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Rural–urban patterns of disability: The role of migration

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Abstract

Disability rates are higher in rural than in urban areas of the United States, raising the question: do residential preferences and selective migration of people with disabilities play a role in higher rural disability rates? Utilising concepts of environmental fit from the disability literature and ideas from classic, residential preference, and household migration studies, we examine the 2011–2015 American Community Survey Public Use Microdata Sample to understand whether migration contributes to higher rural disability. Results show only slightly different propensities to stay in rural than in urban areas and similar destination choices of people with or without disability, suggesting that migration does little to explain higher rates of rural disability. However, we detect noteworthy differences in age migration schedules for persons with disability, persons without disability in households with disability, and persons without disability in households without disability. Disability emerges as a relevant, although underresearched, dimension in household migration research.

Keywords

disability; environmental fit; household migration; migration; rural; urban; United States

1 | THE RESEARCH PROBLEM

Spatial patterns of disability in the United States are uneven. Specifically, rates of disability are higher in rural than in urban United States and higher in the South than the North, an uneven pattern that holds even when age and racial distributions are considered (He & Larsen, 2014; von Reichert, Greiman, & Myers, 2014). Reasons for the irregular distribution of disabilities are not well understood. Evidence to date illustrates that occupational, social, and environmental factors (Seekins et al., 2011), service access (Maart & Jelsma, 2014; Mahmoudi & Meade, 2015), and policy decisions (Montez, Hayward, & Wolf, 2017) all contribute to the prevalence of disability itself but do not explain why these elements are related to observed regional and rural–urban differences in the distribution of disability. Rural–urban disability differences are not unique to the United States and have been observed elsewhere. As one example, Beatty and Fothergill (2005) attributed regional

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differences in health and disability records in United Kingdom to labour market conditions and occupational mix, the skill set of individuals, and prominent differences in the structure of programmes for unemploymentversus sickness and disability in the United Kingdom.

Uneven spatial patterns and clusters are common among social groups, and migration is a force contributing to the patterns. Migration alters both the size and composition of origin and destination populations as different populations seek out different destinations. For example, selective migration of youth out of rural places towards urban environments makes for relatively youthful urban and older rural populations (Brooks, Lee, Berry, & Toney, 2011; Rogers, 2016). Families seek out suburban areas and medium-sized and smaller cities, whereas empty nesters and retirees are often drawn towards amenity destinations with a slower pace of life and more rural feel, as well as proximity to family (Johnson, Winkler, & Rogers, 2013; Plane & Jurjevich, 2009). Life course and age-dependent place preferences associated with selective migration lead to regional differences in age composition. In essence, age, but also race and ethnicity, is unevenly distributed, largely based on differential migration patterns of these groups.

Given the uneven distribution of persons with disabilities, could those patterns be a result of migration? Do residential preferences and selective migration of people with (or without) disabilities play a larger role in higher rates of disability in rural and southern places as opposed to more urban ones? Specifically, (a) do people with disabilities tend to remain in more rural areas, whereas those without disabilities leave, resulting in a disproportionate rate of disabilities in rural regions? (b) Or do people with disabilities move down the urban hierarchy from more urban origins towards more rural destinations, whereas people without disability move away from rural places towards cities?

The purpose of this paper is to examine the role that migration in the United States might play in rural–urban disparities in disability rates. The study includes analysing (a) propensities to stay and (b) directionality in migration. We will draw on the 2011–2015 Public Use Microdata Sample (PUMS) of the American Community Survey (ACS; U.S. Census Bureau, 2017), which includes six disability-related questions: four questions about impairment (hearing, vision, ambulatory, and cognitive) and two questions about activity limitations (selfcare and independent living).

We provide context for the potential relationship between disability and migration and explore concepts in the migration and related literature that may explain the higher rates of rural disability. Section 3 of the paper elaborates on the ACS data used, the approach developed for capturing rural–urban dimensions, and procedures employed to answer the research questions. Section 4 offers descriptions on disability and migration and sheds light on propensities to move or stay and migration directionality (up or down the urban hierarchy) of people with or without disability.

2 | CONTEXT FOR DISABILITY AND MIGRATION

2.1 | Disability context

The World Health Organisation (WHO) defines disability as “an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations” (WHO, 2001). The definition includes individual, environmental, and societal dimensions and builds on the environmental or environment–society model of disability that incorporates Nagi’s (1965) concern for functional limitations and the social aspects of disability. These models specify that disability is associated with differential capacity to carry out socially defined roles or activities as well as physical abilities (Freedman, Martin, & Schoeni, 2004). Note that disability and health are not the same, with health referring to physical, mental, and social well-being, not merely the absence of disease (WHO, 2001), whereas disability refers to actual limitations of activities. Although related, health issues may lead to disability, but ill-health is not the equivalent of disability.

ACS disability data are based on self-reports and, as such, can alter with time and circumstances (Ward, Myers, Wong, & Ravesloot, 2017). By implication, self-reported impairments and activity limitations are associated with the environmental and societal context in which people reside (Seekins et al., 2011). Models of disability suggest that some places are better suited, more amenable, and more inclusive to those with disabilities, whereas other places are poorer fits, less amenable, and more disabling (Jackson, 2018). In other words, in some places, disability may disappear if the place better accommodates persons with different abilities.

Given that disability information from the ACS is self-reported, environments that are not amenable to impairments may result in higher self-reported disability rates. The environment may include the physical area and built infrastructure, institutions and policies, and social and familial context or other supports (Mathews & Seekins, 1987). As an example of physical and environmental issues, curbs and stairs are challenging for people with ambulatory impairments making it difficult for them to access public and private buildings and spaces. Such unsupportive physical environments may contribute to or heighten the experience of impairment, showing up in higher rates of self-reported disability. Similarly, if there are disability support centers or if the individual’s family is able to provide a high level of support, the experience of impairment may be lessened. Higher prevalence of self-reported disability may therefore stem from an unsupportive environment, whereas low self-reported disability may be found in environments amenable to impairments. In aggregate, the interaction of the individual with the environment, as a result of individual perceptions, may result in either relatively high or relatively low regional disability rates. Table 1 synthesises our understanding of this and subsequent lines of reasoning on disability, environment, and migration.

Environmental fit may also be connected to migration: Amenable and supportive environments and places could be appealing to persons with disabilities who therefore may seek to live in such locations. Consequently, persons with disability may be more inclined to stay in amenable places for the good environmental fit and less inclined to move away. Additionally, supportive environments may attract people with disabilities to such places and lead to in-migration. Poorly fitting, less amenable environments, on the other hand, may lead to low propensities to stay and high propensities to leave. People with disabilities may not be drawn to such places, which would show up in low in-migration rates. Migration behaviour, specifically propensities to stay in a place or propensities to move towards a different place, could be a response to environmental fit (Table 1).

For rural areas, disability rates may be higher as a response to greater barriers and poorer environmental fit leading to more self-reported disability. Alternatively, rural communities offering a better environmental fit may be more appealing to persons with impairments and activity limitations. Persons with disability may seek out rural areas with a better fit by opting to stay there (versus move away) or move there. Both would lead to higher shares of persons with disability.

2.2 | Migration context

2.2.1 | Classic migration frameworks—Several classic models in migration research align with the concept of ecological fit in disability research and might provide a rationale for the uneven distribution and clustering of persons with disability. In Lee's (1966) model, individuals leave an origin if there is a push or negative condition at origin, and they seek out a destination if there is a pull or positive condition to that destination. What counts as a push or pull depends on the individual, so that a migration from one area to another is typically undertaken if the migrant has a good reason for moving but also if the barriers to migration are low enough to make a move possible. Much research focuses on how push and pull factors and barriers change with age and life course transitions (Castles, de Haas, & Miller, 2009; Hagen-Zanker, 2008; King, 2012; Massey et al., 1994).

Litwak and Longino (1987) developmental model of elderly migration builds on the push–pull idea, focusing on both age and life course. Although their attention is on the relationship between age and health, not disability, the research suggests a link between disability and migration because they posit that as individuals age, push and pull factors become increasingly specific. For older persons, there is often a move towards a retirement destination, followed by a move towards family and caretaking as individuals begin to encounter health issues and disability. The developmental model specifically incorporates the idea that migration may be about moving towards family, support, and care, explicitly linking migration to age-related disability.

The developmental model complements Sjaastad's (1962) classic view that people "invest" in the cost of a move if they expect a "return" or benefit from moving. The costs of migration include the physical and logistical effort, the monetary expense, stresses, and the social cost of moving away from social networks (friends and family), which can also be thought of as barriers to a move. The costs and returns to migration vary by age and life course stage, with young people having relatively lower costs because they have fewer possessions, often live in rental housing, and experience higher returns to the move, such as long-term improvements in career prospects and time to develop new social ties.

For persons with disability, the disability itself could be a barrier to migration because one would expect costs and stresses of a move to be relatively high. Yet a cost/benefit analysis suggests that the benefits to migration must be considerable for a move to occur. And, following Litwak and Longino (1987), migration would only logically happen as part of a developmental sequence, occurring as individuals change residences in response to either increasing levels of disability and/or need for support. Indeed, we expect the costs of migration to be higher for persons with disabilities, especially if they have developed ties and support networks within the home community and have found ways to accommodate the disability. In other words, if persons with disability overcome migration barriers and do move, they are likely motivated by great needs and high expected benefits.

Findley (1988) connects the concept of migration sequences to disability, hypothesising that those without disability can move more or less at will resulting in greater propensities to move than those with disability. However, increasing age, time since the disability occurred, or even time at originating place of residence will result in persons with significant limitations being more likely to migrate than those with less severe challenges if the move is to obtain necessary care or to move to an environment that they perceive as a better fit (Atchley & Miller, 1983; Gober & Zonn, 1983; Longino, 1981: Meyer & Speare, 1985). Although migration barriers rise with compromised ability, people with disability may be able to move even in the presence of these barriers, if there are disadvantages to the current locale.

2.2.2 | Health migration literature—Although disability and health are not the same, various authors link the two, and health-related migration research provides a lens through which to consider aspects of disability migration. For example, Darlington, Norman, and Gould (2015) note that one aspect of migration is who moves and does not move arguing that health-related factors can influence both. Focusing specifically on the United Kingdom, they remark that "social and/or spatial health inequalities included debate on the relative merits of 'compositional' and 'contextual' explanations" for spatial differences (Darlington et al., 2015, p. 5) referring to Smith and Easterlow's characterisation of spatial differences in health as a "tale of risky places" (2005, p. 174). Smith and Easterlow describe some places as more conducive to those with ill health and others less conducive or more likely to produce ill-health. Others (e.g., Maheswaran et al., 2014) show that internal migration in Sheffield is responsive to the presence of care homes or residential spaces. On the other hand, Tunstall, Pearce, Shortt, and Mitchell (2015) found that moves between environments that exhibit different levels of multiple physical barriers were rare and not associated with rates of poor health in the most deprived areas.

Other studies describe a salmon bias: Those who are healthier are more likely to migrate than those who are not, as illustrated in China (Lu & Qin, 2014), England and Scotland(Wallace&Kulu,2013),and the United States (Turra & Elo, 2008). At the same time, those who become less healthy at place of destination may be more likely to return migrate (Lu & Qin, 2014; Turra& Elo, 2008; Wallace& Kulu,2013).

In the above cases, the effect of health on migration is not greater than the effect of other individual level characteristics of migrants, like socio-economic status, age, or other factors that influence migration. Specifically, evidence suggests that those who migrate live in less conducive environments and develop disability postmigration, and possibly as a result of living in a less healthy place. Indeed, although the health of individuals and communities may be influenced by migration, it is also possible that the health of individuals and communities may stimulate migration. Popham and Boyle (2011) as well as Norman, Boyle, Exeter, Feng, and Popham (2011) specify that both places of origin and destination are changed by migrants and change migrants. However, it is not necessarily clear whether migration results in lesser health or whether changed socio-economic status and residence in the destination result in poorer individual level outcomes later in life. Studies in both the British Isles and the United States have shown that moves to similar or less deprived neighborhoods are more likely among healthier migrants, whereas moves to more deprived areas tend to be associated with poorer health (Norman, Boyle, & Rees, 2005; Tampubolon, 2012; Tunstall, Mitchell, Pearce, & Shortt, 2014). Given that residential preference is incorporated into moves through different residential economic context as well as rural or urban preferences, the nature of the place of origin or destination becomes increasingly relevant.

2.2.3 | Residential preferences and selective migration—Research on residential preferences is closely tied to selective migration (DeJong, 1977; Fuguitt & Zuiches, 1975; Plane & Jurjevich, 2009). Research frequently focuses on life course stage and age selectivity relative to preferences, but there is also work on race selectivity in migration (e.g., return migration of Blacks to the South; Cromartie & Stack, 1989; McHugh, 1987) or occupational differences in selecting migration destinations (Burd, 2012; Florida, 2002).

DeJong (1977) comments that selective migration is a result of differential urban–rural preferences of different age groups or life course stages. Just as the selective out-migration of rural youth to urban centers leads to higher concentrations of young in urban places, the aging in place of older cohorts or the in-migration of people in a later stage of their life course contributes to high concentrations of older cohorts in rural places. People with disabilities may have similar preferences for rural areas if the place offers better fitting environments. As a result, preferences for and selective migration favouring rural areas would contribute to higher rural disability rates. One could also argue the reverse: that more urban places would be preferred by people with disability and exert a pull on them given the broader range of services that urban areas offer, especially medical, rehabilitation, and social services and other urban-style amenities. If so, the propensity of persons with disability to stay in rural areas would be low and in-migration to urban locales would be relatively high. If this urban-focused hypothesis stands up, higher rural disability rates would result from factors other than migration.

2.2.4 | Household migration—Of course, since DaVanzo's (1976) and Mincer's (1978) work on family migration, migration decisions have been recognised as made at the household level, not so much the individual level (Cooke, 2008; Withers & Clark, 2006). Individual migrants may be less independent actors and more "tied" to their household's decision to move, resulting in the expected benefits of a move to accrue to the household, not the individual.

Households are influenced by a variety of factors. Households may migrate to pursue employment options for one partner who is tied to others, such as a “trailing” spouse (Bielby & Bielby, 1992; Lichter, 1980). At the same time, local ties to work and family strongly decrease the likelihood of migrating for couples who both work, although the effect is stronger for women than for men (Mulder & Malmberg, 2014). By implication, when contrasting migration decisions of persons with or without disability, research must recognise that there are households that include persons without disability who live in households with persons who experience disability. The migration decision of the household, or of the person with disability (or without), may be dependent on someone else in the household. That is, how disability affects household migration decisions is currently unknown. What is known is that household migration is complex and influenced by relationships within households (Cooke, 2008). This implies that households with disability likely undergo particular decision processes and should not be grouped with households without disability.

2.3 | Summarising migration and disability interactions

Migration decision-making models assume that those who move, whether disabled or not, have the know-how, resources, and agency to move towards places that fit their preferences. Whether this is true for persons with disability is unclear. Research on the socio-economics of migration shows that marginalised populations have limited geographic mobility, in part due to limited information about destinations, the cost of a move, and a variety of associated barriers (e.g., Erickson, Call, & Brown, 2012). For persons with disability, we expect barriers to migration to be high, which would translate into high propensities to stay and low propensities to migrate. However, if they do move, there must be a significant push of the origin and a strong pull of the destination. Migration is likely a result of the interplay between disability, residential preferences, and environmental fit. The research presented here seeks to establish whether there are disability-related differences in propensities to stay in place, and for those who move, in the direction of migration, whether up or down the urban hierarchy, based on residential preferences and selective migration that favours rural places.

3 | METHOD

3.1 | The data

The data utilised herein are extracted from the 2011–2015 ACS PUMS, a 5-year PUMS of the ACS (U.S. Census Bureau, 2017). The ACS is an annual cross-sectional survey covering a broad range of topics about the demographic characteristics of the population and households in the United States. The 5-year estimates from the ACS are period estimates that represent data collected over a period of 5 years with data available for all geographic areas of the United States and consist of over 15 million cases (excluding Puerto Rico).

3.2 | Disability measures

The ACS contains six disability-related questions, four of which ask about impairments related to hearing, vision, movement (ambulatory), and cognition. Two questions ask about activity limitations regarding self-care and independent living. People who self-identify as experiencing one or several impairments and/or activity limitations are considered to experience disability. Disability is shown as a binary variable of person records: persons with disability and persons without disability.

To account for household context in migration (Mincer, 1978), we separated persons without disability into two groups according to the disability status of other household members they live with: (a) persons without disability who share the household with at least one other person with disability and (b) persons without disability in households without any person with disability. Context is derived by linking household and person data. If there is a disability-migration nexus, as well as tied migration at the household level, we would expect differentials in the migration behaviour of persons without disability in a household with a disabled person. As is, household members face impacts and concerns for disability through the impairments and limitations of another household member, an experience that may affect people in numerous ways, including migration behaviour. Thus, we report on three groups: those with disability, those without disability in households without disability, and those without disability in households with disability.

3.3 | PUMS geographies: PUMAs and MIGPUMAs

ACS PUMS is available for Public Use Microdata Areas (PUMAs). To protect confidentiality of respondents, PUMAs have a minimum population of 100,000. PUMAs in metropolitan areas may consist of one or a cluster of census tracts but, in more sparsely settled areas, are typically made up of multiple counties. ACS PUMS releases data for MIGPUMAs to indicate the prior residence, information which is used to identify whether or not people migrated.

The building blocks of MIGPUMAs are counties, and often, MIGPUMAs are identical to PUMAs. In larger metropolitan areas, however, multiple subcounty level PUMAs are aggregated to become single county-level MIGPUMAs. For 2010, there are over 2,300 PUMAs and just under 1,000 MIGPUMAs. Figure 1 below depicts a map of MIGPUMAs and their disability rates.

Many PUMAS and MIGPUMAs cover multiple counties that may include more urban and more rural counties. The large geographic resolution, which cannot be more finely scaled when using public microdata, is a limiting factor in the rural–urban component in this analysis. 2011–2015 ACS PUMS data are released for dual Census Geographies: 2011 data are based on 2000 Census Geographies, and 2012–2015 data are for 2010 Census Geographies. For analysis of migration on a rural–urban spectrum, we use MIGPUMAs based on 2010 Census Geographies with 2012–2015 data.[1]

3.4 | Rural-urban scale

To examine whether high rural disability rates stem from disabled persons' higher propensity to stay in rural places or from an inclination to move down the urban hierarchy

[1]Disability summary data are publicly available at relatively fine geographic scales allowing for neighbourhood-level analysis. Migration summary data exist for counties. However, research linking disability and migration requires microdata, which, for privacy reasons, are limited in the PUMS to larger MIGPUMAs.

from more urban towards more rural settings, a measure of rurality and urbanity is needed. Though rural and urban are often thought of as a dichotomy, social, political, and economic factors shape rural and urban populations and areas in complex ways (Lichter & Ziliak, 2017). Consequently, rural and urban are better measured on a continuum (Lichter & Ziliak, 2017; Waldorf, 2006) from the most isolated rural areas to the most urban areas, with intermediate spaces aligned on that continuum. A widely used rural–urban classification is based on the set of county-level Rural–urban Continuum Codes (also known as Beale Codes) developed by the Economic Research Service (2013). As MIGPUMAs are made up of counties, we developed a rural–urban continuous scale of MIGPUMAs by averaging county Beale Codes using county populations as weights. The minimum score (1) refers to large metropolitan areas,[2] whereas the maximum (9) refers to highly rural areas. For MIGPUMAs, the largest observed value of the rural–urban weighted scale was just under 8.3. Table 2 shows Beale Codes for counties (ERS, 2013) and the rural–urban classification for 2010 MIGPUMAs that we developed, both as a continuous scale and as classes. The table also includes the number of counties and MIGPUMAs in each class, plus population and disability rates. Our approximation of MIGPUMA rural–urban classes derived from county Beale Codes, although not perfect, appears to reasonably capture population sizes and disability rates along the rural–urban continuum. Table 2 shows the clear increase in disability rates with increasing degrees of rurality, whether rural–urban is based on Beale Codes for counties or for MIGPUMAs.

3.5 | Migration measures

The migration question in the ACS asks whether respondents lived in the same house (nonmovers), in a different house outside the United States (movers from abroad) or in a different house in the United States or Puerto Rico. Children under age one are excluded. Based on the MIGPUMA code for previous residence, movers within the United States are identified and separated into movers within the same MIGPUMA (intra) and movers to different MIGPUMAs (inter). Inter-MIGPUMA movers account for 5.2% of the population, with intra-MIGPUMA movers and nonmovers making up 9% and 84%, respectively. Children under one (1.2%) and migrants from abroad (0.6%) make up the remainder. Although inter-MIGPUMA migrants represent a small portion of the population, they are a sizeable group, with nearly 800,000 sample observations for 2011–2015 and 640,000 for 2012–2015, representing a 2011–2015 population of over 16 million people. The 2012–2015 observations of inter-MIGPUMA migrants are the basis of our analysis of migration propensities and directionality of migration, using the MIGPUMAs based on 2010 Census Geographies.

3.6 | Research focus and procedures

Section 4 begins with a description of the extent of disability and rural–urban differences in disability rates. A research focus on rural–urban disability and migration is only meaningful once it has been established that other factors associated with disability, namely, demographic and socio-economic attributes of the individual and ecological/regional

[2]Beale codes are based on counties, and so, properly, are best referred to as metropolitan or nonmetropolitan (metro/nonmetro), not urban or rural. However, most authors use metro/nonmetro and urban/rural interchangeably.

conditions in which people reside, are not the sole drivers of observed disability patterns. To that end, we use binary logistic regression with presence or absence of disability as dependent variable and rural–urban class as explanatory variable while including individual and ecological control variables. If rural–urban differences in disability remain after controlling for other factors associated with disability, then there is merit in proceeding with an analysis of rural–urban migration and disability.

ACS microdata show persons as members of a household. This characterisation allows the identification of household context in which people with or without disability live. We use household information to describe the age-specific migration of three disability groups: persons with disability, persons without disability in households with disability, and persons without disability in households without disability. These descriptions provide insight on similarities and differences in migration propensities for the three groups.

To test whether persons with disability have different propensities than others to stay in more rural rather than in urban areas, we use logistic regression. Greater propensities to stay in more rural areas would lend support to the hypothesis of a better environmental fit of rural areas and/or residential preferences favouring more rural places.

For people who do move, the direction of their move up or down the urban hierarchy would also influence rural–urban patterns of disability: (a) if moves of persons with disability are directed towards more rural areas and (b) if moves of persons without disability are mainly directed up the urban hierarchy from more rural towards more urban areas. Ordinary least squares regression is used to examine the directionalities in migration based on differences in rural–urban continuum scores of origins and destinations. Moves directed down the urban hierarchy, from more urban towards more rural areas, could attest to greater preferences for and potentially better fit of more rural, less urban areas for persons experiencing disability.

4 | FINDINGS

4.1 | Overview

Based on the 2011–2015 PUMS of the ACS (2011–2015 PUMS ACS), 40.8 million Americans or nearly 13% of the population have some level of disability,[3] most living in households and just under 1% of that population living in group quarters. By differentiating persons without disability into those (a) living in households with a person(s) experiencing disability and (b) in households without persons experiencing disability, ACS microdata can be used to shed additional light on the extent of disability. In addition to over 40 million persons who experience impairments and activity limitations of their own, there are another 40 million persons without disability of their own who experience the disability of another member(s) of the household. The disability experience consequently affects a much greater share of the population (25%) when taking household composition into account.

ACS PUMS data clearly show the rural–urban dimension of disability (as shown in Tables 2 and 3). A breakdown of disability rates on the urban–rural scale shows that disability rates in

[3]The SIPP, with its broader range of questions, concludes there were over 56 million persons with disabilities in 2010 (Brault, 2012).

large metropolitan areas (MIGPUMAs) are relatively low (11.2%) but steadily rise in more rural areas (17.3% to 18.1%).

Disability rates, known to be influenced by demographic and socio-economic variables, show age and race closely correlated with disability (von Reichert, 2017). Although disability rises sharply for people over 75, the rates begin to increase decades prior. Race adds another layer of complexity for disability (Table 3) with rates well below the national average of 12.9% for Asian Americans (6.9%), near average for Whites (13.3%), above average for African Americans (14.5%), and still higher for Native Americans (17.1%).

Disability also connects to socio-economic attributes of individuals (Seekins et al., 2011; Beatty & Fothergill, 2005). Thus, we consider educational attainment, housing context, and incomes. Education (for persons age 25 years and older) is inversely related to disability. Lower levels of education go hand in hand with much above-average disability rates while dropping to below-average rates for persons with bachelor or advanced degrees. For tenure (owning vs. renting), disability rates are quite similar (12.2% vs. 12.6%). However, nearly 35% of residents of group quarters, which includes nursing homes, experience disability. Income, captured in the ACS as income-to-poverty ratio, is inversely related to disability with high disability rates among persons with incomes near or below the poverty level[4] and low disability rates for persons with incomes far above the poverty level.

Spatial patterns of disability also differ between Census Regions and resemble geographic patterns of spatial deprivation, such as patterns of poverty and unemployment. The occupational mix typical of rural labour markets, including mining, manufacturing, and agriculture, also partly overlays with patterns of disability.

Given these associations, one could argue that spatial clusters of disability and higher rates of rural disability can be traced back to the distributions of demographic and socio-economic attributes of individuals and ecological/regional variables linked to social deprivation. Examining whether or not there is an independent rural–urban effect after controlling for individual and regional attributes, we use logistic regression, with disability or no disability as the dependent variable. Table 4 below shows logistic regression results for three models: (a) a rural–urban model only, without control variables; (b) a model including demographic and socio-economic attributes of the individual as controls; and (c) a model additionally including ecological (regional) variables of MIGPUMAs. In Models 2 and 3, we include main effects only to avoid low cell frequency issues (Greenland, Mansournia, & Altman, 2016). Shown are coefficients (*B*), standard error (*SE*), and odds ratio (Exp(*B*)), as well as sample size and two tests of model fit, Nagelkerke R^2 and model −2LogLikelihood (−2LL). We also show changes in the 2LL when removing a variable from the model, which helps in gauging the effect of that variable.

For the rural–urban model without controls, the Nagelkerke R^2 is low at .009. However, it increases considerably to .232 when including socio-demographic variables. This means

[4]Income-to-poverty ratio is 100 for incomes at the poverty level. In our analysis, the upper boundary of the income-to-poverty ratio for the lowest income group is set to 125, or 25% above the poverty level, following examples of several of means-tested U.S. programmes (income, nutrition, health care support, etc.)

socio-demographics are, as expected, connected to disability. Model results affirm the strong association between disability and age but also poverty and education with race and housing also being connected to disability, implying that observed patterns of disability are shaped, in part, by socio-demographic traits. The addition of ecological variables has relatively weak effects indicated by a minimal increase of the Nagelkerke R^2 from .232 to .233. The presence of mining occupations in MIGPUMAs is associated with higher disability odds, whereas other ecological coefficients are only slightly above or below 1, suggesting very limited associations with disability.

Overall, the rural–urban disability effect is diminished when including control variables, as shown by a drop in the odds ratio of disability in nonmetropolitan versus large metropolitan areas from over 1.7 to 1.2 or 1.3. Nonetheless, after taking individual and ecological control variables into account, rural–urban differences in disability remain. The findings offer a sound rationale for taking a closer look at disability and migration in a rural–urban context, as differences in individual and ecological controls are insufficient to account for unequal rural–urban disability rates.

4.2 | Describing propensity to move by disability group and age

To detect whether higher rural disability rates can be traced back to migration between MIGPUMAs, we examine migration rates of persons with or without disability. The decision to move or stay, although shaped by a range of personal, household, and regional factors, is strongly dependent on age (Pandit, 1997; Rogers, Raquillet, & Castro, 1978) making age-migration schedules useful for describing migration. Separating out age for the three disability groups (with disability, without disability in households with disability, and without disability in households without disability) reveals important differences in amplitude and slope of the age-migration curves (Figure 2).

Figure 2 uncovers for the three disability groups remarkably different propensities to migrate over the life course. People without disability (and in households without anyone with a disability), with an overall migration rate of 5.4%, follow the well-known age-migration schedule with high migration propensities as young adults (Pandit, 1997). Mobility drops sharply from late-20s to mid-30s, with the migration of children and adolescents following that of their parents. Migration rates drop gradually for people in their 40s and older with a noticeable rise at very high age.

People with disability have an overall lower migration rate (4.6%) as expected, presuming that the costs of a move (physical effort, the monetary, the social cost, and stresses of relocation) take a heavier toll on persons with impairments and activity limitations. This group also shows peak migration rates for young adults although peak migration rates are much lower than those for persons without disability. The lower peak means that young adults with disability are less migratory, having a greater propensity to stay in place or move more locally (within MIGPUMAs). Further migration rates for persons with disability decline more gradually with increasing age. From the early 30s onward, migration rates of persons with disability are consistently higher than those of persons without disability indicating that persons with disability are less settled and more migratory than persons without disability, at least from middle age onward. Relatively low migration rates of young adults with disability suggest that migration is deferred to subsequent years, at which time these adults show higher migration rates. Migration in midlife and late life may follow Litwak and Longino's (1987) theory that persons move towards family, support, and care. The pattern also aligns with Findley's (1988) findings that increasingly poor health may establish greater needs to be addressed through relocation. If people with impairments and activity limitations do move and accept the cost and stresses of a move, there must be a strong push or pull (a la Lee, 1966), a compelling need (according to Findley, 1988), and an expectation of sizeable benefits from migration (a la Sjaastad, 1962). For such expected benefit, they are willing to take on the inconvenience and cost of a relocation suggesting that the environmental model of disability could explain above average migration rates throughout much of adulthood as a search for less disabling and more inclusive locales where needs are better met.

The third group, people without disability in households with disability, has the lowest overall migration rates (4.2%). Their peak migration rates (in their 20s) are nearly half of the rates of persons without disability (in households without disability). Their migration rates during childhood and adolescence are relatively low as well, but from mid-30s on, their rate closely aligns with that of persons without disabilities (in households without disabilities). Being in a household with other persons who experience disability has an apparent impact on opportunities or desires to migrate, especially curbing migration of young adults in their 20s, when people typically move most. Young adults without disability of their own may forego migration in solidarity to family and to offer kin support to persons with disability in their household. They may be a type of "tied stayers" (Cooke, 2008; Mincer, 1978; Stockdale & Haartsen, 2018). The findings could further mean that foregone migration at a younger age is not compensated for by higher rates later on, in this group, making for diminished lifetime migration.

Noteworthy differences in migration behaviour of the persons with disability, those without disability in households with disability, and persons without disability in households without disability show that household context is highly relevant for the connection of disability and migration.

4.3 | Modelling propensity to stay by disability group and rural-urban class

Propensities to stay can serve as indicators of residential preferences and could be an expression of environmental fit of the places where people live. If people with disability are more inclined than others to stay in rural areas, it would help to explain higher rural disability rates. Stayers, those who have not moved or have only moved within the same MIGPUMA, represent the vast majority, regardless of disability status. Average propensities to stay are lowest for persons without disability in households without disability (94.5%), higher for persons with disability (95.4%), and even higher for persons without disabilities in households with disability (95.7%).

To identify whether persons with disability have a greater tendency to stay in rural than in urban areas, we used logistic regression to model propensities to stay or migrate with rural–urban classes of origin as independent variable. Demographic and socio-economic variables are included as control variables. Ecological variables of origin MIGPUMAs were also taken into account but for the sake of parsimony are not shown here as they had little effect on results. Three sets of models are presented here, one for each disability group (Table 5).

After controlling for demographic and socio-economic attributes, persons with disability show near equal tendencies to stay in smaller than large metropolitan areas, with somewhat lower tendencies to stay in nonmetropolitan areas. Overall, rural–urban effects are rather small as shown by the odds ratios (Exp(B)) close to 1 as well as a very minor change in the −2LL in a model without rural–urban class. Persons without disability in households without disability, on the other hand, are less likely to stay in smaller than large metro areas and much less likely to stay in rural areas, mirroring the national trend. Persons without disability in households with disability fit between the other disability groups. In essence, the rural–urban effect is greater for persons without disability and minimal for persons with disability.

Socio-demographic effects on propensities to stay or move differ for the three disability groups. For age, propensities to stay, as expected, generally rise as age increases. However, the age effect on propensities to stay is stronger for persons without disability than with disability. For racial groups, overall effects are smaller than those for age groups. African and Asian Americans with disability show higher odds of staying than Whites, whereas the relatively small minority of Native Americans show slightly lower odds of staying. For persons without disability in households with disability, non-White racial groups show stronger tendencies to stay than Whites, suggesting an inclination to stay to offer family support to household members with disability. Tied staying may be more common in minority than White households. Unsurprisingly, there is a strong inverse relationship between educational attainment and odds of staying, odds that diminish sharply with increasing education levels. The drop is largest for persons without disability in households without disability, suggesting high levels of education come with fewer barriers and greater incentives to move. The effect of housing on odds of staying is quite strong, as renters are less inclined to stay than homeowners. The very low odds of staying for persons in group quarters indicates that a large share of group quarter residents lived elsewhere a year ago and relocated to group quarters relatively recently. Income levels also exert inverse effects on odds of staying for persons with disability. Among persons with disability, those in the highest income group have 30% lower odds of staying than those with incomes near or below the poverty threshold. One could anticipate that disability is associated with a broad range of barriers to migration. Higher incomes may provide the resources to overcome these migration barriers vis-a-vis lower incomes. Except for income, which more strongly affects odds of staying for persons with disability, socio-demographic variations appear to exert stronger effects on staying for persons without disability. This suggests decisions to stay or move may follow different regularities for persons with disability than persons without.

For rural–urban differences, staying may indicate residential preferences for certain types of places. Such preferences could signal a better environmental fit of such preferred locales. This analysis finds no clear preference of people with disability for less urban areas, as shown by odds ratios close to 1. However, there is a stronger preference of persons without disability in households without disability for more urban than rural areas. Their tendency to leave, not stay, goes up with higher degrees of rurality. All in all, findings on propensities to stay offer relatively little to explain comparatively high rural disability rates. Migration nonetheless may contribute to geographically uneven disability rates, depending on the destination chosen by migrants with disability.

4.4 | Directionality: Moving up or down the urban hierarchy

Higher rates of rural disability may stem from disabled persons' preference in moving to rural places. Directionality in migration towards more urban or more rural areas can be detected by comparing continuous values of rural–urban score of origin MIGPUMAs with the corresponding scores of destination MIGPUMAs. As a measure of directionality and indicators of preferences for moving towards more rural or more urban areas, we chose origin score minus destination score. A negative difference score reflects a move down the urban hierarchy towards more rural areas, whereas a positive difference score indicates migration up the rural–urban spectrum. Large scores indicate a bigger leap across several classes of the rural–urban spectrum/continuum. Small difference scores signal migration to a similar rural or urban area. Difference scores of zero signal a lateral move to another MIGPUMA with the same rural–urban continuum score. For consistency with our prior analysis, we include here persons 25 years of age and older.

Observed difference scores are concentrated around 0 for all disability groups with median values of 0. The mean of the difference score for all disability groups is slightly negative but close to 0 (−.072 for persons with disability, −.053 for persons without disability in households with disability, and −.003 for those without disability in households without disability). No matter the disability group, on average, moves tend to be destined for regions that are identical or similar to the rural–urban spectrum of prior residences.

To detect whether or not persons with disability have a greater preference for moving towards more rural rather than urban areas, we use difference scores as the dependent variable in ordinary least squares regression. Regressing disability groups against difference score yields an adjusted R^2 of zero, showing that disability alone does not account for moves up or down the urban hierarchy (Table 6). By adding rural–urban class of origin MIGPUMA to the regression, the R^2 rise to a .351. Moderately small negative coefficients for people with disability suggest they have a preference towards moving down the urban hierarchy when compared with people without disability. However, the rural–urban coefficients are larger and positive suggesting that (a) migrants tend move up the urban hierarchy and (b) disability effects are small compared with rural–urban effects. At the same time, coefficients are higher for the most rural areas than the most urban areas, indicating a tendency for migrants from rural areas to make greater leaps up the hierarchy, whereas migrants from metropolitan areas seem to move to fairly similar areas on the rural–urban spectrum. Overall, the rural–urban character of origin MIGPUMAs exerts a stronger influence on destination choice than does disability.

Figure 3 visualises the relationship between the rural–urban scores of origins and difference scores between origins and destination. Each dot presents a rural–urban score of origins (x-axis) and the mean difference between origin and destination score associated with a particular origin score (y-axis). Positive y-values indicate that migrants tend to move up the urban hierarchy, whereas negative values stand for moves down the urban hierarchy, from more urban to less urban/more rural areas. There are two bubble plots, essentially proportional scatterplots, overlaid in Figure 3, one for persons with disability and, for reference, the second for persons without disability in households without disability[5]

Figure 3 is obvious in visualising (a) the greater volume of migrants without disability in households without disability and (b) the large volume of migrants from the most urban (large and intermediate metropolitan) areas. Furthermore, there is some movement down the urban hierarchy, for persons with or without disability alike. However, this typically involves moves from a larger metropolitan area towards the same or lesser metropolitan areas, rarely reaching more rural areas. The large number of remaining, small volume flows are mainly up the urban hierarchy, not down. Consistent with regression coefficients, the upward movements are greatest for migrants from the most rural origins. Most importantly, persons with disability show very similar directions in migrations than persons without disability in households without disability. There also is a tendency to move within a "band." On average, people seem to make relatively predictable changes when seeking a new destination suggesting there is a "comfort zone."

Overall, the impact of disability on destination choice appears to be minimal. There is little support for the notion that migration is the driver of high rural disability rates.

5 | CONCLUSION

5.1| Summary

Our analysis using data from the 5-year 2015 ACS PUMS adds important insights to the relationship between migration and disability. First, and of particular importance for the demography of disability, disability influences more than just the individual. Over 40 million people, or 13% of the U.S. population, experience disabilities. An additional 40 million people without disabilities live in households with disability. That means 25% of the total population is affected by disability, of their own or another household member.

Second, disability is disproportionately found in rural areas. Although differences in rural–urban disability rates are, in part, associated with socio-demographics, they are not fully explained by these variables. Controlling for age, race, education, housing, and income of the individual and ecological variables decreases the odds of rural disability, but the odds remain higher than those in urban America.

In seeking to answer why rural disability is higher than anticipated, we explored migration leading to surprising results. Microdata show that although those with no disability in households without disability follow characteristic age migration schedules, those with no disability who live in households with someone who experiences disability are substantially less likely to migrate. Migration rates are particularly low during the prime migration ages of late adolescence through early adulthood. As a result, the lifetime mobility of those without disability but in households with disability appears to be greatly diminished. Low

[5]Patterns for persons without disability in households with disability closely align with patterns for persons with disability. For greater ease of viewing the chart, that group is not included in Figure 3.

migration at young age suggests this group may represent “tied stayers.” In solidarity to family and/or to offer support, they appear to forego a move to potentially allow other household members to also stay. Additionally, “tied staying” appears to be a stronger factor in minority households. Scholars on household migration have expanded their focus on “tied migrants” to “tied stayers” (Cooke, 2013; Stockdale & Haartsen, 2018). Our work suggests there is also a disability component in household migration decisions.

Similarly unexpected, we found that persons with disability move less as young adults but have above average migration rates starting in their 30s. Given the challenges to migration faced by persons with disability, the pattern of late, but greater than average migration, could be indicative of a prolonged search for new, potentially better fitting environments. Stages 2 and 3 of the Litwak–Longino model (1987), initially proposed for elderly migration, may apply as early as midlife to people with disability. Our findings for the United States are supported by health-related migration studies for other countries. As discussed earlier, health researchers have shown that those in poorer health migrate differentially (Darlington et al., 2015; Maheswaran et al., 2014; Smith & Easterlow, 2005) with some returning to their origin at higher rates resembling a salmon effect (Lu & Qin, 2014; Turra & Elo, 2008; Wallace & Kulu, 2013).

A related finding is that persons with disability have higher overall propensity to stay in place with slightly lower inclinations to stay in rural than large urban area. Whether this comes from lesser affinity for rural areas or greater barriers to migration is difficult to determine. As it stands, for people with disability, rural–urban effects are minimally offering no support for the rural environmental fit hypothesis. Persons without disability in households without disability, however, have much lower odds of staying in rural than large urban areas. Different odds for the disability groups could have a modest effect on higher rural disability rates.

The directionality of migration is such that regardless of disability or household category, migrants leaving very rural areas tend to move to less rural and somewhat more urban places and people residing in highly urban areas tend to move to slightly less urban areas. Apparently, migrants, regardless of other factors, move within a certain “band” or “comfort zone.” The overall trend during the period considered here is mostly up, not down, the urban hierarchy. This pattern reflects the contemporaneous trend of urban draw wherein rural places were generally losing population to migration rather than earlier decades when rural places experienced rebound and renaissance.

5.2 | Caveats and outlook

Our findings suggest that migration is strongly associated with disability but insufficient for explaining relatively high rural disability rates. However, we cannot rule out that migration contributes to rural disability. Our findings are based on migration microdata available for census-defined MIGPUMAs, which require relatively large population sizes and cover multiple counties in the less metropolitan, more rural parts of the country. This coarse spatial resolution may mask differences that could exist at finer geographic scales. How this impacts research findings cannot be determined with publicly available data.

Also, in this post-Great Recession era, on top of a long-term decline in migration rates, migration in the United States is now at an historic low (Champion, Cooke, & Shuttleworth, 2018). Migration streams to nonmetropolitan areas have been shrinking and only minimally reach the most rural areas. The period under examination has been an era of less migration than has occurred in the past, so that the uneven distribution of persons with disabilities might be a result of migration trends from an earlier time frame. We find this possibility unlikely since the disability rates controlled for age distribution are still higher in rural places, thereby effectively also controlling for earlier migration events.

Instead, there are other possible explanations for the higher rates of disability in rural places. Rural places may offer less amenable environments for people with disability and, due to poorer environmental fit, rural places may increase the experience of disability and lead more individuals to self-identify as having a disability. Conversely, those in urban places may live in environments more accommodating to impairments and limitations, thus reducing the need or desire to self-identify as having a disability. Environmental context extends to health care, rehabilitation, and transportation options for people with disability, where rural areas generally have more limited or available services. People with a health issue, an injury, or an accident may have increased long-term impairment risks if they live where services are not readily available.

Limited migration of persons with disability towards more rural places undermines the assumption of a better rural environmental fit. Because people with disability and people without disability in households without disability move in similar directions, disability per se may have little influence on residential preferences and destination choice. It could also be that people with disability move for reasons other than the rural–urban character of places on which our research focused. Time and, again, migration research showed that proximity to family exerts an influence on the choice of destinations (e.g., Mulder, 2007; Mulder & Cooke, 2009; von Reichert, Cromartie, & Arthun, 2013, 2014). People may move for proximity to family, without being or becoming a household member, in order to stay near or live closer to family. A tendency to follow family across different life course stages is consistent with migration which, for persons with disability, is prolonged over stages of midlife and late life.

Our initial focus on the rural–urban dimensions in disability migration has drawn attention to the household context and raises additional questions about the role of family in disability migration. More in-depth quantitative and qualitative research in family and household migration is needed to provide a better understanding of complex relationships between disability, household context, family attachment, place, and migration.

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REFERENCES

Atchley RC, & Miller SJ (1983). Types of elderly couples. In Brubaker TH (Ed.), Family relationships in later life (pp. 77–90). Beverly Hills, CA: Sage.

Beatty C, & Fothergill S. (2005). The diversion from ‘unemployment’ to ‘sickness’ across British regions and districts. Regional Studies, 39(7), 837–854.10.1080/00343400500289804

Bielby WT, & Bielby DD (1992). I will follow him: Family ties, gende-rrole beliefs, and reluctance to relocate for a better job. American Journal of Sociology, 97(5), 1241–1267. 10.1086/229901

Brault MW (2012). Americans with disability: 2010. In Current Population Survey Report P70-131. Washington, DC: U.S. Census Bureau. https://www2.census.gov/library/publications/2012/demo/p70-131.pdf

Brooks T, Lee SL, Berry EH, & Toney MB (2011). The effects of occupational aspirations and other factors on the out-migration of rural youth. Journal of Rural and Community Development, 5(3), 19–36. https://journals.brandonu.ca/jrcd/article/view/445/108

Burd CA, (2012). Migration, residential preference, and economic development: A knowledge-based approach regarding locational preferences of two disparate subgroups of the Creative Class. PhD diss., University of Tennessee. http://trace.tennessee.edu/utk_graddiss/1513.

Bureau of Labor Statistics. 2018. Local area unemployment statistics. Washington, D.C.: U.S. Department of Labor. https://www.bls.gov/lau/laucnty12.xlsx.

Castles S, de Haas H, & Miller MJ (2009). The age of migration: International population movements in the modern world. London: Palgrave Macmillan.

Champion T, Cooke T, & Shuttleworth I. (Eds.) (2018). Internal migration in the developed world: Are we becoming less mobile? New York: Routledge.

Cooke TJ (2008). Migration in a family way. Population, Space and Place, 14(4), 255–265. 10.1002/psp.500

Cooke TJ (2013). All tied up: Tied staying and tied migration within the United States, 1997–2007. Demographic Research, 29(30), 817–836. 10.4054/DemRes.2013.29.30

Cromartie JB, & Stack CB (1989). Reinterpretation of Black return and nonreturn migration to the South 1975-1980. Geographical Review, 79 (3), 297–310. 10.2307/215574

Darlington F, Norman P, & Gould M. (2015) Health and internal migration). In Smith DP, Finney N, Halfacree K, & Walford N. (Eds.), Internal migration: Geographical perspectives and processes. International Population Studies. Farnham: Ashgate.

DaVanzo J. (1976). Why families move: A model of the geographic mobility of married couples. Santa Monica: Rand Corporation.

DeJong GF (1977). Residential preferences and migration. Demography, 14(2), 169–178. 10.2307/2060574 [PubMed: 870349]

Economic Research Service (2013). 2013 Rural-urban continuum codes. Washington, D.C.: U.S. Department of Agriculture. https://www.ers.usda.gov/webdocs/DataFiles/53251/ruralurbancodes2013.xls?v=41404

Erickson LD, Call VRA, & Brown RB (2012). SOS—Satisfied or stuck, why older rural residents stay put: Aging in place or stuck in place in rural Utah. Rural Sociology, 77(3), 408–434. 10.1111/j.1549-0831.2012.00084.x

Findley SE (1988). The directionality and age selectivity of the health-migration relation: Evidence from sequences of disability and mobility in the United States. International Migration Review, 22(2), 4–29. 10.1177/019791838802200301

Florida RS (2002). The rise of the Creative Class: And how it's transforming work, leisure, community and everyday life. New York: Basic Books.

Freedman VA, Martin LG, & Schoeni RF (2004). Disability in America. Population Bulletin, 59(3), 3–32. https://www.prb.org/disabilityinamericapdf540kb/

Fuguitt GV, & Zuiches JJ (1975). Residential preferences and population distribution. Demography, 12(3), 491–504. 10.2307/2060831 [PubMed: 1164943]

Gober P, & Zonn LE (1983). Kin and elderly amenity migration. The Gerontologist, 23(3), 288–294. 10.1093/geront/23.3.288 [PubMed: 6873699]

Greenland S, Mansournia MA, & Altman DG (2016). Sparse data bias: A problem hiding in plain sight. BMJ, 352, i1981. 10.1136/bmj.i1981

Hagen-Zanker J. (2008). Why do people migrate? A review of the theoretical literature. Maastricht Graduate School of Governance Working Paper No. 2008/WP002. 10.2139/ssrn.1105657

He W, & Larsen LJ (2014). Older Americans with a disability: 2008–2012, U.S. Census Bureau. In American Community Survey Reports, ACS-29. Washington, DC: U.S. Government Printing Office. https://www2.census.gov/library/publications/2014/acs/acs-29.pdf

Jackson MA (2018). Models of disability and human rights: Informing the improvement of built environment accessibility for people with disability at neighborhood scale? Laws, 7(1), 1–21. 10.3390/laws7010010

Johnson KM, Winkler R, & Rogers LT (2013). Age and lifecycle patterns driving US migration shifts. Carsey Institute Issue Brief No 62. Durham, New Hampshire: University of New Hampshire.

King R. (2012). Theories and typologies of migration: An overview and primer. Working Paper. Malmö: Malmö University.

Lee E. (1966). A theory of migration. Demography, 3(1), 47–57. 10.2307/2060063

Lichter D. (1980). Household migration and the labor market position of married women. Social Science Research, 9(1), 83–97. 10.1016/0049-089X(80)90010-1

Lichter DT, & Ziliak JP (2017). The rural-urban interface: New patterns of spatial interface. The Annals of the American Academy of Political and Social Science, 672(1), 6–25. 10.1177/0002716217714180

Litwak E, & Longino CF Jr. (1987). Migration patterns among the elderly: A developmental perspective. Gerontologist, 27(3), 266–272. 10.1093/geront/27.3.266 [PubMed: 3609792]

Longino CF (1981). Retirement Communities. In Berghorn FJ, & Schafer D. (Eds.), Dynamics of aging. Boulder, CO: Westview Press.

Lu Y, & Qin L. (2014). Healthy migrant and salmon bias hypotheses: A study of health and internal migration in China. Social Science & Medicine, 102, 41–48. 10.1016/j.socscimed.2013.11.040 [PubMed: 24565140]

Maart S, & Jelsma J. (2014). Disability and access to health care: A community based descriptive study. Disability and Rehabilitation, 36(16), 1489–1493. 10.3109/09638288.2013.807883 [PubMed: 23829353]

Maheswaran R, Pearson T, Strong M, Clifford P, Brewins L, & Wight J. (2014). Assessing the impact of selective migration and care homes on geographical inequalities in health—A total population cohort study in Sheffield. Spatial and Spatio-temporal Epidemiology, 10, 85–97. 10.1016/j.sste.2014.06.001 [PubMed: 25113594]

Mahmoudi E, & Meade MA (2015). Disparities in access to health care among adults with physical disabilities: Analysis of a representative national sample for a ten-year period. Disability and Health Journal, 8 (2), 182–190. 10.1016/j.dhjo.2014.08.007 [PubMed: 25263459]

Massey D, Arango J, Hugo G, Kouaouci A, Pellegrino A, & Taylor JE (1994). An evaluation of international migration theory: The North American case. Population and Development Review, 20(4), 699–751. 10.2307/2137660

Mathews RM, & Seekins T. (1987). An interactional model of independence. Rehabilitation Psychology, 32(3), 165–172. 10.1037/h0091571

McHugh KE (1987). Black migration reversal in the United States. Geographical Review, 77(2), 171–182. 10.2307/214978

Meyer JW, & Speare A Jr. (1985). Distinctive elderly mobility: Types and determinants. Economic Geography, 61(1), 79–88. 10.2307/143676 [PubMed: 12280179]

Mincer J. (1978). Family migration decisions. Journal of Political Economy, 86(5), 749–773. 10.1086/260710

Montez JK, Hayward MD, & Wolf DA (2017). Do U.S. states' socio-economic and policy contexts shape adult disability? Social Science and Medicine, 178, 115–126. 10.1016/j.socscimed.2017.02.012 [PubMed: 28219027]

Mulder CH (2007). The family context and residential choice: A challenge for new research. Population, Space and Place, 13(4), 265–278. 10.1002/psp.456

Mulder CH, & Cooke TJ (2009). Family ties and residential location. Population, Space and Place, 15(4), 299–304. 10.1002/psp.556

Mulder CH, & Malmberg G. (2014). Local ties and family migration. Environment and Planning A, 46(9), 2195–2211. 10.1068/a130160p

Nagi SZ (1965). Some conceptual issues in disability and rehabilitation. In Sussman MB (Ed.), Sociology and rehabilitation (pp. 100–113). Washington, DC: American Sociological Association.

Norman P, Boyle P, Exeter D, Feng Z, & Popham F. (2011). Rising premature mortality in the UK's persistently deprived areas: Only a Scottish phenomenon? Social Science and Medicine, 73(11), 1575–1584. 10.1016/j.socscimed.2011.09.034 [PubMed: 22030211]

Norman P, Boyle P, & Rees P. (2005). Selective migration, health and deprivation: A longitudinal analysis. Social Science and Medicine, 60 (12), 2755–2771. 10.1016/j.socscimed.2004.11.008 [PubMed: 15820585]

Pandit K. (1997). Demographic cycle effects on migration timing and the delayed mobility phenomenon. Geographical Analysis, 29(3), 187–199. 10.1111/j.1538-4632.1997.tb00956.x

Plane DA, & Jurjevich JR (2009). Ties that no longer bind? The patterns and repercussions of age-articulated migration. The Professional Geographer, 61(1), 4–20. 10.1080/00330120802577558

Popham F, & Boyle PJ (2011). Is there a 'Scottish effect' for mortality? Prospective observational study of census linkage studies. Journal of Public Health, 33(3), 453–458. 10.1093/pubmed/fdr023 [PubMed: 21493620]

Rogers A, Raquillet R, & Castro LJ (1978). Model migration schedules and their applications. Environment and Planning A, 10(5), 475–502. 10.1068/a100475

Rogers LT (2016). America's age profile told through population pyramids. Census Blog. https://www.census.gov/newsroom/blogs/random-samplings/2016/06/americas-age-profile-told-through-population-pyramids.html.

Seekins T, Ravesloot C, Rigles B, Enders A, Arnold N, Ipsen C, Boehm T, & Asp C. (2011). The future of disability and rehabilitation in rural communities. Rural Futures Lab Foundation Paper, No. 3. Columbia, MO: Rural Futures Lab. http://lib.ncfh.org/pdfs/2k9/9240.pdf

Sjaastad LA (1962). The costs and returns of human migration. Journal of Political Economy, 70, 80–93. 10.1086/258726

Smith SJ, & Easterlow D. (2005). The strange geography of health inequalities. The Transactions of the Institute of British Geographers, 30 (2), 173–190. 10.1111/j.1475-5661.2005.00159.x

Stockdale A, & Haartsen T. (2018). Editorial introduction: Putting rural stayers in the spotlight. Population, Space and Place, 24(4), 1–8. 10.1002/psp.2124

Tampubolon G. (2012). Neighbourhood social capital and individual mental health. In Van Ham M, Manley D, Bailey N, Simpson L, & Maclennan D. (Eds.), Neighbourhood effects research: New perspectives (pp. 175–193). Dordrecht: Springer. 10.1007/978-94-007-2309-2_8

Tunstall H, Mitchell R, Pearce J, & Shortt N. (2014). The general and mental health of movers to more- and less-disadvantaged socio-economic and physical environments within the UK. Social Science & Medicine, 118, 97–107. 10.1016/j.socscimed.2014.07.038 [PubMed: 25112564]

Tunstall H, Pearce J, Shortt N, & Mitchell RJ (2015). Residential mobility and the association between physical environment disadvantage and general and mental health. Journal of Public Health, 37(4), 563–572. 10.1093/pubmed/fdu058 [PubMed: 25174040]

Turra CM, & Elo IT (2008). The impact of salmon bias on the Hispanic mortality advantage: New evidence from social security data. Population Research and Policy Review, 27(5), 515–530. 10.1007/s11113-008-9087-4 [PubMed: 19122882]

U.S. Census Bureau (2011). Census 2010. Summary File 1. Washington, D.C: U.S. Department of Commerce. https://www2.census.gov/census_2010/04-Summary_File_1/

U.S. Census Bureau (2017). American Community Survey Public Use Microdata Sample 2011–2015. Washington, D.C.: U.S. Department of Commerce. https://www.census.gov/programs-surveys/acs/data/pums.html

von Reichert C. (2017). Prevalence of disability: Individual and household context. Research Brief Independent Living and Community Participation. 44. Missoula, MT: Rural Institute: RTC Rural at the University of Montana. https://scholarworks.umt.edu/ruralinst_independent_living_community_participation/44/

von Reichert C, Cromartie JB, & Arthun RO (2013). Intergenerational relationships and rural return migration. In Glasgow N, & Berry EH (Eds.), Rural aging in 21st century America (pp. 251–271). Dordrecht, The Netherlands: Springer. 10.1007/978-94-007-5567-3_14

von Reichert C, Cromartie JB, & Arthun RO (2014). Reasons for Returning and Not Returning to Rural U.S. Communities. The Professional Geographer, 66(1), 58–72. 10.1080/00330124.2012.725373

von Reichert C, Greiman L, Myers A, & Rural Institute, University of Montana (2014). The geography of disability in America: On rural-urban differences in impairment rates. Factsheet Independent Living and Community Participation. 7. Missoula, MT: Rural Institute: RTC Rural at the University of Montana. https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=1006&context=ruralinst_independent_living_community_participation

Waldorf BS (2006). A continuous multi-dimensional measure of rurality: Moving beyond the threshold measures (p. 2006). Long Beach, CA: American Agricultural Economics Association 2006 Annual Meeting.

Wallace M, & Kulu H. (2013). Migration and health in England and Scotland: A study of migrant selectivity and salmon bias. Population Space and Place, 20(8), 694–704. 10.1002/psp.1804

Ward B, Myers A, Wong J, & Ravesloot C. (2017). Disability items from the Current Population Survey (2008–2015) and permanent vs temporary disability status. American Journal of Public Health, 107(5), 706–708. 10.2105/AJPH.2017.303666 [PubMed: 28323478]

Withers SD, & Clark WAV (2006). Housing costs and the geography of family migration outcomes. Population, Space and Place, 12(4), 273–289. 10.1002/psp.415

World Health Organization (2001). International Classification of Functioning, Disability and Health (ICF). World Health Organization (WHO).

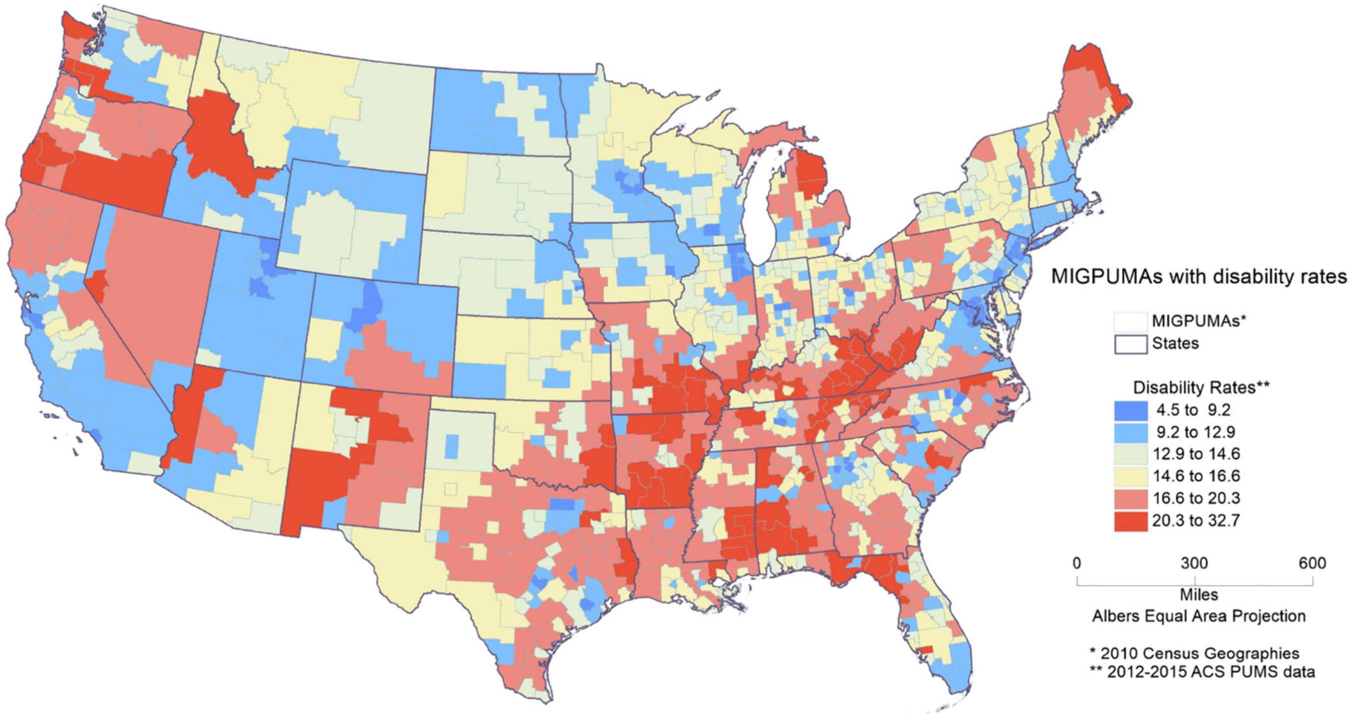

FIGURE 1.
Map of MIGPUMAs with disability rates

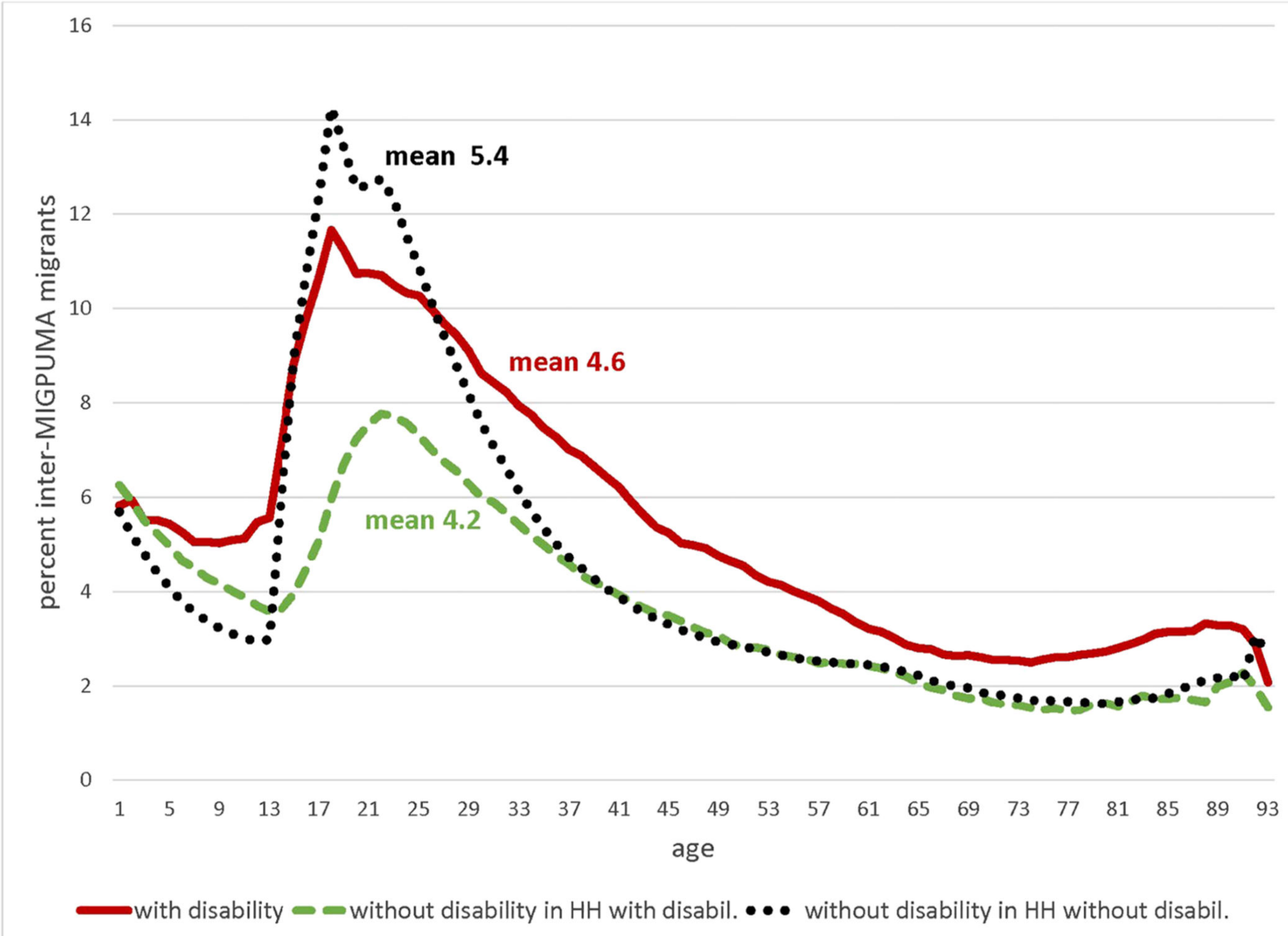

FIGURE 2.
Migration propensity by age and disability group

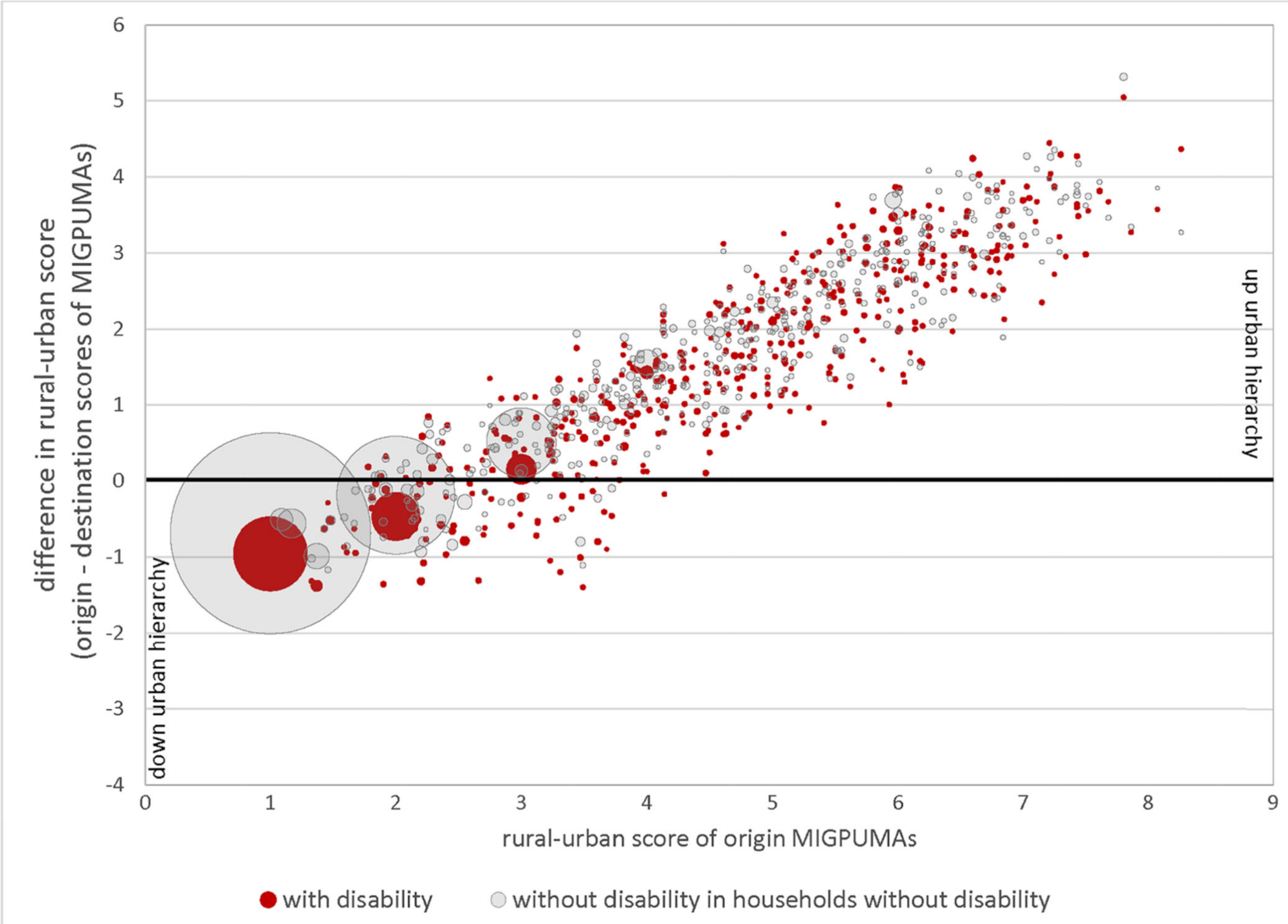

FIGURE 3.

Directionalities in migration of persons with disability and persons without disability in households without disability

TABLE 1

Environmental fit, migration, and disability rates

Environment	Experience of disability	Self-reporting	Environment & disability rate	Propensity to stay in place or leave	Propensity to move to place	Migration & disability rate
Supportive: Good environmental fit	Lessened	Low	Low disability rate	High propensity to stay, low propensity to leave	High in-migration	Increase in disability rate
Unsupportive: Poor environmental fit	Heightened	High	High disability rate	Low propensity to stay, high propensity to leave	Low in-migration	Decrease in disability rate

Source: Authors' conceptualisation of relationships between variables.

TABLE 2

Rural–urban spectrum: Rural–urban continuum codes for counties and rural-urban measures for MIGPUMAs

Rural-urban spectrum	MOST URBAN		↔	INTERMEDIATE			↔		MOST RURAL
Rural-urban continuum code (Beale Code) for counties									
Code and descriptors for metro & nonmetro, adjacent & not adjacent counties	1 Large metro	2 Intermed. metro	3 Small metro	4 Large nonmetro, adjacent	5 Large nonmetro, not adjac.	6 Intermed. nonmetro, adjacent	7 Intermed, nonmetro, not adjac.	8 Small nonmetro, adjancet	9 Small nonmetro, not adjac.
#2013 counties	432	379	356	214	92	593	433	220	424
2010 population (in million)	168.5	65.6	28.3	13.5	5.0	14.8	8.2	2.2	2.6
Disability rate (in %)	10.8	13.0	14.2	15.5	14.6	17.1	16.8	18.3	18.2
Rural-urban measures for MIGPUMAs [a]									
Rural-urban scale	1.0, 1.01	↔		continuous		↔		8.29, 8.30	
Rural-urban class	1	1–2	2–3	3–4	4–5	5–6	6–7	7–8.3 [b]	
	EQ 1 [b]	GT 1, LE 2	GT 2, LE 3	GT 3, LE 4	GT 4, LE 5	GT 5, LE 6	GT 6, LE 7	GT 7, LE 8.3	
Descriptors	metro 1	metro 1–2	metro 2–3	nonmet 3–4	nonmet 4–5	nonmet 5–6	nonmet 6–7	nonmetro 7–8.3	
Altemat. descript.	most urban	↔		intermediate		↔		most rural	
#2010 MIGPUMAs	237	178	163	108	96	95	77	26	
2011–2015 Population (in million)	158.1	68.5	31.7	17.6	14.2	12.9	10.3	3.1	
Disability rate (in %)	11.2	13.0	14.4	16.5	17.0	17.3	17.5	18.1	

Note. Source of 2013 RUCC (Beale) Codes: Economic Research Service (ERS, 2013). Source of 2010 population: Decennial Census of Population and Housing 2010 (U.S. Census Bureau, 2011). Source of 2011–2015 population and disability rate: ACS PUMS 2011–2015 (U.S. Census Bureau, 2017).

Abbreviations: EQ, equal to; GT, greater than; LE, less than or equal to.

[a] Derived from Beale Code of counties, weighted by county populations.

[b] Classes 7–8 and 8 plus combined due to small number of MIGPUMAs.

TABLE 3

Disability rates by rural–urban class and demographic and socio-economic attributes

Rural–urban class[a]	**Disability rate**		**Age groups**[b]	**Disability rate**	**Racial groups**[b]	**Disability rate**
Metro 1	11.2		Under 15 years	3.8	White	13.3
Metro 1–2	13.0		15 to 24	5.9	African American	14.5
Metro 2–3	14.4		25 to 34	6.2	Native American	17.1
Nonmetro 3–4	16.5		35 to 49	9.0	Asian American	6.9
Nonmetro 4–5	17.0		50 to 64	17.4	Other single race	8.2
Nonmetro 5–6	17.3		65 to 74	26.2	Two or more races	11.4
Nonmetro 6–7	17.5		75 and older	52.7		
Nonmetro 7–8.3	18.1					
Total	13.0		Total	12.9	Total	12.9
N in sample	12,525,440			15,637,457		15,637,457
N weighted	254,040,502			316,515,024		316,515,024
Educational attainment[c]	Disability rate		Housing (tenure, group quarters)[b]	Disability rate	Income-to-poverty ratio[d]	Disability rate
	Age 3 and older[c]	Age 25 and older				
Less than HSD	12.9	30.7	Owners	12.2	Under 125[e]	18.1
HSD or GED	19.1	21.0	Renters	12.6	125–275	14.8
Some college	13.7	16.5	Group quarters	34.8	275–500	10.6
Associates degree	11.7	12.5			500 and higher	7.5
Bachelor's degree	8.1	8.5				
Professional, Masters, PhD	8.4	8.4				
Total	13.4	17.0	Total	12.9	Total	12.5
N in sample	15,151,116	10,883,533		15,637,457		14,975,680
N weighted	304,914,162	211,495,175		316,515,024		308,606,359

Abbreviations: GED, General Education Diploma; HSD, High School Diploma.

[a] Observations using 2010 Census Geography, years 2012–2015 of ACS PUMS.

[b] All observations in 2011–2015 ACS PUMS.

[c] Observations in 2011–2015 ACS PUMS on educational attainment, available for age 3 and older in ACS.

[d] Observations in 2011–2015 ACS PUMS for which income-to-poverty ratio has been determined in ACS.

[e] Income-to-poverty ratio is 100 for incomes equal to poverty level; 125 = 25% above poverty level, etc.

TABLE 4

Logistic regression[a]: Persons with or without disability by rural–urban class—with demographic, socio-economic, and ecological control variables

		Rural–urban model, only			Additional demographic and socio-economic controls			Additional ecological controls		
Category[b]	**Variable**	***B***	***SE***	**Exp(*B*)**	***B***	***SE***	**Exp(*B*)**	***B***	***SE***	**Exp(*B*)**
Constant		−1.809	0.000	0.164	−2.003	0.001	0.135	−1.840	0.004	0.159
Explanatory variable										
Rural–urban class	Metro 1–2	0.185	0.001	1.204	0.088	0.001	1.092	0.068	0.001	1.070
	Metro 2–3	0.310	0.001	1.364	0.183	0.001	1.200	0.138	0.001	1.149
	Nonmetro 3–4	0.466	0.001	1.594	0.278	0.001	1.321	0.200	0.001	1.222
	Nonmetro 4–5	0.508	0.001	1.661	0.267	0.001	1.306	0.186	0.001	1.205
	Nonmetro 5–6	0.528	0.001	1.696	0.269	0.001	1.309	0.185	0.001	1.203
	Nonmetro 6–7	0.551	0.001	1.735	0.280	0.001	1.324	0.190	0.001	1.209
	Nonmetro 7–8.3	0.581	0.002	1.788	0.302	0.002	1.353	0.246	0.002	1.279
Control variables: Demographic										
Age groups	35 to 49				0.516	0.001	1.676	0.524	0.001	1.689
	50 to 64				1.382	0.001	3.983	1.396	0.001	4.040
	65 to 75				1.896	0.001	6.658	1.913	0.001	6.774
	75 and older				2.882	0.001	17.845	2.906	0.001	18.289
Racial groups	African American				0.120	0.001	1.127	0.104	0.001	1.110
	Native American				0.345	0.002	1.413	0.349	0.002	1.418
	Asian American				−0.500	0.001	0.606	−0.485	0.001	0.616
	Other single race				−0.474	0.001	0.622	−0.465	0.001	0.628
	Two or more racial groups				0.432	0.002	1.541	0.439	0.002	1.551
Control variables: Socio-economic										
Educational attainment	HSD or GED				−0.322	0.001	0.725	−0.314	0.001	0.731
	Some college, no degree				−0.373	0.001	0.689	−0.363	0.001	0.695
	Associates degree				−0.513	0.001	0.599	−0.499	0.001	0.607
	Bachelor’s degree				−0.851	0.001	0.427	−0.832	0.001	0.435
	Professional, Masters, PhD				−0.915	0.001	0.400	−0.894	0.001	0.409
Housing	Renters				0.254	0.001	1.290	0.252	0.001	1.286
	Group quarters				1.607	0.003	4.987	1.612	0.003	5.014

		Rural–urban model, only			Additional demographic and socio-economic controls			Additional ecological controls		
Category[b]	Variable	***B***	***SE***	**Exp(*B*)**	***B***	***SE***	**Exp(*B*)**	***B***	***SE***	**Exp(*B*)**
Income-to-poverty ratio[c]	125 to less than 275				−0.516	0.001	0.597	−0.511	0.001	0.600
	275 to less than 500				−0.839	0.001	0.432	−0.828	0.001	0.437
	500 and higher				−1.140	0.001	0.320	−1.121	0.001	0.326
Control variables: Ecological/regional										
Occupation structure (of occupation)	Agricultural							−0.017	0.000	0.983
	Extract./mining							0.112	0.001	1.119
	Production occupations							0.015	0.000	1.015
Employment	Unemployment rate							0.014	0.000	1.014
Poverty	Mean income-to-poverty ratio							−0.002	0.000	0.998
U.S. Census Region	Midwest							0.013	0.001	1.013
	South							0.076	0.001	1.079
	West							0.044	0.001	1.045
N in sample			8,482,101			8,482,101			8,482,101	
N weighted			167,370,489			167,370,489			167,370,489	
−2LL			148,259,696			124,588,900			124,441,747	
Nagelkerke R^2			.009			.232			.233	
% correctly classified			83.6			84.3			84.3	
Change in −2LL without variable										
Rural–urban class									50,960	
Age groups									14,834,004	
Racial groups									404,002	
Educational attainment									1,194,943	
Housing									531,289	
Income-to-poverty ratio									2,251,197	
% agricultural occupations									15,539	
% extractive/mining occupations									32,572	
% production occupations									24,388	
Unemployment rate									12,930	
Mean income-to-poverty ratio									22,192	
U.S. Census region									16,587	

Note. Data sources: 2012–2015 data extracted from 2011–2015 ACS PUMS using 2010 Census Geography; unemployment rate for 2012 derived from Local Area Unemployment Statistics (BLS, 2018). Significance level: $p < .001$ for all coefficients.

[a] Included in analysis: Persons age 25 and older (due to including educational attainment).

[b] Reference categories: Rural–urban class, Metro 1; age groups, 25–34; racial groups, White; educational attainment, less than High School Diploma (HSD) or General Education Diploma (GED); housing, owner; income-to-poverty ratio, less than 125; U.S. Census Region, Northeast.

[c] Income-to-poverty ratio is 100 for incomes equal to poverty level; 125 = 25% above poverty level, etc.

TABLE 5

Logistic regression[a]: Staying versus migrating[b] by rural–urban class—with demographic and socio-economic control variables

		Persons with disability			Persons without disability in households with disability			Persons without disability in households without disability		
Category[c]	**Variable**	***B***	***SE***	**Exp(*B*)**	***B***	***SE***	**Exp(*B*)**	***B***	***SE***	**Exp(*B*)**
	Constant	3.477	0.005	32.357	3.263	0.005	26.124	3.791	0.002	44.302
Explanatory variable										
Rural–urban class (origin)	Metro 1–2	0.002	0.003	1.002	−0.033	0.003	0.968***	−0.070	0.001	0.932***
	Metro 2–3	0.009	0.004	1.009*	−0.126	0.004	0.882***	−0.146	0.002	0.864***
	Nonmetro 3–4	−0.031	0.004	0.969***	−0.155	0.005	0.856***	−0.254	0.002	0.776***
	Nonmetro 4–5	−0.120	0.005	0.887***	−0.096	0.006	0.908***	−0.237	0.002	0.789***
	Nonmetro 5–6	−0.115	0.005	0.892***	−0.166	0.006	0.847***	−0.272	0.002	0.762***
	Nonmetro 6–7	−0.043	0.005	0.958***	−0.079	0.007	0.924***	−0.207	0.003	0.813***
	Nonmetro 7–8.3	−0.101	0.009	0.904***	−0.263	0.011	0.769***	−0.330	0.005	0.719***
Control variables: Demographic										
Age groups	35 to 49	0.400	0.003	1.491***	0.442	0.003	1.556***	0.612	0.001	1.845***
	50 to 64	0.680	0.003	1.974***	0.767	0.003	2.154***	0.871	0.001	2.390***
	65 to 74	0.951	0.004	2.588***	1.020	0.005	2.772***	0.993	0.002	2.698***
	75 and older	0.925	0.004	2.522***	1.177	0.007	3.245***	1.168	0.003	3.217***
Racial groups	African American	0.274	0.003	1.315***	0.301	0.004	1.351***	0.223	0.001	1.249***
	Native American	−0.049	0.009	0.952***	0.132	0.012	1.141***	0.126	0.006	1.134***
	Asian American	0.263	0.007	1.301***	0.427	0.006	1.532***	0.044	0.002	1.045***
	Other single race	0.418	0.007	1.519***	0.469	0.006	1.599***	0.498	0.003	1.646***
	Two or more racial groups	0.007	0.006	1.007	0.002	0.007	1.002	−0.032	0.003	0.969***
Control variables: Socio-economic										
Educational attainment	HSD or GED	−0.130	0.003	0.878***	−0.184	0.004	0.832***	−0.263	0.002	0.769***
	Some college, no degree	−0.279	0.003	0.757***	−0.301	0.004	0.740***	−0.498	0.002	0.608***

Category[c]	Variable	Persons with disability			Persons without disability in households with disability			Persons without disability in households without disability		
		B	**SE**	**Exp(B)**	**B**	**SE**	**Exp(B)**	**B**	**SE**	**Exp(B)**
	Associates degree	−0.296	0.005	0.744***	−0.316	0.005	0.729***	−0.539	0.002	0.583***
	Bachelor's degree	−0.392	0.004	0.676***	−0.479	0.005	0.619***	−0.789	0.002	0.454***
	Professional, Masters, PhD	−0.404	0.005	0.668***	−0.590	0.006	0.554***	−0.965	0.002	0.381***
Housing	Renter	−1.190	0.002	0.304***	−0.957	0.003	0.384***	−1.356	0.001	0.258***
	Group quarters	−1.917	0.005	0.147***				−2.610	0.005	0.074***
Income-to-poverty ratio[d]	125 to 274	−0.032	0.003	0.968***	0.152	0.003	1.164***	0.056	0.001	1.058***
	275 to 499	−0.181	0.003	0.834***	0.106	0.004	1.111***	0.004	0.001	1.004***
	500 and higher	−0.331	0.004	0.719***	0.011	0.004	1.011**	−0.100	0.002	0.905**
N in sample				1,504,119			1,009,398			5,927,629
N weighted				27,301,299			19,795,531			119,323,154
−2LL				8,024,232			5,964,932			39,141,074
Nagelkerke R^2				.066			.056			.105
% correctly classified				96.4			96.3			95.6
Change in −2LogLikehoood without variable										
Rural–urban class				1,375			2,470			37,576
Age groups				84,117			82,992			668,911
Racial groups				12,006			14,898			59,318
Educational attainment				15,248			15,819			317,283
Housing				295,358			125,876			1,824,459
Income-to-poverty ratio				9,860			2,796			13,573

Note. Data source: 2012–2015 data extracted from 2011–2015 ACS PUMS using 2010 Census Geography.

[a]Included in analysis: Persons 25 years of age and older (due to including educational attainment).

[b]Migrating to a different MIGPUMA.

[c] Reference categories: Rural–urban class, Metro 1; age groups, 25 to 34 years of age; racial groups, White; educational attainment, less than High School Diploma (HSD) or General Education Diploma (GED); housing, owner; income-to-poverty ratio, less than 125.

[d] Income-to-poverty ratio is 100 for incomes equal to poverty level; 125 = 25% above poverty level, etc.

* Significance level: .05.

** Significance level: .01.

*** Significance level: .001.

TABLE 6

Ordinary least squares regression[a]: Directionality of moving up or down the urban hierarchy by disability group and rural–urban class

Category[b]	Variable	Disability *b*	Disability *SE*	Disability beta	Disability & rural-urban class *b*	Disability & rural-urban class *SE*	Disability & rural-urban class beta
	Constant	0.025	0.001		−0.610	0.001	
Disability group	With disability	−0.077	0.002	0.015	−0.295	0.001	−0.059
	Without disability in households with disability	−0.103	0.002	0.017	−0.204	0.002	−0.033
Rural–urban class (origin)	Metro 1–2				0.391	0.001	0.087
	Metro 2–3				0.939	0.002	0.153
	Nonmetro 3–4				1.552	0.002	0.199
	Nonmetro 4–5				2.364	0.003	0.268
	Nonmetro 5–6				3.224	0.003	0.358
	Nonmetro 6–7				3.785	0.003	0.365
	Nonmetro 7–8.3				4.580	0.005	0.257
	Adjusted R^2	.000			.351		

Note. Data source: 2012–2015 data extracted from 2011–2015 ACS PUMS, using 2010 Census Geography. Significance level: $p < .001$ for all coefficients.

[a] Included in analysis: Persons 25 years of age and older.

[b] Reference categories: Disability group, without disability in households without disability; rural–urban class (origin), Metro 1.