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# Community Investment in the Digital Divide Pays Dividends for Years to Come

**Paper Category:** Research-in-progress

## **ABSTRACT**

As the COVID-19 pandemic has led to unprecedented trials experienced by almost every population in the way of public health, food systems, businesses and families, Information and Communication Technologies (ICT) have helped to mitigate many challenges. The hope of the many academic research efforts taken during this time will help those in civic authority understand these impacts as civic leaders make decisions about the areas of society and the community that need emergency funds and how to allocate future expenditures to best serve the populations within the community. At-risk populations that have limited or no access to the Internet / ICT or who lack the skills to effectively use it can fall into a state of social isolation which prior research has shown can have costly health implications such as an increase in cardiac disease, diabetes and liver disease which is due to lack of exercise and depression brought on by the isolation. An investment in ICT now will strengthen communities and families. This research in progress paper investigates the barriers to getting ICT to at-risk populations and the present and future costs to society for failing to do so. Finally, several implications will be extracted, particularly those that will become part of a Strategic Framework that can be implemented in every city across the United States to pinpoint at-risk populations and define the best remedies per demographic to bridge the digital divide so that every population is connected to their caregiver network and the latest health information.

## **Keywords:**

Societal impact of COVID, Social isolation, Disease, Older adult population, Digital divide, Social exclusion theory

## 1. INTRODUCTION

As digital technology adoption has increased across the globe at a breakneck pace, there have been gaps leading to certain demographics and communities being left out (Graham, 2011, Philip et al., 2017, Riddlesden and Singleton, 2014). The introduction of COVID has caused schools to increase their reliance on the use of cloud-based online-learning platforms, 5G technology, mixed reality, interactive apps, synchronous face-to-face video, and live radio and television for educational delivery in the U.S., China, and Japan (Vishkair, 2020). For most of the population the emergence of the information age and an exponential growth of digital technology has ensured that information is more readily accessible (Irish Times, 2021). While the coronavirus crisis has accelerated the uptake of digital solutions, tools, and services for some populations, many people within the most at-risk populations remain unconnected, revealing just how far behind many are (“Coronavirus Reveals Need to Bridge the Digital Divide | UNCTAD” n.d.). Understanding how to pinpoint these populations by census map and quickly close the gaps with the right ICT solution will be critical to a full recovery of our communities. Preliminary research shows a spike in social isolation due to COVID lockdowns and fear of getting the disease. This isolation if not resolved via human connection at least by ICT can lead to serious diseases that will financially devastate families and communities. Prior literature has increased our understanding of the various facets and factors of the digital divide. The problem involves not only access to information and digital communication resources, it involves language, socioeconomic standing, and culture. Bridging these divides is critical for sustainable digitalized societies (Vassilakopoulou and Hustad 2021). During the past two years close to three billion people around the world have been confined to their homes causing some families to invest in the right ICT to bring their family members closer. However, many populations of senior adults who live alone and cannot receive visits from their families don’t have access or the skills to utilize technology solutions (Galdón 2020). Civic leaders of rural areas implement broadband initiatives to help make technologies accessible yet availability alone doesn’t bring about digital inclusion and engagement with new digital technologies (Roberts et al. 2017). The 2015 US Census Bureau indicates that 73% of US homes had home-internet access (Census Bureau, 2015). Once this data is broken down by demographic group, rates of home-internet accessibility show significant disparities based on economic status and race. Just less than half of

households with annual family incomes less than \$20,000 have home-internet access (Rothschild 2019).

This investigation is important because it can provide guidance to state and local civic leaders who must prioritize limited resources for tackling the variety of problems caused by the pandemic as they face communities struggling to return to normal. It will provide a blueprint for quickly getting at-risk populations functioning with ICT. Further, if communities fail in the effort to get the entire population across the digital divide, the populations left behind will experience an increase isolation and negative emotions during times of stress regardless of the cause. Although it's hard to precisely measure "isolation", prior research has indicated that many adults aged 50 and older who are socially isolated are also putting their health at risk including:

- 50% increased risk of dementia (Lara et al. 2019)
- 29% increased risk of heart disease (Valtorta et al. 2016)
- 32% increased risk of stroke (Valtorta et al. 2016)
- higher rates of depression, anxiety, and suicide ("Loneliness and Social Isolation Linked to Serious Health Conditions" 2021).

This impact raises several more important questions. The first concerns the barriers that keep certain populations from having the skills and access to the technologies that other people utilize with minimal effort. Other questions concern what specific technologies are the fast track to bridging the digital divide per demographic? What factors of technology adoption are unique per demographic? Can technology adoption be modelled per demographic?

Recently, several researchers have investigated a variety of factors that contribute to the digital divide to uncover why it persists. For example, some researchers looked at the issue to ascertain barriers for adopting telehealth systems for patients of free clinics (Ramsetty & Adams et al., 2020). Other research considers factors surrounding the adoption of healthcare technology and health related digital devices (Winkle, et al., 2017). Still further studies have considered the factors of technology adoption for older adults which are technology-specific such as a study on the response of older adults to virtual reality (Roberts, et al., 2019) or a study of online shopping habits of older adults (Wu & Song, 2019). However, there is no research to our knowledge that considers a range of barriers over a breadth of technologies. Examining this issue will help to understand per demographic which are the various barriers that need to be bridged to eliminate

the digital divide be they cultural, reach, income related or any other barrier factor. We propose that social exclusion theory, a multidimensional concept, that goes beyond material poverty and associates social exclusion with exclusion from social participation, cultural and structural processes, opportunities to build human capital, access to services and power structures, as the underlying conceptual framework for the intra city digital divide in this study.

The remaining sections of this paper are organized as follows. In the next section, we review Social Exclusion Theory which has previously been associated with unemployment, poor job skills, low income, poor housing, and neighborhoods that lack security and poor family structures (Social Exclusion Unit, 1998). Subsequently, we review the literature concerning key risk factors and subsequent harm to at-risk populations and the community should we fail to reach these populations. We then focus on the starting point of this research effort, analyzing the data collected by the local partner organizations in San Antonio to develop the groundwork for a research effort to identify the various at-risk populations and the barriers that have precluded them from the best ICT solution for their health needs and societal support.

## **2. SOCIAL EXCLUSION THEORY**

Levitas (1998) defined social exclusion theory within the broader dialogue of redistribution, moral, and social integration discourses that is concerned with inequality and poverty, structural oppression as opposed to moral condemnation of disadvantage groups, and paid work. Miliband (2006) expanded this to social inequality as concentrated and deep exclusion. Concentrated exclusion can occur due to geographic concentration of disadvantages, while deep exclusion results due to disadvantages on multiple and overlapping levels of structural oppression that intersect along various factors. In effect, those who are socially excluded have the inability to participate effectively in economic, social, political and cultural life due to some characteristic alienation from mainstream society (Duffy, 1995), and are deprived in opportunities and resources due to structural oppression associated with being part of certain race, socio-economic status, and/or their geographical location.

The digital divide in general, is an outcome in itself as an indicator for exclusion. However, we also assess it as a result of inequality in many quality-of-life factors due to the lack of access and utilization of technology. Essentially, the digital divide represents inequality in access to technology which can improve the quality of life of residents. Those who do not have access are

digitally excluded and are prevented from broader access to resources and opportunities when compared to those who are digitally included. In terms of Sen's (1995) capabilities concepts, digital technology has instrumental relevance particularly for the older adult population allowing them to interact with their support systems and care givers and access the latest health information.

Social exclusion is an unintended outcome because of policy decisions which were enacted to protect the population from COVID. The social exclusion theory in this research is a means to understanding how lack of ICT access impacts marginalized groups within a city. Prior research found that there was a digital divide especially in terms of geography and socioeconomic status (Reddick et al. 2020). It confirmed the social exclusion theory as it relates to marginalized groups and broadband access. In that, certain disadvantaged groups within the city are just not able to afford this important technology to improve their quality of life. This is especially relevant during a crisis in this case with stay-at-home orders in San Antonio, and other parts of the U.S. with nearly a quarter of its residents with no broadband at home to complete schoolwork, work from home, connect with family members and complete other critical tasks.

Research Question: Therefore, the primary goal of our study is to understand at a census tract level which demographics are not able to utilize the Internet and the barriers that prevent them from doing so.

### **3. IMPACT OF THE DIGITAL DIVIDE DURING COVID**

Prior research demonstrated that the digital divide is not exclusively a rural/urban digital divide but can also occur in an intra-city context (Reddick et al. 2020). This is especially evident in low-income areas within the city because they have substantially lower broadband adoption rates. The results of this study demonstrated the importance of looking more deeply at issues of social exclusion of marginalized groups and the affordability of broadband and other ICT access intra-city. This research effort draws on prior research to understand the digital divide and its impact in a more granular way to develop a technology adoption framework by demographic needs that can be used across the United States. Some of the questions that need to be understood include that as most of the world went online due to COVID, are there marginalized populations for whom the digital divide is getting wider? What are the barriers that prevent all parts of a community to have equal access to technology and information? The following three

factors on the impact of social isolation on the community and its members emerged from a literature review.

### *3.1 Risk factors of social isolation on physical health*

The impact of social isolation on health and mortality has been extensively documented by literature (e.g., (Holt-Lunstad, Smith, and Layton 2010), (Marmot 2005)). Many studies have observed significant links between a person's social circumstances and their mortality. For example, in an influential early study that summarizes the findings of five prospective studies, (House, Landis, and Umberson 1988) found a lack of social relationships, and associated social isolation, to be major risk factors for health. Less socially integrated individuals were less healthy, both psychologically and physically, than their integrated counterparts and likely to die far sooner. Moreover, the researchers noted that paucity of social relationships posed a health risk that was comparable to well-established and more widely discussed risk factors such as smoking, obesity, physical inactivity, and high blood pressure.

Other research focused on the specific kinds of health problems that tend to intensify by social isolation. For example, a meta-analytic report indicated that poor social connection increased the risk of developing heart disease by 29 percent and risk for stroke by 32 percent (Valtorta et al. 2016). Another study finds that socially isolated individuals are more prone to have newly diagnosed and prevalent type 2 diabetes mellitus due to less emotional support related to important decisions and reduced practical recognition and support for the sickness in its initial stages (Brinkhues et al. 2017). Living alone is associated with a substantially increased risk of alcohol-related mortality, irrespective of gender, or socioeconomic status (Herttua et al. 2011). An additional systemic review concerning social isolation and cognitive function determined that considering specific measures of cognition, social measures were most strongly associated with measures of global cognition, followed by measures of memory, and then executive function. Sub-analyses suggested that the association between social isolation and measures of global cognitive function, memory, and executive function were similar and there was no difference according to gender or number of years follow-up (Lara et al. 2019).

H1: ICT Usage will reduce social isolation and therefore increase emotional and mental wellness.



H2: There are factors that mediate ICT Usage which must be addressed after devices and access are provided to at-risk populations.

H3: An investment in ICT training in addition to ICT device and access distribution will mediate ICT usage.

### *3.2 Risk factors of social isolation on mental health*

Research also points to a negative impact of social isolation on mental health in general. Studies have found that social contact tends to buffer social isolation and mental health but when offline contact was reduced, online contact was critical to protect emotional health. Those with limited online contact suffered a measurable decrease in mental health (Pancani et al. 2021). Yet why given the link between health and isolation are these health risks not considered as policy seeks to protect the population from COVID? Perhaps the answer is found in another research effort which indicated that people tend to underestimate the importance of social factor and the impact of social factors on the health of an individual (Haslam et al. 2018).

H4: As successful deployment of ICT reaches all members of the community the reports of social isolation and negative moods will decrease.

### *3.3 Value of the Community Partners*

Marginalized populations are difficult to reach. This research effort engages the community stakeholders at a variety of levels therefore is more likely to be effective and be sustained as the community partners are the closest to the problem and have reach into the communities affected. Older adults and families that lack disposable income find it difficult to purchase devices or gain access to broadband (West, 2015). Some of the solutions proposed to achieve higher broadband adoption rates in rural areas include government sponsored universal broadband. Should governments opt to put in place policies that provide financial support for broadband access this could go far to bridge the digital divide (Glass & Stefanova, 2010). Public private partnerships in research provide a faster track to rapidly react to the challenges of COVID-19. Community-engaged/participatory research and programmatic coalitions can reach at-risk populations and ascertain which demographics are most impacted by quarantine activities so that public policy can quickly respond to immediate and critical needs (Michener et al. 2020). What can the results of ICT research do to change perception and policy? Are these marginalized populations and the

impact of social isolation known to county officials? What is the long-term impact to the community if marginalized populations are not reached? Will there be a fiscal impact to the community should this divide not be crossed? Rapid response to these questions would seem to be crucial for efforts to promote an informed public debate around health. A systemic means to glean the demographics of those who are not utilizing ICT so that their unique barriers can be addressed is critical for ICT usage to cover the community. A technology solution that can tease out these populations, measure them and provide demographic markers and statistics to government leaders and the private organizations so that they can include these in their service offerings. These, then, are the key questions that the present research seeks to address so that comprehensive national solutions can be implemented.

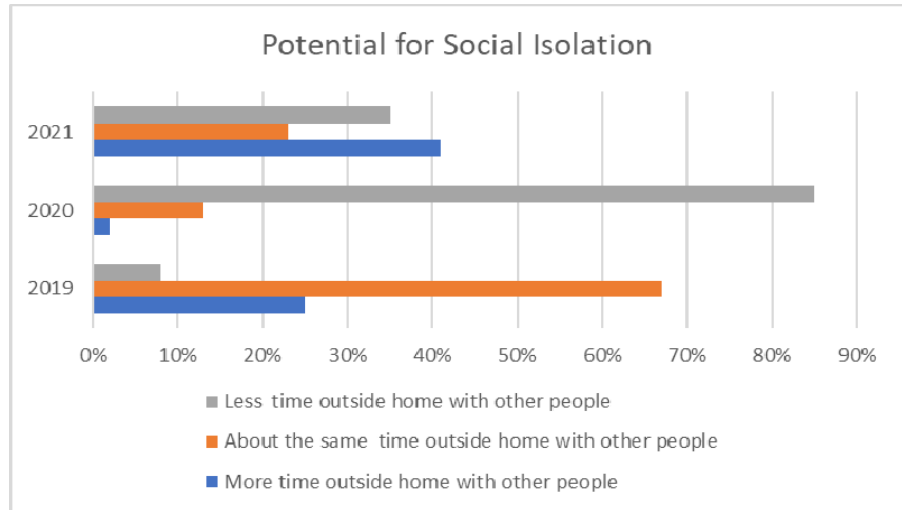
H5: A tool that helps uncover and measure hidden populations will act as a feedback mechanism to organizations and local governments to provide the resources to ensure complete ICT usage of any community.

## **4. RESEARCH METHODS**

### *4.1 Initial Insights Community Partner Data – the Problem of Isolation*

Each of the community partners in this research effort have developed programs to extend their reach into the at-risk populations of the community with ICT. OASIS has developed a national portal which serves to offer online classes for senior adults. Goodwill Industries serves the at-risk population by offering low-cost refurbished computers and computer training. The University of Texas at San Antonio Westside Community Partnerships organization has created a team of Digital Ambassadors to help marginalized populations take advantage of ICT. This “feet on the street” approach has offered unique insights pointing our research effort to better target the problems encountered by these typically hard to reach populations and provides the research team with a baseline of information from which our further research efforts may glean deeper insights into the barriers and challenges per demographic and locale of the community. The partner data collection approaches have been varied yet they were able to collect information at the source of the population impacted. The initial data from local community partners noted that between 2019 and 2020 (COVID) there was a 77% increase in the older population constituents spending less time outside their home with other people (Figure1). Other data indicates that at

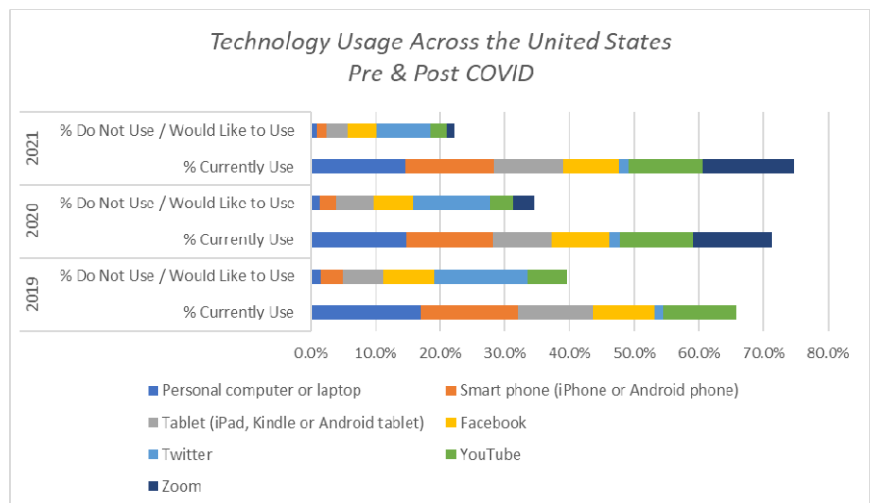
least 12% of the population surveyed by this partner do not have friends or family that they can count on in times of trouble.



**Figure 1:** In response to the survey question: “Compared to last year, are you spending more or less time outside your home with other people?”

#### 4.2 Initial Insights Community Partner Data – Lack of ICT

Data collected by the San Antonio community partners suggests that prior to COVID almost 10% of this population didn’t use a personal computer and 12% did not have use of a smart phone. Another OASIS survey taken in 2021 found improvements in that more respondents reported the use of ICT (Figure 2). Additional input concerning the older adult population indicates that while COVID has caused more older adults to utilize technology, more work needs to be done to ascertain if these efforts solved the two biggest issues: are the older



adults socially connected and do they have access to the latest

**Figure 2** A slight increase in technology use after COVID. More older adults are using ICT yet are they able to connect to their support networks at this point?

health care information.

By focusing this research effort to uncover specific barriers per demographic and locale of those who are not digitally connected, the effort will pinpoint the types of ICT that will most efficiently bridge this gap. Currently 22% of the population in San Antonio is over 55 years old (“The Demographic Statistical Atlas of the United States - Statistical Atlas”). The goal is for all adults to become connected to their own emotional support team and the best health information that is available to the digitally connected population.

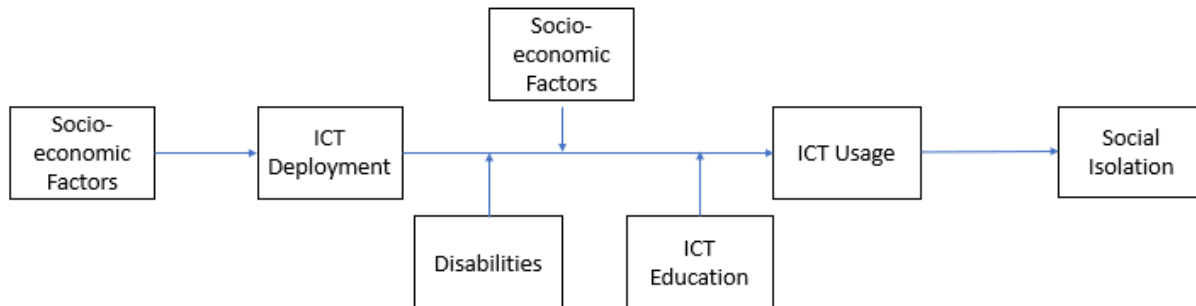
These trends are reflected in further analysis of the partner data collected from several cities across the United States. The trends indicate that between 2019 and 2021 more older adults reported that they use some form of ICT. The data also indicates that there remains a percentage of the population that does not use ICT at all and a portion of this population that would like to use technology. The data does not ascertain if the older adults are socially connected nor if they have access to the latest health care information.

#### *4.3 Research in Progress*

Prior research has indicated that those residents with less education had decreased broadband access at home, and that income, race, and ethnicity also had an impact on broadband access at home. Current research goes further to try to define, understand the barriers and measure these populations that still do not have ICT usage even as we reach the twentieth anniversary of the dot com crash. What are factors that keep them from ITC usage? Initial reports while not qualitative have indicated that disabilities are one barrier to ICT usage. Another report was that they have chosen a more isolated life to avoid being identified by society and so are paid for their labor in cash, pay their bills with a money order and so stay hidden from society at large.

The next part of the research effort will be to work with the partnerships to demark their targeted populations to ascertain what demographics are being missed. This effort will start with a focus group meeting with civic leaders responsible for broadband infrastructure improvements for San Antonio, leaders from local and national organizations that target at risk populations and the employees of the organizations that provide computer training for those who get a computer or a smart mobile device through their low-cost device programs. This should help identify the types of barriers that prevent ICT usage and provide the “markers” for the effort to study further through surveys and census reports so that we are able to define and measure these barriers so

that they can be addressed by the government and community partnerships. Given the amount of resources that are being poured into infrastructure improvements throughout the nation, it is vital to make sure this infrastructure push leads to 100% ITC usage.



**Figure 3 Barriers to ICT Usage**

Prior research has uncovered that there are socioeconomic factors that prevent ICT deployment detailed in Reddick, et al. 2020. This continued research effort will seek to measure at a census tract level at-risk populations and understand per demographic the obstacles of getting ICT Usage by the older adults and the locations most effected by the digital divide. Secondly, this effort will through surveys ascertain other barriers that may mediate ICT usage should residents have a digital device and digital access. These factors are described as factors of digital literacy. Based on the local survey and data analysis, this research effort will develop a plan for a national study on the roadblocks to enhancing scalable strategies to improve quality of life through improved community cohesiveness, and digital inclusion of divergent communities. The hope is to develop digital inclusion interventions via infrastructure and access and improve digital literacy to overcome every obstacle encountered by these populations. The key thrust areas of Civic Engagement, Social Engagement, Creative Expression, Health and Wellness and Financial Security will identify the key parameters to enhance recovery and resilience planning related to pandemics and disasters. The goal of the research is to generate user inspired scalable digital connectivity strategies around accelerating community cohesiveness, digital connectivity, literacy, public assistance services and work force adaptation for the older adult (50+) demographics with the purpose of narrowing or eliminating the digital divide.

Learning modules related to this project will be prepared to educate students and older adults on mechanisms for improving emergency resilience and a workshop will be conducted for planning the scaling of the pilot to the national level.

Research output will include

1. White papers on measures of resilience via ICT
2. Resilience building of older and disabled communities via ICT
3. Collaborative use-based research frameworks for implementing ICT that crosses the digital divide
4. Evaluation of digital interventions
5. A tool that indicates neighborhoods which lack either digital access (broadband) or devices along with the barriers for that particular demographic to be measured and addressed.

#### *4.4. Implications*

Prior research gauges the harmful impact of social isolation on the health of our older population. Investment in technology training and ICT can help those most at risk, those in lower social-economic strata and the older adult population to reduce social isolation and improve health outcomes. The initial research efforts have identified the existence of a digital divide throughout the community and prior research has shown the negative effect on health outcomes. The goal of the on-going research effort is to better understand the unique barriers for the at-risk populations and have the data to allow the communities to move from cookie-cutter ICT solutions to multi-faceted and targeted programs that will truly eliminate the digital divide and improve the health and resilience of the communities around San Antonio in while laying the groundwork for delivering interventions that can help heal communities across the United States.

## References

- Brinkhues, Stephanie, Nicole H. T. M. Dukers-Muijers, Christian J. P. A. Hoebe, Carla J. H. van der Kallen, Pieter C. Dagnelie, Annemarie Koster, Ronald M. A. Henry, et al. 2017. “Socially Isolated Individuals Are More Prone to Have Newly Diagnosed and Prevalent Type 2 Diabetes Mellitus - the Maastricht Study.” *BMC Public Health* 17 (1): 955. <https://doi.org/10.1186/s12889-017-4948-6>.
- Bureau, US Census. 2015. “2015 Data Release.” The United States Census Bureau. 2015. <https://www.census.gov/programs-surveys/acs/news/data-releases/2015.html>.
- Carney, Jan K., Hendrika J. Maltby, Kathleen A. Mackin, and Martha E. Maksym. 2011a. “Community–Academic Partnerships.” *American Journal of Preventive Medicine* 41 (4): S206–13. <https://doi.org/10.1016/j.amepre.2011.05.020>.
- Centers for Disease Control and Prevention. “Loneliness and Social Isolation Linked to Serious Health Conditions.” 2021. April 30, 2021. <https://www.cdc.gov/aging/publications/features/lonely-older-adults.html>.
- Unctad.org. 2021. Coronavirus reveals need to bridge the digital divide | UNCTAD. [online] Available at: <<https://unctad.org/news/coronavirus-reveals-need-bridge-digital-divide>> [Accessed 29 September 2021].
- Davila, Vianna. 2016. “7 Major Issues Facing San Antonio amid Population Growth.” MySA. June 28, 2016. <https://www.mysanantonio.com/news/local/article/7-major-issues-facing-San-Antonio-amid-population-8329213.php>.
- Duffy, K. (1995). Social exclusion and human dignity in Europe. Council of Europe.
- Evans, Isobel E. M., Anthony Martyr, Rachel Collins, Carol Brayne, and Linda Clare. 2019. “Social Isolation and Cognitive Function in Later Life: A Systematic Review and Meta-Analysis.” *Journal of Alzheimer’s Disease* 70 (s1): S119–44. <https://doi.org/10.3233/JAD-180501>.
- Galdón, Concepción. 2020. “The Digital Divide and The Perfect Inequality Storm.” *Building Resilience* (blog). 04 2020. <https://www.ie.edu/building-resilience/knowledge/digital-divide-perfect-inequality-storm/>.
- Gazley, Beth, and Jeffrey L. Brudney. 2007a. “The Purpose (and Perils) of Government-Nonprofit Partnership.” *Nonprofit and Voluntary Sector Quarterly* 36 (3): 389–415. <https://doi.org/10.1177/0899764006295997>.

- Glass, V., & Stefanova, S. (2010). An empirical study of broadband diffusion in rural America. *Journal of Regulatory Economics*, 38(1), 70–85. <https://doi.org/10.1007/s11149-010-9119-y>.
- Graham M. Time machines and virtual portals: The spatialities of the digital divide. *Progress in Development Studies*. 2011;11(3):211-227. doi:10.1177/146499341001100303.
- Griffin, R. Morgan. n.d. “Medical Cost of Heart Disease.” WebMD. Accessed September 29, 2021. <https://www.webmd.com/healthy-aging/features/heart-disease-medical-costs>.
- Haslam, S. Alexander, Charlotte McMahon, Tegan Cruwys, Catherine Haslam, Jolanda Jetten, and Niklas K. Steffens. 2018. “Social Cure, What Social Cure? The Propensity to Underestimate the Importance of Social Factors for Health.” *Social Science & Medicine* 198 (February): 14–21. <https://doi.org/10.1016/j.socscimed.2017.12.020>.
- Herttua, Kimmo, Pekka Martikainen, Jussi Vahtera, and Mika Kivimäki. 2011. “Living Alone and Alcohol-Related Mortality: A Population-Based Cohort Study from Finland.” *PLOS Medicine* 8 (9): e1001094. <https://doi.org/10.1371/journal.pmed.1001094>.
- Holt-Lunstad, Julianne, Timothy B. Smith, and J. Bradley Layton. 2010. “Social Relationships and Mortality Risk: A Meta-Analytic Review.” *PLOS Medicine* 7 (7): e1000316. <https://doi.org/10.1371/journal.pmed.1000316>.
- House, James S., Karl R. Landis, and Debra Umberson. 1988. “Social Relationships and Health.” *Science* 241 (4865): 540–45. <https://doi.org/10.1126/science.3399889>.
- “How Digital Technology Can Play a Role in Building Workforce Resilience.” 2021. The Irish Times. September 29, 2021. <https://www.irishtimes.com/advertising-feature/how-digital-technology-can-play-a-role-in-building-workforce-resilience-1.4459419>.
- Lara, Elvira, Natalia Martín-María, Alejandro De la Torre-Luque, Ai Koyanagi, Davy Vancampfort, Ana Izquierdo, and Marta Miret. 2019. “Does Loneliness Contribute to Mild Cognitive Impairment and Dementia? A Systematic Review and Meta-Analysis of Longitudinal Studies.” *Ageing Research Reviews* 52 (July): 7–16. <https://doi.org/10.1016/j.arr.2019.03.002>.
- Lee, Sunmin, Hee-Soon Juon, Genevieve Martinez, Chiehwen E. Hsu, E. Stephanie Robinson, Julie Bawa, and Grace X. Ma. 2008. “Model Minority at Risk: Expressed Needs of Mental Health by Asian American Young Adults.” *Journal of Community Health* 34 (2): 144. <https://doi.org/10.1007/s10900-008-9137-1>.
- Levitas, R. (1998). Delivering social inclusion. The inclusive society? Social exclusion and new labour (pp. 159–177). London: Palgrave Macmillan UK. [https://doi.org/10.1007/978-1-349-27111-1\\_10](https://doi.org/10.1007/978-1-349-27111-1_10).



- 1057/9780230511552. Marmot, Michael. 2005. "Social Determinants of Health Inequalities." *Public Health* 365: 6.
- Mayfield, Loomis, Maureen Hellwig, and Brian Banks. 1999. "The Chicago Response to Urban Problems: Building University-Community Collaborations." *American Behavioral Scientist* 42 (5): 863–75. <https://doi.org/10.1177/0002764299042005011>.
- Michener, Lloyd, Sergio Aguilar-Gaxiola, Philip M. Alberti, Manuel J. Castaneda, Brian C. Castrucci, Lisa Macon Harrison, Lauren S. Hughes, Al Richmond, and Nina Wallerstein. 2020. "Engaging With Communities — Lessons (Re)Learned From COVID-19." *Preventing Chronic Disease* 17 (July): 200250. <https://doi.org/10.5888/pcd17.200250>.
- Miliband, D. (2006). *Social exclusion: The next steps forward*. London: ODPM.
- National Academies of Sciences, Engineering, and Medicine. 2020. *Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25663>.
- Pancani, Luca, Marco Marinucci, Nicolas Aureli, and Paolo Riva. 2021a. "Forced Social Isolation and Mental Health: A Study on 1,006 Italians Under COVID-19 Lockdown." *Frontiers in Psychology* 12: 663799. <https://doi.org/10.3389/fpsyg.2021.663799>.
- Philip, Lorna, Caitlin Cottrill, John Farrington, Fiona Williams, Fiona Ashmore, The digital divide: Patterns, policy and scenarios for connecting the 'final few' in rural communities across Great Britain, *Journal of Rural Studies*, Volume 54, 2017, Pages 386-398, ISSN 0743-0167. <https://doi.org/10.1016/j.jrurstud.2016.12.002>.
- Ramsetty , Anita, Cristin Adams, Impact of the digital divide in the age of COVID-19, *Journal of the American Medical Informatics Association*, Volume 27, Issue 7, July 2020, Pages 1147–1148, <https://doi.org/10.1093/jamia/ocaa078>.
- Reddick, Christopher G., Roger Enriquez, Richard J. Harris, and Bonita Sharma. 2020. "Determinants of Broadband Access and Affordability: An Analysis of a Community Survey on the Digital Divide." *Cities* 106 (November): 102904. <https://doi.org/10.1016/j.cities.2020.102904>.
- Riddlesden, Dean, Singleton, Alex D. (2014). Broadband speed equity: A new digital divide?, *Applied Geography*, Volume 52, 2014, Pages 25-33, ISSN 0143-6228, <https://doi.org/10.1016/j.apgeog.2014.04.008>. (<https://www.sciencedirect.com/science/article/pii/S0143622814000782>).
- Roberts, Amy Restorick, Bob De Schutter, Kelley Franks & M. Elise Radina (2019) Older Adults' Experiences with Audiovisual Virtual Reality: Perceived Usefulness and Other

- Factors Influencing Technology Acceptance, *Clinical Gerontologist*, 42:1, 27-33, DOI: 10.1080/07317115.2018.1442380
- Roberts, Elisabeth, Brett Anne Anderson, Sarah Skerratt, and John Farrington. 2017. "A Review of the Rural-Digital Policy Agenda from a Community Resilience Perspective." *Journal of Rural Studies* 54 (August): 372–85. <https://doi.org/10.1016/j.jrurstud.2016.03.001>.
- Rothschild, Lauren. 2019. "US 'Digital Divide': How Internet Access Disparities Affect Resilience." Global Resilience Institute. September 13, 2019. <https://globalresilience.northeastern.edu/us-digital-divide-how-internet-access-disparities-affect-resilience/>.
- "The Demographic Statistical Atlas of the United States - Statistical Atlas." n.d. Accessed September 29, 2021. <https://statisticalatlas.com/place/Texas/San-Antonio/Race-and-Ethnicity>.
- Sen, A. K. (1995). *Inequality reexamined*. Oxford University Press.
- Social Exclusion Unit (1998). *Bringing Britain together: A national strategy for neighborhood renewal*. Cm 4045, London: The Stationery Office.
- Valtorta, Nicole K., Mona Kanaan, Simon Gilbody, Sara Ronzi, and Barbara Hanratty. 2016. "Loneliness and Social Isolation as Risk Factors for Coronary Heart Disease and Stroke: Systematic Review and Meta-Analysis of Longitudinal Observational Studies." *Heart* 102 (13): 1009–16. <https://doi.org/10.1136/heartjnl-2015-308790>.
- Vassilakopoulou, Polyxeni, and Eli Hustad. 2021. "Bridging Digital Divides: A Literature Review and Research Agenda for Information Systems Research." *Information Systems Frontiers*, January. <https://doi.org/10.1007/s10796-020-10096-3>.
- Vishkaie, Rojin. 2020. "The Pandemic, War, and Sanctions: Building Resilience for the Digital Divide in Education | ACM Interactions." August 2020. <http://interactions.acm.org/archive/view/july-august-2020/the-pandemic-war-and-sanctions>.
- West, D. M. (2015). *Digital divide: Improving Internet access in the developing world through affordable services and diverse content*. Center Technology Innovation at Bookings.
- Winkle BV, Carpenter N, Moscucci M. Why aren't our digital solutions working for everyone? *AMA J Ethics* 2017; 19(11): 1116–24.
- Wu, Juanjuan & Sanga Song (2021) Older Adults' Online Shopping Continuance Intentions: Applying the Technology Acceptance Model and the Theory of Planned Behavior,

International Journal of Human-Computer Interaction, 37:10, 938-948, DOI:  
10.1080/10447318.2020.1861419.