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Stop bashing the suburbs: Mobility limitations of older residents are less relevant as connectivity options expand

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ABSTRACT

Most older persons (age 65 and over) in the United States occupy suburban residential areas. Distinguishing where the older population lives is important because critics argue that the built environments of their suburban communities make it difficult for them to age in place successfully, that is, to have healthy, independent, active, and enjoyable lives. They point to their low population and building densities, long distances separating their residences from services, amenities, and commercial areas, and few transit and walking options. Consequently, when the mobility limitations of older residents prevent them from safely driving their vehicles, they have difficulties reaching destinations outside their homes (mobility behaviors) to satisfy their discretionary and obligatory needs. This paper questions this suburban bashing. It argues that future cohorts of older people, especially women, will be more able to drive, cars will be technologically safer and easier to operate, and ride-sharing options will be more available. More suburbs will also have mixed-use and pedestrian-accessible built environments reducing the need for vehicular travel. Most importantly, the information, activities, goods, services, and care required by older people to age in place will be delivered to their dwellings. Home sharing, home care, internet connectivity, e-commerce, social media, smart homes, telemedicine and robotic technologies will make the mobility or out-of-home behaviors of older residents less necessary. The paper introduces the constructs of *connectivity options* and *connectivity behaviors* to encompass these expanded travel and in-home delivery strategies. These new ways of connecting with their environments will result in more self-reliant older persons who are less constrained by their mobility limitations. These conclusions offer insights for planners and policymakers seeking to make their suburban communities more age-friendly. They must keep pace with the changing ways that older people will access their environments if they are to improve the quality of their lives and help them to age in place successfully.

Introduction

The older population (age 65 and over) in the United States is projected to grow by 44%, from 56.1 to 80.8 million between 2020 and 2040 (U.S. Bureau of the Census, 2018). Less well appreciated is that a disproportionate share of this population increase will occur in America's suburbs. Knowing where older persons live is important because experts and pundits argue that their suburban communities are inhospitable environments that make it difficult for them to age in place successfully, that is, to have healthy, independent, active, and enjoyable lives.

Critics focus on the built environments of the suburbs, referring to their transportation or travel mode options, land use patterns and urban design characteristics (Frank, Engelke, & Schmid, 2003). They point to their low population and building densities and the long distances separating their residences from services, amenities, and commercial areas (e.g., strip malls, shopping centers, and big box stores). These spread-out settlements require older occupants to rely on privately owned vehicles (e.g., cars, SUVs, and pickup trucks) to reach their destinations because transit and walking options are unavailable.

Critics argue that when older residents cannot safely drive their vehicles, suburban built environments restrict their "*mobility behaviors*" making it difficult for them to "*move from one place to another and reach places outside the home*" (Penger & Oswald, 2017, p. 153). These out-of-home activities will be especially problematic for a baby boomer population that over the next twenty years will be top-heavy with persons in their late 70s, 80s, and 90s, who are at greater risk of having *mobility limitations*—cognitive, physical, psychosocial, or financial (Webber, Porter, & Menec, 2010). One policy analysis summed it up: older adults are "*disadvantaged by the separation of [residential and commercial] land*

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uses and by the distance to facilities and services…Mobility [behavior] becomes more difficult because of either cost or diminishing physical abilities" (Miller, 2017, p. 8). These assessments lead to characterizations like that of long-term care expert Robyn Stone: "*the suburbs are the absolutely worst place to grow older with a lack of transportation and ecosystem*" (Eisenberg, 2018).

This paper questions this suburban bashing. It offers three reasons for why the mobility limitations and behaviors of older persons will be less reliable predictors of their ability to satisfy their discretionary and obligatory needs. First, they will have better travel options. Future cohorts of older people, especially women, will be more able to drive, benefit from more flexible ride-sharing options, and cars will be technologically safer and easier to operate, and perhaps self-driving. Second, a growing number of suburbs will have mixed-use built environments making it possible for older persons to reach destinations by walking. Third, and most importantly, the information, activities, goods, services, and care required by older people to age in place will be delivered to their private residences making their out-of-home activities less necessary. This paper introduces the constructs, *connectivity options* and *connectivity behaviors,* to encompass these expanded travel and in-home delivery strategies (Fig. 1). By drawing attention to these changing connectivity options, the paper also attempts to alert planners and advocates on how they might better prioritize efforts to make their communities more age-friendly for their older suburban residents.

Demographic rationale for the suburban focus on older persons

Research in the 1970s predicted that older persons would predominantly live in the suburbs (Cagney & Cornwell, 2018; Golant, 1975). The correctness of this prediction is evident today. Appropriately, cultural anthropologist, Stafford (2009) referred to these suburban residential patterns as *Elderburbia*.

As of 2014 in the United States, 53% of the age 65 and older population lived in the suburbs, 27% occupied the urban cores (principal cities) of metropolitan areas and the remaining 20% occupied rural or nonmetropolitan counties (U.S. Department of Health and Human Services, Administration on Aging, 2015). Consequently, about two-thirds of the older population living in metropolitan areas occupy their suburbs rather than their cities or urban cores. In the largest metropolitan areas (over 1,000,000 in size), about 87% of seniors live in the suburbs (Cox, 2018a).

Suburban counties have also been graying faster than the core cities of metropolitan America (Parker, Horowitz, Brown, Fry, & D., C., & Igielnik, R., 2018). Between 2010 and 2016, 90% of the growth of older persons in the largest metropolitan areas occurred in the suburbs (Cox, 2018a). These growth rates result in disproportionately large numerical increases and higher residential concentrations of older persons found in very low population density neighborhoods (Joint Center for Housing Studies of Harvard University, 2018). These residential enclaves of older persons are often referred to as naturally occurring retirement communities or NORCs (Hunt & Gunter-Hunt, 1985).

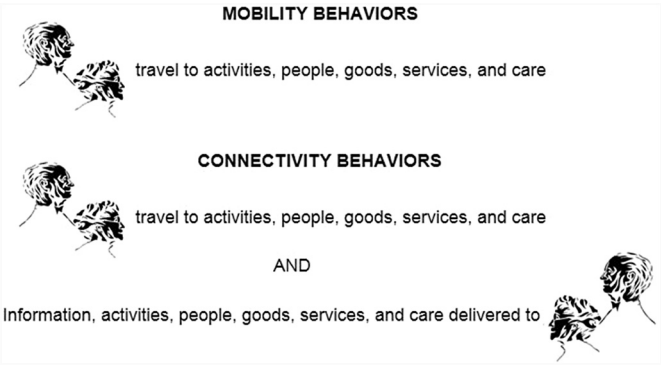

Fig. 1. Mobility and Connectivity Behaviors of the Suburban Older Population.

Three factors explain these demographics. First, when the oldest members of the baby boomer generation turned age 65 in 2011, the majority were already living in the suburbs (Frey, 2003). These older boomers are the "*first truly suburban generation*" because they occupied the suburbs throughout their adult lives (Frey, 2007, p. 15).

Second, once living in the suburbs, older persons typically decide to stay put or age in place (Golant, 1975). The 79% of older households who are homeowners (in 2019) are especially unlikely to change their residences compared with younger age groups (U.S. Census Bureau, 2018).

Third, when late middle-aged and older people do move they favor suburban destinations. At least since the 1970s, older persons have predominantly moved from the central or core principal cities of metropolitan areas to their suburbs, rather than in the opposite direction. Moreover, when older suburban occupants move, they typically relocate to another suburb (Frey, 2007; Golant, 1987; Kotkin, 2016). Consequently, along with the aforementioned aging in place influences, suburban communities experience net gains of their older populations because of their migration behaviors (Cox, 2018b). Recent opinion polls do not suggest any shift in these patterns. They consistently find that both boomers and seniors overwhelmingly rate suburban communities as either essential or desirable (Emrath, 2016).

Generalizations must be tempered by how suburban areas are defined

The suburbs, as contrasted with the urban cores, have later development origins, newer housing stock, lower population densities and are in more decentralized locations farther from the downtown cores. Yet generalizing about suburban communities in the United States is challenging because they do not all equally have these characteristics and because different city-suburban-rural taxonomies will inconsistently label the same territories as suburban (Cox, 2018a; Hart, Larson, & Lishner, 2005; Parker et al., 2018). Thus, findings regarding suburban differences must be interpreted carefully.

Traveling to activities, people, goods, services, and care: when mobility limitations matter more

Privately owned vehicles

Older persons in the United States depend mostly on privately owned vehicles (autos, SUVs, small trucks) to reach their everyday destinations (Table 1 and Fig. 2). They make over 90% of their daily trips using this travel mode, although riding as a passenger is more common among age 75 and over persons (Shen, Koech, Feng, Rice, & Zhu, 2017). These travel patterns are consistent with the high driver licensing rates of older people (U.S. Department of Transportation, F. H.

Table 1
Distribution of daily trips by mode of travel of older persons, United States in 2015 (in percentages).

	Age of older population	
Travel mode	65 to 74	75 and Over
Privately owned vehicles as drivers	72.9	68.9
Privately owned vehicles as passengers	18.6	24.5
Bus	1.1	0.4
Train	1.1	0.0
Walk	5.8	5.2
Bicycle	0.1	0.2
Taxi	0.1	0.2
Boat, plane	0.2	0.3
Unspecified	0.1	0.3
TOTAL	100.0	100.0

Adapted from: Shen et al. (2017).

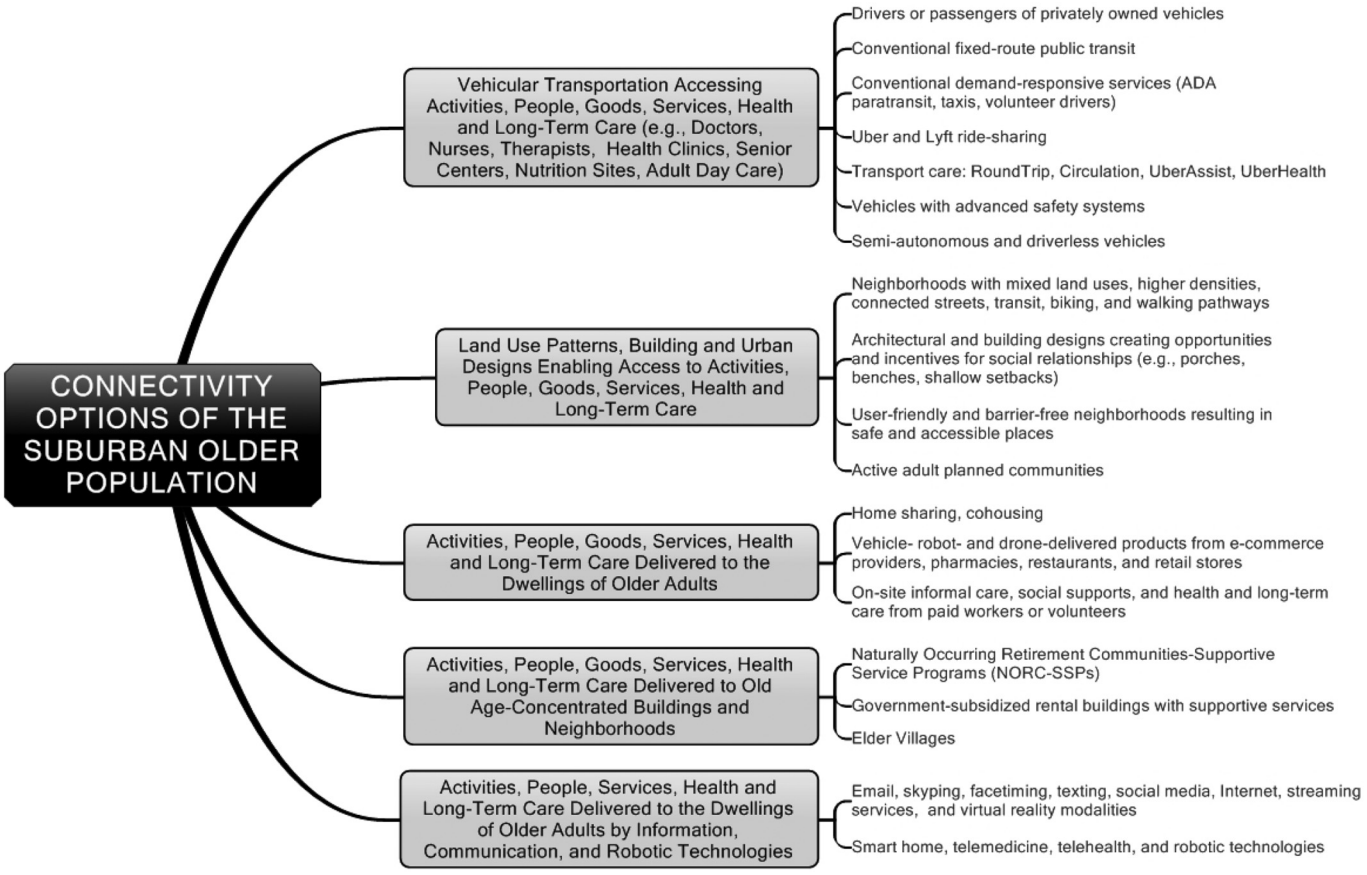

Fig. 2. Connectivity options of the suburban older population.

A, 2016). Even among persons in their early 80s, almost 79% were licensed to drive in 2016. We would expect these travel and licensing rates to be significantly higher in suburban locales where driving is arguably easier because of less congested roads (Alsnih & Hensher, 2003).

However, generalizations must be made carefully because the mobility limitations of older persons differ. At the highest chronological ages, both vehicle licensing and trip travel rates of older persons substantially decline, which are troubling relationships because by 2040 over half of the older population in the United States will be age 75 or older (U.S. Bureau of the Census, 2018). Gender differences are also critical. Men, especially over the age of 75, are more likely to drive than women (Shen et al., 2017). Among men in the early 80s age group, almost 90% were licensed to drive in 2016, compared with only 71% of same-aged women (U.S. Department of Transportation, F. H. A, 2016). Women traveling in privately owned vehicles are also more likely to be passengers (Rosenbloom, 2006; Shen et al., 2017).

A generation or cohort effect largely accounts for these gender disparities, a gap expected to close in the future. Today's older women were less likely to drive in their younger years compared to later-born female cohorts. For example, in 2010, 67% of women in their early 80s were licensed to drive, compared with the aforementioned 71% of women in the same age group in 2016. In contrast, the driving licensing rates of older men in their early 80s largely remain unchanged. Nonetheless, while this gender gap is expected to narrow, it will persist for another reason. Older women live longer than men with the result that after age 70, they will spend more years unable to drive (Foley, Heimovitz, Guralnic, & Brock, 2002).

Other subgroups of old also rely less on private vehicular modes, although they are less likely to occupy the suburbs. These include low income elders, especially ethnic and racial minorities, who cannot afford the costs of owning or operating a car (American Association of State Highway and Transportation Officials, 2013; Rosenbloom, 2003). Importantly, persons born outside the United States will comprise a higher share of the future older population (Federal Interagency Forum on Aging Related Statistics, 2016).

These vehicle travel and licensing rates do not fully reveal the mobility behavior challenges confronted by older people. Even when older persons still drive, they may substantially limit their out-of-home activities because of their mobility limitations (e.g., hip problems, Parkinson's disease, arthritis, and declines in their cognitive, visual and motor skills). Typically, they cope by modifying or self-managing their driving behaviors. They avoid poor weather, unfamiliar areas, or challenging traffic conditions (Payyanadan, Lee, & Grepo, 2018).

Older persons experience other disincentives to drive. Although they have a lower involvement rate in fatal crashes per 100,000 licensed drivers than younger age groups, after controlling for miles driven, they are more likely to be seriously injured and have medical complications. This risk is increasing because older drivers are keeping their licenses longer and driving more miles than in the past. In 2017, per mile traveled, fatal crash rates increased significantly at age 70–74 and were especially high for persons 85 and older (Insurance Institute for Highway Safety, H. L. D. I, 2018; National Center for Statistics and Analysis, 2018).

Older persons who no longer drive suffer from well-documented consequences (National Aging and Disability Transportation Center, 2018). They make substantially fewer trips to the doctor, to shop or eat out, to visit friends and family, or for leisure purposes (Transportation for America, 2011). They become more sedentary and more likely to experience depression and to feel socially isolated (Chihuri et al., 2016; Donorfio, D'Ambrosio, Coughlin, & Mohyde, 2009). Their inability to easily get around reminds them of their limitations and dependency on others (Golant, 2015b; Mackett, 2015). They often feel guilt or shame when they must burden family or friends with their unmet

transportation needs (Baily, 2004).

Other vehicle transportation alternatives

Very small percentages of older persons rely on taxi and transit modes of transportation and both have downsides compared with privately owned vehicles, the most flexible and comfortable travel mode (Luiu, Tight, & Burrow, 2017).

Taxis

A very small share of the trips made by older people, less than 0.2% (Table 1), is made by taxis (Shen et al., 2017). However, an estimated 10% of older persons with disabilities rely on this travel mode (National Aging and Disability Transportation Center, 2018). Unfortunately, because of the expense of taxi trips, they are primarily used by higher income older populations, unless local governments subsidize their costs (National Center on Senior Transportation, 2011).

Fixed route transit

Experts often propose public transit (e.g., busses, streetcars, trains, subways) as the most important vehicle alternative to auto travel (Transportation for America, 2011). But in the United States overall, age 65 to 74 persons make only about 2% of their trips and persons age 75 and older make an even smaller 0.4% of their trips by public transit (Table 1). These shares are undoubtedly smaller in transit-deficient suburban locales (Dumbaugh, 2008; Shen et al., 2017). Even when transit stops are within walking distance, older persons complain that their routes do not take them to where they need to go and in reasonable times, especially during off-peak hours and weekends (Kerschner, 2003). Mobility limited older people are especially challenged by long wait times, getting on and off busses, finding a seat, being pushed and jostled, and negotiating their packages.

Demand-responsive alternatives

When older persons cannot reach destinations using public transit, demand-responsive or paratransit alternatives offer door-to-door travel services in van-like vehicles (Kerschner, 2003). One specific category of para-transit services fulfills the legal requirements of the Americans with Disabilities Act of 1990 (ADA). ADA requires public transit agencies to provide complementary transportation (that is, additional to their fixed route, fixed schedule transit services) to passengers (of all ages) with disabilities (including older adults) who cannot access transit stops from their homes. Along with local governments, various federal programs may fund these demand-responsive services, including Medicaid and the Veterans Administration and Title III of the Older Americans Act (Koffman, Weiner, Pfeiffer, & Chapman, 2010).

However, this mode of transportation has downsides. Satisfying spur of the moment transportation needs is impossible because older persons must usually call at least 24 h in advance to reserve trip pickups. These services typically operate only during daytime hours, and they have limited geographic coverage. They may also only be available for certain categories of trips—such as visits to a doctor—and to older persons with limited mobility or lower incomes. However, the disabilities of elders are sometimes not severe enough to qualify (Rosenbloom, 2007).

Overall, this transportation option may fill a critical supply gap, but it serves only a very small proportion of older persons (exact percentages are unavailable). Experts believe they "*will likely not be a viable strategy for addressing the community mobility needs of older individuals*" (Vanderbur & Silverstein, 2011, p.28).

New ride-sharing options

The newest demand-responsive travel alternatives, the ride-sharing options of Uber and Lyft, increase the options of the mobility limited. Unlike para-transit travel, older persons do not have to plan their trips in advance, can make them at most times and travel to most destinations. Furthermore, there is no negative welfare or dependency stigma associated with their use.

However, older persons may have difficulties using these services. They must use their smartphones to hail these rides, putting them out of reach of the less tech-savvy (see later in the paper). Others will distrust what are now mostly unregulated travel services. However, these usage barriers are weakening. Uber has partnered with nonprofit organizations, such as AARP, to teach older participants at senior centers in Florida to use the ride-sharing app. A family member or friend can now request the service using a web-based tool such as Concierge or GreatCall. Moreover, these ride-sharing companies are collaborating with medical facilities and home care companies who can request these services for their clients (e.g., services such as Roundtrip and Circulation). These health and home care companies sometimes have a licensed caregiver accompany their older clients (Morrissey, 2018). UberAssist will provide cars that can accommodate patients with wheelchairs and walkers and employ drivers who help mobility-impaired older persons into and out of their vehicles (CSA Blog, 2017). Although their costs make them unaffordable to lower income older persons, some local governments subsidize these ride-sharing fares (Leistner & Steiner, 2017). Public transit agencies are also partnering with Uber and Lyft to solve their first and last mile solutions whereby older people can more easily access their public transit routes. These are often free or discounted ridesharing trips (Schwieterman, 2018).

New driver-friendly privately owned vehicles

New auto technologies such as lane departure warnings, collision warnings, emergency braking, blind spot warnings, and parking assist systems are making privately owned vehicles both easier and safer for older persons to drive even when they have mobility limitations. Semi-autonomous cars will further compensate for the driving limitations of older persons. However, it will be the widespread adoption of driverless or fully autonomous vehicles that will represent a paradigm shift and substantially reduce the relevance of older people's mobility limitations and their stigma of driving as passengers. Likewise, these vehicles would make poor driving conditions such as "*heavy traffic, unfamiliar roads, night-time driving, and poor weather*" far less relevant (Aaronson, Zinn, & Rosko, 1995, p. 171). Even if older persons opt not to own these cars, they will benefit from the expected expansion of ride-sharing programs using these vehicles.

However, these driver-friendly vehicles still have downsides. Older persons will be slow to adopt these new and costly technologies. Experts also worry that the mobility limitations of older people (e.g., who are in wheelchairs) will prevent them from accessing these cars (from their dwellings or destinations) or getting into or out of these vehicles. Traveling alone will be unsafe for older persons suffering from dementia symptoms (Coughlin, 2017).

Walking as a travel mode alternative

An increasing number of American suburbs more closely resemble New Urbanism communities than auto-dependent sprawling subdivisions. These more compact communities have higher residential and building densities and are located near commercial districts. Residents can walk to their everyday destinations, even during nighttime hours (Chaudhury, Mahmood, Michael, Campo, & Hay, 2012; Van Cauwenberg et al., 2014). Their dwellings also may have porches close to the streets (shallow setbacks) enabling spontaneous social interactions (Kerr, Rosenberg, & Frank, 2012).

These suburban built environments have different origins. Some were once historic village centers—a product of 18th and 19th century development—now enveloped by the expanding metropolitan area and contain a variety of shopping and personal services (Fang, 2013). Still others represent redevelopment efforts or built-from-scratch

communities (Leinberger, 2018).

A growing number of active adult communities catering to persons age 55 and older who are attracted by their leisure and social activities offer yet another built environment that deviates from the stereotypic suburb (Golant, 2015a). These master-planned communities may have the physical look and feel of low-density suburban neighborhoods; however, they often have a full spectrum of shopping, services, and recreational uses within golf cart or walking distances of their older occupants. The residents also enjoy frequent contacts with their neighbors.

Critics of auto-oriented suburbs argue that these New Urbanism-like neighborhoods enable their residents to walk more frequently to their destinations. The empirical evidence offers five reasons for a more nuanced portrayal of their benefits.

First, older persons infrequently walk to places (Table 1). In the United States, about 6% of the daily trips of age 65–74 persons and 5% of the trips by age 75 and older persons are by walking (Shen et al., 2017). Of course, these numbers may reflect the lack of opportunities to walk—such as in the suburbs. However, older people who occupy the built environments of New Urbanism-like communities do not always walk more (Luiu et al., 2017) and sometimes they even walk less (Rosso, Auchincloss, & Michael, 2011). Analyses also are plagued by their failure to confirm the direction of causality. So, when older people walk more in these so-called favorable built environments, they may be self-selected individuals who were attracted to these walkable settings in the first place (Kerr et al., 2012; Rosso et al., 2011). As one study concluded, "*participants preferring and selecting neighborhoods with greater walkability walked more for both nondiscretionary and discretionary travel; especially when located in environments that are conducive to walking*" (Frank, Saelens, Powell, & Chapman, 2007, p. 1911). However, "*the absolute amount of walking is extremely low for those who do not prefer a walkable environment regardless of neighborhood walkability*" (Frank et al., 2007, p. 1912).

Second, the establishments in these compact communities often cannot satisfy the nondiscretionary needs of older persons, such as doctors, clinics, and senior centers.

Third, the same mobility limitations that make driving difficult for older persons also constrain their walking. They have difficulty negotiating walking pathways in inclement weather, with slippery or hilly surfaces, obnoxious noise, inconsiderate younger walkers, smells, fast-changing street lights, or homeless persons. They worry about crime (Choi & Matz-Costa, 2017).

Fourth, studies are equivocal as to whether walking for recreational purposes is more likely in these more compact urban environments. Low-density suburban neighborhoods with less traffic, fewer traffic lights, fewer automobile fumes, safer streets, less competition for the use of walking paths and fewer street crossings, with parks, pleasant scenery, a sense of neighborhood belonging, and flatter topography might be more conducive for recreational walks, especially with a pet (Kerr et al., 2012).

And fifth, the dwellings in the most desirable walkable communities have higher owning and renting costs, making them unaffordable except to higher-income seniors.

Other connectivity behaviors of older people: when the mobility limitations of older persons matter less

Given that all transportation modes have downsides, it is not surprising that multiple studies find that at least one-third of older persons have unmet travel needs (Luiu et al., 2017). Reinforcing this conclusion is the finding that transportation requests are the leading concern of U.S. older callers to the Eldercare Locator service funded by the U.S. Administration on Aging (National Association of Area Agencies on Aging, 2017).

However, as this paper has argued, the factors influencing these unmet transportation needs are changing. More suburban communities offer their older occupants walking options. Higher shares of older women drive and Uber and Lyft make it possible for even mobility limited older persons to make out-of-home trips. New vehicle technologies—including semi-autonomous and driverless cars—should also make travel safer and easier.

Most importantly, it is no longer correct to assume that "*car access is necessary*" for older people to realize their discretionary or obligatory needs (Luiu et al., 2017, p. 502). A broad spectrum of *connectivity options* are steadily reducing the relevance of older people's mobility or out-of-home behaviors and their mobility limitations (Fig. 1). They include three distinctive strategies by which information, activities, people, goods, services, health and long-term care are delivered into the homes of older people. The following sections consider their more important strengths and weaknesses (Fig. 2).

Activities, people, goods, services, health and long-term care delivered to the dwellings of older adults

Home sharing options

Some connection strategies are not new. Older people have longtime shared their dwellings with persons both related and unrelated to them though they favor family members. Over the past decade, an average of 6% of men and 17% of women age 65 and older shared their households with family members other than a spouse. This living arrangement is more likely for those in their mid-70s or older (Vespa, 2017). Older persons are much less likely to share their households with persons unrelated to them. Over the past decade, an average of 3.5% of men and 2.6% of women age 65 and older shared their accommodations with either friends, unmarried partners, or boarders. These household arrangements are modestly more likely among those age 75 and older. Historically, these percentages have remained consistently low but recently higher shares of older persons are living with their unmarried partners (Vespa, 2017). More municipalities are also encouraging these arrangements by relaxing their zoning ordinances to allow accessory units, mother-in-law suites, or on-site cottages in their single-family zoned neighborhoods. Those pursuing these arrangements also can more easily find charitable organizations and private home sharing companies that pair older persons with appropriate boarders.

By sharing their households, older persons can often rely less on their own mobility behaviors because their housemates become their legs to the outside world. These living arrangements may also facilitate rewarding social relationships. However, these options have downsides. Loss of privacy is always a concern. Additionally, older occupants can lose control over how their dwellings look or function. Consequently, home sharing may not always be a viable choice (Golant, 2015a).

Senior cohousing arrangements occupied by an even smaller share of U.S. older persons offer another connectivity strategy (Boyer & Leland, 2018). Older people living in these closely-knit planned neighborhoods can reduce their mobility behaviors if they can depend on other residents to secure their groceries and other household essentials. These settings also provide an in situ social network of potential friendships (Glass & Vander Plaats, 2013).

Goods delivered to the dwellings of older adults

With the tremendous growth of e-commerce businesses and the Amazons and Ebays of the world, older persons can now have delivered to their homes more goods than ever before via trucks, drones, and eventually robots. Although getting products at one's doorstep is not foreign to America's retail history—remember home milk delivery and Sear's mail-order catalog—the scope of the current home delivery retail model is unprecedented. Irrespective of their mobility limitations, older persons can now receive home-delivered products, from toilet paper to raised toilet seats and drug prescriptions. Still, a substantial percentage of today's seniors are not users. They are uninterested in products they cannot touch, lack viable or affordable internet connections, are incapable of using computer-based ordering systems or are suspicious of

this new retail paradigm.

Food delivery options are especially pervasive. Older persons can now use privately-operated commercial services such as Grub-Hub, Amazon food providers, Blue Apron, Hello Fresh, and Door Dash, among many others. Of course, lower income older Americans have longtime benefited from home-delivered food programs offered under the Older Americans Act (Title III), but they can enjoy these newer food delivery options without being stigmatized as accepting welfare. The major downside: these services are usually unaffordable to these low income seniors.

Activities, people, services, health, and long-term care delivered to the dwellings of older adults

Older persons now have more in-home options to cope with their unmet health and long-term care needs without traveling to clinics or medical centers. Visits by volunteers may also relieve their loneliness. Families (informal caregivers) continue to provide most assistance including emotional supports (Golant, 2019). However, when families cannot do it all, they can benefit "*from an extensive and fast-growing infrastructure of homecare services staffed by rehab professionals, and home health and personal care aides who help them recuperate from a hospital stay or receive long-term assistance with performing their self-care and homemaking activities*" (Golant, 2017a, p. 82–83). By receiving these home care services, older persons can reduce their hospitalization and emergency room episodes (O'Brien, Fox-Grage, & Ujvari, 2019).

The newest home care models enable older persons to receive assistance from interdisciplinary teams of professionals and direct care workers (personal care aides, home health aides, and nursing assistants). For example, the CAPABLE program funded by the Centers for Medicare and Medicaid has relied on an in-home team comprised of an occupational therapist, a registered nurse, and a handyman (to make home modifications) to help older persons safely perform activities in their dwellings, such as getting upstairs, taking a shower, and walking out the front door (Szanton, Leff, Wolff, Roberts, & Gitlin, 2016).

A very small but growing share of older persons can now see a doctor in their homes. Physicians making house calls were once commonplace in the United States. In the 1930s, some 40% of primary care was delivered in the home but in the ensuing decades, such practices dropped precipitously. However, doctor home visits appear to be making a comeback motivated by claims that they yield both improved health cost savings and clinical outcomes (Kinosian, Taler, Boling, & Gilden, 2016). By 2016, doctors were making over two million house calls (Schuchman, Fain, & Cornwell, 2018).

The major limitations of these home care and physician programs are their availability and affordability. Federal and state programs offer limited funding for these services and mainly to very low income seniors. Typically, only wealthier older persons can afford to pay their out-of-pocket costs.

Activities, people, goods, services, health and long-term care delivered to old age concentrated buildings and neighborhoods

NORCs may emerge in high rise rentals, co-ops, condominium high rise buildings, in neighborhoods of single-family-owned homes and manufactured home park subdivisions. These residential concentrations or clusters of older persons enable vendors and providers who deliver goods and services to benefit from economies of scale whereby they realize outreach, cost (per commodity or service), and efficiency advantages (Golant, 2015a; Golant, Parsons, & Boling, 2010). So, for example, a service provider can make a single trip to a building or neighborhood enclave of twenty older clients and more efficiently and less expensively target their needs as opposed to spending the fuel and time to target the same number of recipients who are geographically dispersed across multiple and spread-out suburban locales.

These residential enclaves of old also offer ready-made social networks for their occupants and help compensate for their reduced out-of-home social activities. Not all experts agree, however, that these age-segregated social arrangements reduce the likelihood of social isolation and loneliness (Portacolone & Halpern, 2016).

Two notable exemplars of NORCs exist today that are linked or integrated with supportive services for their older occupants. The first includes the affordable rental projects sponsored by federal housing programs that offer their lower income elder occupants on-site social work counseling (e.g., service coordinators), communal meals, recreation activities, and health and wellness services (Golant et al., 2010; Spillman, Biess, & MacDonald, 2012). The second includes elder villages that are neighborhood-based organizations created and membered by their middle-class residents who craft their own service support networks and offer their members easier and more affordable access to community-based services and supports. This model depends heavily on volunteers to help these residents (Scharlach & Lehning, 2016).

Studies report that older residents occupying NORCs linked with services are satisfied with their accommodations, feel more independent and have fewer hospitalization or emergency room visits (Golant, 2015a; Golant et al., 2010; Spillman et al., 2012). However, these service-delivery strategies may not offer enough supportive services to enable their residents to cope with more severe mobility limitations (Golant, 2015a). Permanent funding streams from the public or nonprofit sectors are often unavailable to fund these NORCs with the result that they are continually struggling to find sources of financial support.

Activities, people, services, health and long-term care delivered to the dwellings of older adults by information, communication, and robotic technologies

Personal business

The digital economy and internet connectivity has made it possible for older persons to conduct much of their personal business without leaving their homes. They can now receive and deposit their Social Security checks, pay bills and mortgages, manage their bank accounts, and renew their driver's licenses, while sitting at their computers.

Information, entertainment, and learning

Internet connectivity and the transmission of audio, video and data information now enable older Americans to access new sources of information and self-help activities (Baker, 2013). They can easily access distance learning opportunities and on-demand leisure activities. Online streaming providers such as Amazon and Netflix offer almost limitless home entertainment experiences. Voice-controlled speakers such as Amazon's Echo and Google's Assistant can play music, read the news, set alarms, provide task reminders, and answer questions. Although still at an embryonic stage, virtual reality applications allow older people to engage in real-world recreational and leisure experiences—from fitness-based activities to visiting exotic places—even when confined to their homes (Roberts, De Schutter, Franks, & Radina, 2019).

Social networking

Critics argue that older persons who occupy the built environments of today's suburbs are more at risk of feeling socially isolated and lonely than their city counterparts (Molinsky & Forsyth, 2018). However, older adults now have many opportunities to maintain "*intimacy at a distance*" social relationships in real time. Textual communication alternatives, such as emailing and instant messaging, enable constant contact with their most valued significant others. Older users of Facebook, for example, can bond with younger relatives, see their photos, and learn about their lives without revealing their own vulnerabilities (Jung, Walden, Johnson, & Sundar, 2017). Their ability to choose the timing and length of these real-time interactions enables them to feel more competent and in control (Chen & Schulz, 2016; Golant, 2015b).

When they seek communication alternatives that provide the benefits of face-to-face interactions, they can turn to skyping and facetiming (Teo, Markwardt, & Hinton, 2019).

A growing number of robot prototypes, such as the ParoTherapeutic (baby seal) Robot, can function as social companions or as "*social interaction partners*" (Abdi, Al-Hindawi, Ng, & Vizcaychipi, 2018, p. 2) to help older persons combat loneliness and depression. Older persons adopting these devices have improved their communication skills, felt less lonely, and experienced greater well-being (Abdi et al., 2018).

Smart homes and telehealth technologies

Home-based digital technology solutions are also reducing the need for out-of-home travel (National Science & Technology Council, 2019; Satariano, Scharlach, & Lindeman, 2014). These smart home digital devices operate with various types of sensors (e.g., passive infrared, radio frequency, pressure, accelerometer-based, video and motion detectors) and are incorporated in smartphones and watches, but also embedded in clothing attachments, necklaces, belt buckles, and inserted in walls and furniture (e.g., beds). Robots that are human-like or pet-like in appearance may incorporate many of these sensor types (Shishehgar, Kerr, & Blake, 2018).

These devices monitor, evaluate, and respond to the activities and behaviors of older persons. When they detect actions outside of normal limits, these devices "passively" communicate alerts in real time to family members or remote monitoring centers staffed by medical or care staff. Consequently, older persons themselves do not have to trigger an alarm or rush to an emergency room. These devices can detect a wide range of their potentially dangerous or limiting mobility behaviors including irregularities in gait behavior, fall detection, wandering behaviors, or "unhealthy" activities, such as staying overly long in bed, going to the bathroom frequently, not opening a refrigerator, or failing to communicate with friends and family (van Hoof, Kazak, Perek-Białas, & Peek, 2018).

Home telehealth or telemedicine devices enable older people to receive medical diagnoses and care once only available in a clinical or hospital setting (Dorsey & Topol, 2016; Quinn, O'Brien, & Springan, 2018). These devices also rely on sensors, but they monitor, assess, and respond to the physical health conditions of older persons. Along with smartphones and watches, Bbody-implanted epidermal, tissue-embedded and ingestible sensors measure their physiological functioning (Reh, Korenda, & Cruse, 2016). A variety of telecommunication technologies make this remote care possible. These variously rely on telephones (e.g., interactive voice-response system collecting patient information), smartphones and tablets (e.g., communicating diagnostic information and therapeutic solutions), but also videoconferencing connections that allow two-way synchronous interactions between clinicians/providers and patients/family members (National Science & Technology Council, 2019).

Older persons benefit in three ways from these telehealth devices. First, they receive information that prevents problems before they happen (e.g., vaccination and medication reminders, exercise directives, and nutrition information). Second, they have their health conditions continually monitored in real-time through measurements and evaluations of vital diagnostic indicators such as blood sugar, blood pressure, respiratory functioning, and allergic reactions. And third, when these devices detect problems, older persons are offered in-home management guidance and therapeutic solutions.

Some critics argue that such remotely delivered health care can never adequately replace in-person visits with health care professionals. They claim that while good at detecting and responding to clinical indicators, they cannot take into consideration the motivational and emotional responses of older patients that are often crucial to diagnosing and responding to their health conditions. Others counter that if older persons lack travel alternatives to reach their doctors and medical professionals, the "*provision of care at a distance*" will be lifesaving (Dorsey & Topol, 2016, p. 159).

The receptiveness of older adults to internet and digital connectivity

Older persons, especially the chronologically oldest, lag behind younger persons as adopters of these innovative technologies. However, it would be inaccurate to depict them as computer- or technologically-illiterate. A 2016 survey reported that among age 65 and over households, 66% had a desktop or laptop computer, 49% had a smartphone and 67% had a broadband internet subscription. Moreover, these rates are continually rising (Ryan, 2017).

Still, significant percentages of older people have unaffordable or poor internet connections. They are not convinced that these technological innovations are efficaciousness. They are less open to or afraid of new ideas (Golant, 2017b; Peek et al., 2014). Orlov (2019, p. 5) succinctly observes that "*device complexity, price, poor usability, rapid obsolescence combined with lack of standard professional training have created big barriers to broadening usage of an aging population, particularly for individuals age 75+*." Older persons also are afraid of the unintended and harmful consequences of adoption, that is, their *collateral damages* (Golant, 2017b). They worry about giving too much power or control to anonymous evaluators who can make life-changing decisions (Golant, 2015b). They fear family members will be less available as caregivers because these new technologies will reduce the need for their assistance. They worry about losing their privacy and fear that if they expose their vulnerabilities, they will have to transition to less desirable senior care facilities. And they fear the dehumanizing effects of these devices and the dangers of lost human contacts (Chen & Chan, 2013; Lorenzen-Huber, Boutain, Camp, Shankar, & Connelly, 2011).

Conclusion

Critics argue that the low density, sprawling residential, and car-dependent built environments of suburban communities are the worst places for older persons to live when they lose their ability to drive and cannot conduct out-of-home activities. It is essential to address this claim because tomorrow's growing population of aging baby boomers will primarily be suburban dwellers. Adding urgency is that by 2040 well over half of the age 65 and older population will be in their mid-70s or older and at higher risk of having mobility limitations.

This paper argued that this pessimistic assessment is unfounded for three reasons. First, it fails to recognize the many factors that will make it easier and safer for older persons to travel to their urban and suburban destinations. A higher share of older women will possess driver licenses and all older persons, even those with physical and cognitive impairments, will benefit from ride-sharing options such as Uber and Lyft and driver-friendly, technologically advanced vehicles, including semi-autonomous and self-driving cars. Second, a growing number of suburbs will have built environments that resemble New Urbanism communities because their commercial districts will be within walking distance of their residential areas, while others will offer public transit.

A third influence will especially blunt the arguments of the suburban critics. Older people will rely less on their own travel behaviors to satisfy their unmet needs. To encompass these newer access strategies, the paper introduced the theoretical constructs, *connectivity options* and *connectivity behaviors*. These include the multiple ways by which older persons can now have information, activities, goods, services, and care delivered into their own homes and enjoy in situ social relationships to minimize feelings of loneliness and social isolation. As higher shares of older persons occupy NORCs and are concentrated or clustered in the same buildings or neighborhoods, it becomes economically and organizationally more feasible for older suburban occupants to benefit from these new delivery strategies.

Overall these new individual-environment connections will result in an older suburban population that is far more self-reliant and less constrained by their mobility limitations. Moreover, unlike prior delivery and travel strategies—such as the government supported meals on wheels program or paratransit services—older persons will enjoy more flexibility and less negative stigma when they access their

activities, products, services, and care.

These connectivity solutions are far from ideal. They will not benefit all the suburban old. Many will be unavailable (at least in the short-term) to those who cannot afford or distrust the new travel options or who are unable or afraid to use the new home delivery strategies such as e-commerce, digital, internet, smart home and telehealth technologies. In particular, those who are foreign born, with lower incomes, less education, and the most physically and mentally frail may be unable to reap fully their benefits. And older people will resist adopting even the most efficacious and usable technological solutions because they worry about threats to their privacy and losing control over their health and care decisions. Yet, all together, both these traditional and newer ways by which older persons will access their suburban environments significantly weaken the arguments of the suburban critics.

The scope and potential of these connectivity options demand that we rethink what constitutes an age-friendly community. Consider the mission of the World Health Organization (World Health Organization, 2007, p. 1):

> "*An age-friendly city encourages active ageing by optimizing opportunities for health, participation and security in order to enhance quality of life as people age.*"

At issue is what constitutes "*optimizing opportunities*" that will ensure that the largest share of older adults experience independent, healthy, active, and enjoyable lives (Golant, 2014). Critics argue that our suburban elders should pack up en masse and move to higher density city locations (Segedy, 2018, September 14). More realistically, this paper proposes that we should refocus our planning and action efforts so that our newest travel and home-delivery solutions better enable older persons with mobility limitations to access their obligatory and discretionary goods, services, and care and maintain healthy social relationships. Rather than fixing broken sidewalks, we should educate older people on the benefits of telehealth technologies and how to use them. Rather than increasing the availability of para-transit alternatives, we should find ways to make ride-sharing services (e.g., Uber & Lyft) more hospitable, affordable and easier to use. Rather than making public transit more available, we should put more government funding into computer training and internet accessibility. Rather than pushing home modifications, we should make our food delivery options and smart house technologies more available, affordable, and easier to use and turn our less educated and lower income elders into consumers (Lindeman, 2017). Our age-friendly initiatives must keep pace with the rapidly changing ways that older people will seek to access their environments to improve the quality of their lives and age in place successfully.

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