskal-Wallis test, or chi-squared test).

	1st generation	2nd generation	Nonmigrants	Total
	Mean (SD) or N (column %)	Mean (SD) or N (column %)	Mean (SD) or N (column %)	Mean (SD) or N (column %)
Social support				
N all contacts *	8.7 (4.2)	10.4 (5.2)	9.6 (4.1)	9.5 (4.3)
N confidants *	2.2 (2)	3 (2)	3 (1.8)	2.9 (1.9)
N practical support providers	1.4 (1.6)	1.6 (1.8)	1.7 (1.7)	1.6 (1.7)
N health-related support providers	2.7 (1.5)	2.8 (1.7)	2.9 (1.8)	2.9 (1.7)
N close ties	4 (2.8)	4.5 (3.1)	4.8 (3.4)	4.5 (3.2)
N local ties *	6.8 (3.5)	8.3 (5.1)	7.6 (3.9)	7.5 (4.1)
Network closeness				
Proportion close ties	0.48 (0.28)	0.43 (0.25)	0.5 (0.28)	0.49 (0.28)
Proportion local ties	0.77 (0.21)	0.78 (0.2)	0.8 (0.22)	0.79 (0.22)
Self-rated health *				
Fair/Poor	40 (29)	6 (6)	85 (20)	131 (20)
Good	48 (35)	28 (25)	99 (24)	174 (26)
Very Good	39 (28)	44 (40)	155 (37)	238 (36)
Excellent	12 (8)	32 (29)	80 (19)	123 (18)
Any serious illness last year *				
Yes	39 (28)	21 (19)	158 (38)	219 (33)
No	99 (72)	89 (81)	260 (62)	447 (67)
Mental illness experience				
Yes	32 (23)	27 (25)	94 (22)	152 (23)
No	107 (77)	83 (75)	324 (78)	514 (77)

ethnicity, marital status, and education. However, social support disparities between first-generation migrants and the two other groups remain significant after adjusting for all sociodemographic characteristics in Table 1 (and for survey mode). With these characteristics held constant, the average first-generation migrant has a significantly smaller personal network and more limited access to social support in all domains, compared to nonmigrants and the second generation (Table 3). This is particularly true for practical and emotional support, with the average first-generation migrant nominating 38% ($\exp(\hat{\beta}) = 0.62$) and 29% ($\exp(\hat{\beta}) = 0.71$) fewer contacts than the average nonmigrant in these two areas, respectively. By contrast, second-generation migrants report similar numbers of social contacts to nonmigrants, with no significant differences after controlling for sociodemographics, except for

Table 3

Negative binomial models for social support and linear models for network closeness as explained by migration status (ref = Nonmigrants) in older adult cohort: coefficient estimates (standard errors). Coefficient estimates are exponentiated for negative binomial models. All models control for age, gender, marital status, race/ethnicity, education, income, survey mode. * p-value < .05, ** p-value < .01, *** p-value < .001.

	1st generation	2nd generation
Social support		
N all contacts	0.8 (0.05) ***	0.98 (0.05)
N confidants	0.71 (0.08) ***	0.92 (0.07)
N practical support providers	0.62 (0.14) ***	0.86 (0.12)
N health-related support providers	0.83 (0.07) *	0.85 (0.07) *
N close ties	0.87 (0.09)	0.86 (0.08)
N local ties	0.77 (0.07) ***	0.95 (0.06)
Network closeness		
Proportion close ties	0.04 (0.03)	-0.06 (0.03)
Proportion local ties	-0.04 (0.03)	-0.04 (0.02)

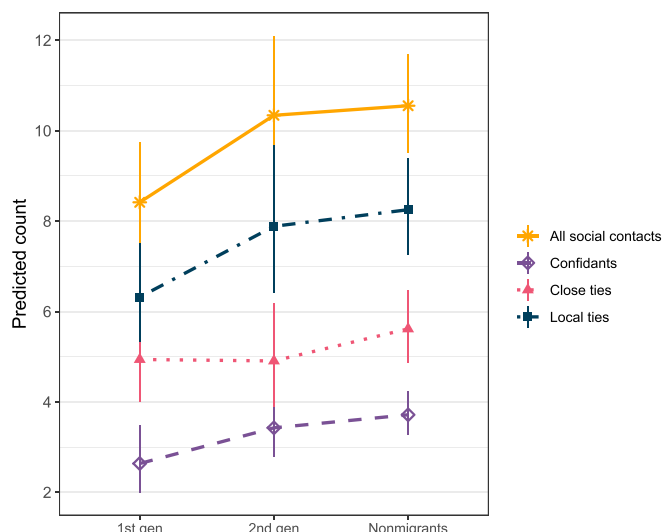


Fig. 2. Predicted counts of social contacts from negative binomial models in Table 3 (older adult cohort). Counts are calculated for an individual with typical sociodemographic characteristics in the overall population (see Table 1).

health-related support (15% fewer contacts, $\exp(\hat{\beta}) = 0.85$). Fig. 2 displays these results in terms of predicted numbers of social ties (in four selected dimensions) when holding sociodemographic characteristics constant to mean or modal values. On average, first-generation migrants nominate over 2 fewer contacts than nonmigrants, and slightly less than 2 contacts than second-generation migrants, in their overall personal network. They also nominate almost 2 fewer local ties and one less confidant compared to nonmigrants. Contrarily, second-generation migrants report similar numbers of social relationships as nonmigrants in all four dimensions. While the amount of social support varies significantly between migrant generations, the proportions of close and local ties are similar across the three groups.

4.3. Migration, social support and health

We find a significant bivariate association between migration and self-rated health before adjusting for other sociodemographic characteristics (Table 2 and Fig. 3). Compared to nonmigrants, first-generation migrants report systematically worse health, while the second

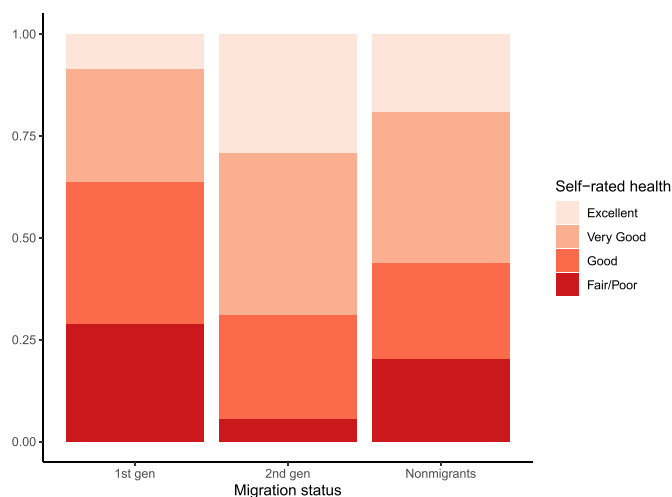


Fig. 3. Proportions of self-rated health categories by migration status (older adult cohort).

generation tends to report better health. In particular, first-generation migrants are substantially less likely to report Excellent or Very Good health compared to the other two groups; while second-generation migrants are significantly more likely to report Excellent health and much less likely to describe their health as Fair/Poor. Migrant descendants are also the most likely to have had no serious health issue in the previous year (81%), but on this measure first-generation migrants also report better health than nonmigrants (72% vis-à-vis 62%). The proportions of people who have never been diagnosed with any mental illness are comparable across the three groups.

Although the three groups are similar in terms of age, gender, and income distribution, bivariate associations between migration and health may result from systematic differences between migrant generations in terms of marital status, race/ethnicity, education level, and social support. To remove potential confounding effects, in the last part of the analysis we estimate regression models for health outcomes as a function of migration and social support, controlling for all socio-demographic characteristics. An interaction term between migration and social support allows the association between support and health to vary by migration group. For each health outcome (Self-rated health, No serious illness last year, No mental illness experience) we estimate six models, using each of our six counts of ties (see section 3.1) as the social support predictor. These counts are logged in all 18 models to account for potential curvilinear associations.

Coefficient estimates and confidence intervals for all models are shown in Fig. 4 (see Tables S2-S7 for full results). Based on these results, Fig. 5 displays predicted probability curves for three positive health outcomes: very good or excellent self-rated health (henceforth referred to as best self-rated health), no serious illness in previous year, and no experience with mental illness. The figure focuses on the four support variables that are most strongly associated with health according to model results. Finally, Table 4 shows the predicted probability of positive health outcomes at low and high levels of social support (one standard deviation below and above the mean, respectively) in different migration groups, with the resulting discrete changes in probability (DCMs) between low and high support levels.

Taken together, Figs. 4-5 and Table 4 reveal three important patterns. First, among people with the lowest levels of social support (0-2 social ties in each domain), migrants and their descendants tend to have similar or better outcomes than nonmigrants in our two measures of overall and physical health (self-rated health and no recent illness). This is indicated by the generally positive or insignificant coefficient estimates for the main effects of first- and second-generation migrants on self-rated health and no recent illness (Fig. 4): these indicate a positive or null health “effect” of being a first- or second-generation migrant (compared to nonmigrant) among individuals with no social support. Consistently, at low levels of social support, migrants and their descendants have generally higher probability of best self-rated health and no recent illness than nonmigrants (Fig. 5 and Table 4).

Second, in the nonmigrant population social support has the expected, generally positive association (main effect) with self-rated health and no recent illness. Higher counts of supportive ties in all six domains correspond with better self-rated health categories among nonmigrants, a particularly strong effect for total network size, local ties, and close ties. In the same group, the counts of local ties, close ties, and health-related support providers are also significantly and positively associated with the likelihood of having had no recent illness. Thus, the predicted probabilities of best self-rated health and no recent illness strongly increase with the numbers of social ties in the nonmigrant population (Fig. 5); and Table 4 shows high, positive DCMs for self-rated health (18-24 percentage point increases in probability) and no recent illness (4-12 percentage point increases) in this group.

Third, in contrast with the strong, positive relationship in the nonmigrant population, social support tends to have a weak, at times negative, association with overall and physical health among migrants and their descendants. This is reflected, for self-rated health and no

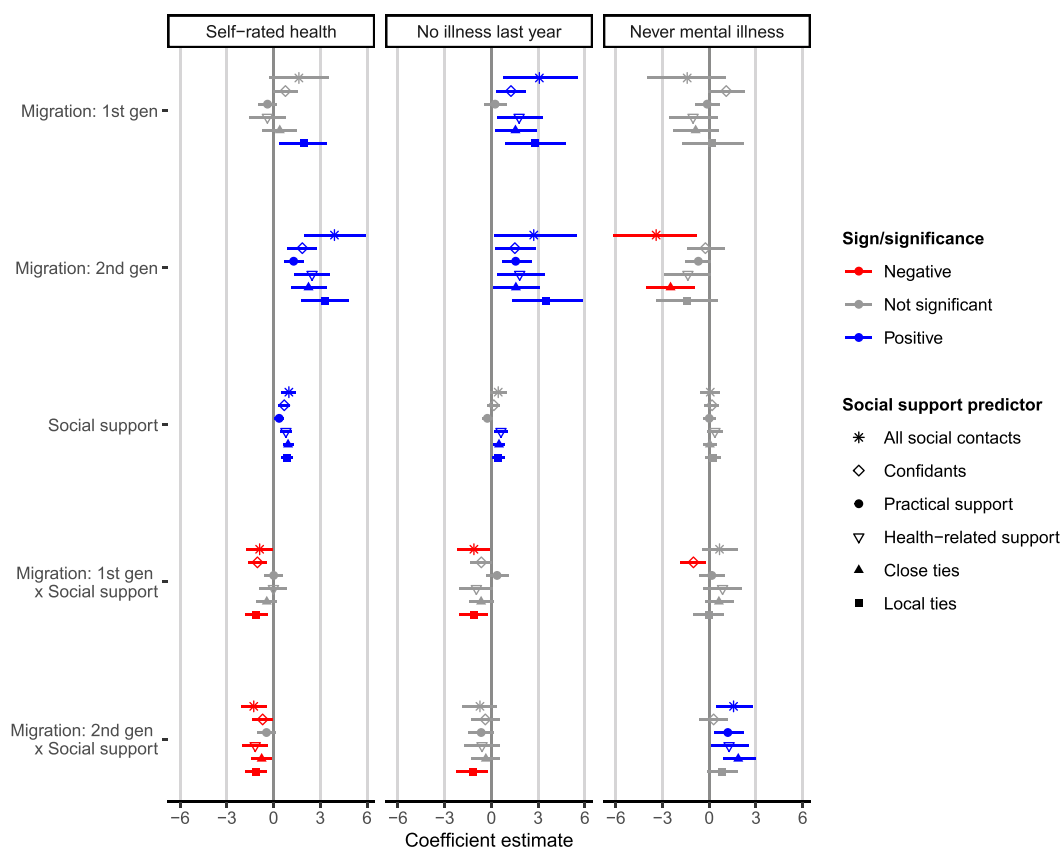


Fig. 4. Ordered logit models for self-rated health, and logistic models for no serious illness in previous year and no mental illness experience (older adult cohort): coefficient estimates and 95% confidence intervals. Significance assessed at 5% level. All models control for age, gender, marital status, race/ethnicity, education, income, survey mode. See Tables S2-S7 in Supplementary Materials for full results. Social support predictors are logged counts.

recent illness, in generally negative interaction coefficients for migration and social support (Fig. 4); in predicted probability curves that are weakly increasing, constant or even decreasing with social support (Fig. 5); and in smaller, null, or even negative DCMs for first- and second-generation migrants (Table 4). First-generation migrants, in particular, are overall healthier than nonmigrants at low degrees of social support, but the opposite is true at medium-to-high support levels. At average values of alter counts (see Table 2), first-generation migrants are equally or less likely to report best self-rated health or no recent illness compared to nonmigrants (Fig. 5), and the disadvantage grows steadily with larger and more supportive personal networks (see the probability curves for higher alter counts in Fig. 5 and the probabilities at High support levels in Table 4). The counts of all social contacts and of local ties, for example, are strongly and positively associated with self-rated health and no recent illness in the nonmigrant population; among migrants and their descendants, however, they have a flat or negative association with these two outcomes (Fig. 5).

Interestingly, a different pattern emerges in models for no mental illness experience. The relationship between this outcome and social support is essentially null in the nonmigrant population, and similarly null or weakly positive among first-generation migrants (except for a significant, negative relationship with the number of confidants). However, social support in most domains is strongly and positively associated with no mental illness experience for the second generation.

5. Discussion and conclusions

This study offers three major findings. First, as expected in H1, 50-to-70 years old first-generation migrants perceive and mobilize lower levels of social support compared to the second generation and nonmigrants. They nominate significantly fewer social relationships in all

domains, reporting both smaller personal networks overall and fewer local ties (less than an hour's drive away), providers of practical support, and friends or family in whom they can confide about personal matters. In certain domains, such as practical support and local ties, the spatially dispersed and transnational nature of migrants' personal networks may contribute to explain such differences (Bilecen and Cardona, 2018; Vacca, 2018). However, the systematically lower levels of support among migrants in all domains, including those that do not imply spatial proximity, suggest that other migration-related mechanisms might be responsible for this penalty.

Second, in line with H2, older first-generation migrants tend to report worse self-rated health compared to the two other migration groups. This is a striking pattern considering that, in the SFB Area and in our data, first-generation migrants have similar or higher SES and are more frequently married compared to native-born individuals – characteristics that are associated with better health both in our analyses (see Tables S2-S7) and in existing literature (Bird et al., 2010). The self-rated health disadvantage of first-generation migrants may be partly explained by racial/ethnic disparities in health (Williams and Sternthal, 2010): migrants may report poorer overall health because they are disproportionately non-White (particularly, Asian), a characteristic associated with lower self-rated health categories in our analyses (Tables S2-S7). The pattern of worse self-rated health among first-generation migrants is in contrast with the healthy migrant notion, but in agreement with recent arguments on migration as an adverse social determinant of health (Castañeda et al., 2015; Kimbro et al., 2012; Nielsen and Krasnik, 2010). However, while first-generation migrants give a worse assessment of their health, they are less likely than nonmigrants (but still more likely than second-generation migrants) to have recently experienced a serious illness, and as likely as the other two groups to have ever been diagnosed with depression or another

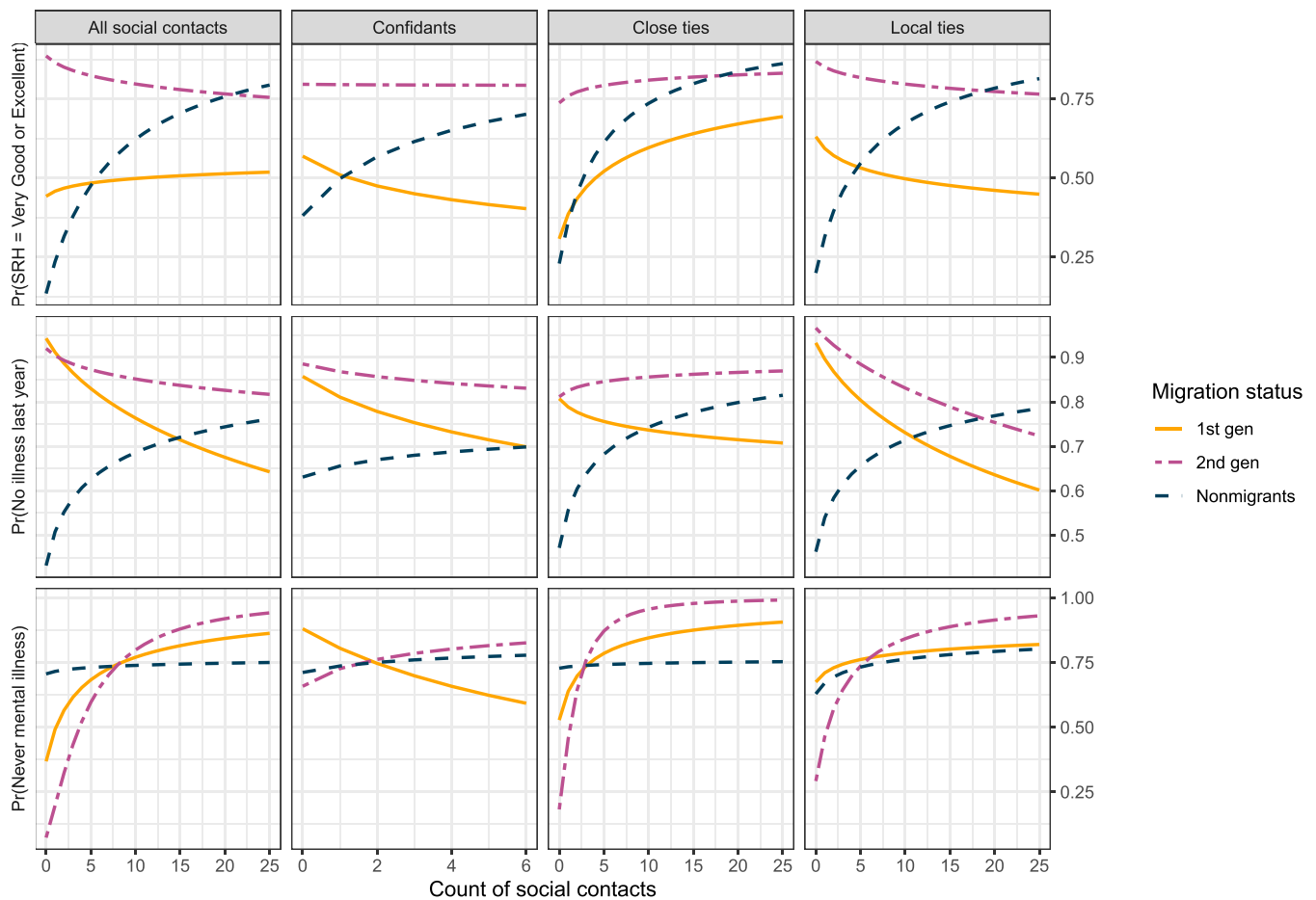


Fig. 5. Predicted probability of self-rated health being very good or excellent, of having had no serious illness in previous year, and of having no mental illness experience, as a function of counts of social contacts and migration status (older adult cohort). Probabilities are calculated from models in Fig. 4 and Tables S2-S7 for an individual with typical sociodemographic characteristics in the overall population (see Table 1).

psychological problem.

Our third major finding is that, while social support is associated with good overall health in the nonmigrant group (consistently with H3), the same relationship is *not* observed among migrants and their descendants, contrary to our expectation in H4. In other words, migrant generation emerges as an important moderator in the relationship between social support and health: in addition to showing different levels of social support and health outcomes, migration groups also differ in the *association* between support and health. The strong and positive association found among nonmigrants becomes much weaker, and in some cases even negative, among first- and second-generation migrants. According to the healthy migrant paradox literature, the positive gradient between SES and health that is observed in the native-born population is unexpectedly weaker among migrants, as low-SES migrants are healthier than nonmigrants with equally low SES. In parallel, we propose the term “isolation paradox” to describe the unexpected finding that the support-health gradient is much weaker among migrants and their descendants than it is in the general population: first- and second-generation migrants with low levels of social support are healthier than similarly isolated nonmigrants, while health outcomes among migrants embedded in larger and more supportive networks are similar to, or worse than levels among comparable nonmigrants.

Taken together, our study draws in part encouraging, in part alarming conclusions about migrant health. On the one hand, first-generation migrants are healthier than expected when experiencing very low levels of social support, as if immune to the worst health effects of acute isolation. On the other hand, they are both more at risk of social isolation, and less likely to enjoy the same protective health effects of

social support that are commonly observed among nonmigrants. Interestingly, earlier studies often argue that stronger social support, especially from family and coethnic networks and neighborhoods, may be responsible for better health behaviors and outcomes among migrants, thus explaining the healthy migrant paradox (Almeida, 2009; Dubowitz et al., 2010; Eschbach et al., 2004). Our results challenge this argument, showing that first-generation migrants are *not* embedded in larger networks of supportive and close ties, compared to native-born individuals; they are healthier than nonmigrants only in cases of very low supportive resources, and do not enjoy the same beneficial health effects of social support as nonmigrants. This picture is consistent with studies documenting the disruptions of social relationships caused by migration (Lubbers et al., 2010; Ryan, 2011), and suggests that the common view that migrants are surrounded by more extensive, supportive, and health-protective social networks may be far from reality – at least in certain contexts, such as that of older adult migrants in the SFB Area. Social networks might also be a source of burdens and constraints for migrants (Bilecen, 2020; Portes, 2014), which result in worse health outcomes. Obligations and social control within networks might decrease intergenerational support (Heath et al., 2008) and value clashes might increase conflict within migrant families (Kalmijn, 2019). While these issues could not be explored here, they certainly deserve attention in future research and interventions on social networks and migrant health.

A few limitations of the present study point to important avenues for future research on social support and health in migrant populations. First, our analyses could not differentiate between migration motives and ethnic/national backgrounds, although there is evidence of

Table 4

Predicted probabilities of self-rated health being very good or excellent, of having had no serious illness in previous year, and of having no mental illness experience, from models in Fig. 4 and Tables S2-S7 (older adult cohort). Low = Probability with social support predictor one standard deviation below the mean. High = Probability with social support predictor one standard deviation above the mean. DCM = High – Low. Predicted probabilities are calculated for an individual with typical sociodemographic characteristics in the overall population (see Table 1).

	All contacts	Confidants	Close ties	Local ties
	DCM (Low-High)	DCM (Low-High)	DCM (Low-High)	DCM (Low-High)
Pr(Self-rated health = Very Good or Excellent)				
1st generation	0.02 (0.49–0.51)	–0.09 (0.51–0.42)	0.14 (0.43–0.57)	–0.05 (0.54–0.49)
2nd generation	–0.03 (0.82–0.78)	0 (0.79–0.79)	0.03 (0.77–0.8)	–0.03 (0.82–0.79)
Nonmigrants	0.18 (0.51–0.69)	0.18 (0.5–0.68)	0.24 (0.45–0.7)	0.18 (0.51–0.69)
Pr(No illness last year)				
1st generation	–0.09 (0.81–0.72)	–0.1 (0.81–0.71)	–0.03 (0.78–0.74)	–0.1 (0.82–0.72)
2nd generation	–0.03 (0.87–0.84)	–0.03 (0.87–0.84)	0.02 (0.83–0.85)	–0.08 (0.9–0.82)
Nonmigrants	0.07 (0.64–0.71)	0.04 (0.66–0.69)	0.12 (0.6–0.72)	0.08 (0.64–0.72)
Pr(Never mental illness)				
1st generation	0.1 (0.71–0.81)	–0.18 (0.8–0.62)	0.13 (0.7–0.83)	0.04 (0.75–0.79)
2nd generation	0.21 (0.65–0.87)	0.09 (0.73–0.82)	0.29 (0.64–0.94)	0.16 (0.7–0.85)
Nonmigrants	0.01 (0.73–0.74)	0.04 (0.74–0.77)	0.01 (0.74–0.74)	0.04 (0.72–0.77)

important multidimensional differences across migrant groups (e.g., Castles, 2018) and the second generations (e.g., Tran et al., 2019). In particular, our analysis does not account for the potential effects of cultural differences in interpretations and answers to health questions (such as different ways to understand notions of “good health” or “serious illness”). However, we have attempted to limit this problem by controlling for race/ethnicity and including three different health measures. Future research may adopt a similar comparative approach but consider different receiving contexts and migrant groups, disaggregating migrant populations by race/ethnicity, citizenship, or type of migration. Second, common factors of potential sampling bias with migrant populations, typical of all survey research, apply here too. For example, first-generation migrants without legal status and who do not speak English or Spanish (the survey languages) might have been less likely to appear in our data. Third, our conclusions rely mostly on two measures of overall health (self-rated health and no serious illness recently) and on data on older adults. Our main findings were not reproduced in analyses of mental health, and in data about 21-to-30 years old individuals (see Supplementary Materials). The nonsignificant results in the young adult cohort may be due to methodological reasons, such as self-rated health being a poorer health indicator at a younger age and the UCNETs young adult sample being in part non-probability. Future research would benefit from studies of younger age groups using probability samples and a wider battery of health measures. Similar analyses to those presented in this article should also be replicated on nationally representative samples, ideally including larger numbers of migrants and migrant descendants.

Credit author statement

Başak Bilecen: Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Raffaele Vacca: Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft,

Writing – review & editing, Visualization.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2021.114204>.

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