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Research Report

Older Adults' Loneliness in Early COVID-19 Social Distancing: Implications of Rurality

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Abstract

Objectives: Older adults face greater health risks due to coronavirus disease 2019 (COVID-19), yet preventative social distancing measures may cause increased social isolation, potentially heightening risk of loneliness. In this mixed-methods study we examine changes in older adults' loneliness due to social distancing, explore variability in perceptions, and identify whether such changes differ by rurality.

Methods: A Midwestern sample of 76 older adults aged 70–97 (mean age = 82; 74% female; 95% White; 39% rural) completed a phone interview about their experiences with social distancing due to COVID-19. Interviews were conducted during early weeks of regional social distancing. Participants completed retrospective and current assessments of loneliness, including providing explanations of their responses.

Results: On average, loneliness increased during early social distancing, yet variability was evident. Those experiencing increased loneliness described a feeling of loss or lack of control, whereas those experiencing stability in loneliness identified adaptability in social connection modes or feeling accustomed to social isolation. Rural older adults experienced a significantly smaller increase in loneliness than their nonrural counterparts.

Discussion: These findings suggest nuanced experiences among older adults, but generally negative implications for loneliness. Interventions to address older adults' social isolation and loneliness during COVID-19 are warranted.

Keywords: Aging, Coronavirus, Loneliness, Rurality

To date, the coronavirus disease 2019 (COVID-19) pandemic has led to more than 525,000 deaths in the United States (Johns Hopkins University, 2021), with older adults at greater risk of severe health outcomes and mortality (Promislow, 2020). To reduce disease spread, public health measures were implemented, including social distancing recommendations to reduce community spread (Courtemanche et al., 2020). While social distancing can help curtail the spread of COVID-19, other unexpected impacts for older adults, such as increased feelings of loneliness, warrant concern (Vahia et al., 2020).

Loneliness is a threat to well-being across the life span, yet has unique implications for older adults (Hawkley & Cacioppo, 2010). Among older adults, loneliness is associated with increased risks of depression, poor cognitive functioning, negative physical health outcomes, and mortality (e.g., Barg et al., 2006; Luo et al., 2012; Rafnsson et al., 2020). Various sociodemographic and contextual factors, such as gender, marital status, living alone, and functional health, have been linked to loneliness in older adulthood (Hawkley & Kocherginsky, 2018; Rantakokko et al., 2014; Savikko et al., 2005). Rurality is another contextual factor

that affects risk of later-life loneliness; however, research is inconclusive about whether urban or rural older adults report greater loneliness (Drennan et al., 2008; Henning-Smith et al., 2019; Menec et al., 2019; Savikko et al., 2005). Rural older adults' smaller communities may provide rich and enduring social connections, yet fewer opportunities for formal social participation (Burholt & Scharf, 2014; Vogelsang, 2016). Thus, rurality has the potential to be either protective or detrimental for loneliness.

Older adults are already at increased risk for social isolation and loneliness (Hawkley & Cacioppo, 2010), but the requirement to social distance due to COVID-19 heightens that risk (Vahia et al., 2020), potentially leading to adverse physical and mental health outcomes. Prior research has suggested that environmental barriers to leaving the home (i.e., winter weather) increase the likelihood of older adults' loneliness (Rantakokko et al., 2014). We propose that COVID-19 social distancing recommendations may act similarly by forcing unexpected social isolation. The current study aimed to examine changes in older adults' loneliness from prior to during early stages of recommended COVID-19 social distancing and qualitatively explore perceptions of shifts in loneliness. Additionally, given that approximately one-quarter of older adults live in rural areas (Rural Health Information Hub, 2020), we examined whether such changes varied by rurality in order to understand social distancing affects within unique geographic contexts.

Method

Participants

A convenience sample of 76 older adults (aged 70–97; mean age = 82) were recruited from Minnesota (MN; *N* = 29) and North Dakota (ND; *N* = 47) to complete a phone interview regarding their experiences with social distancing due to COVID-19. Participants were recruited through local newspapers, regional aging-focused organizations, social media outlets, and word of mouth. The sample demographic description is provided in Table 1.

Procedure

The study design was a mixed-methods phone interview consisting of closed- and open-ended questions. The questionnaire was designed to qualitatively explore experiences related to COVID-19 including daily life, social connections, and coping, and quantitatively assess aspects of quality of life, well-being, and stress using validated measures. Procedures were approved by the Institutional Review Board of North Dakota State University. After providing consent, participants participated in a 30- to 90-min phone interview. Interviewers recorded responses to closed questions and took notes on open-ended responses. Phone interviews were recorded and transcribed verbatim. Subsequent quantitative analyses were conducted using SPSS Version 26.0 (IBM SPSS, 2019).

Phone interviews were conducted between March 28 and April 20, 2020, aligning with the beginning of social

Table 1. Description of Variables of Interest and *t* Tests for Loneliness Change (for All Participants and Stratified by Rurality)

	All (*N* = 76)	**Rural** (*N* = 29)	**Nonrural** (*N* = 47)	
	Mean (*SD*)/%	Mean (*SD*)/%	Mean (*SD*)/%	Mean differences by rurality
Age (years)	81.6 (7.4)	81.6 (6.8)	81.9 (7.7)	n.s.
% Female	72.4	79.3	69.6	n.s.
Education (years)	14.8 (2.6)	13.8 (2.2)	15.5 (2.7)	*
% Caucasian/White	94.7	96.6	93.5	n.s.
% Married/partnered	35.5	44.8	28.3	n.s.
% Lives alone	53.9	44.8	60.9	n.s.
% Employed	6.6	3.4	8.7	n.s.
% Rural	38.7			
Prior Loneliness	3.51 (1.00)	3.41 (0.91)	3.57 (1.06)	n.s.
Current Loneliness	4.68 (1.81)	3.97 (1.21)	5.13 (1.98)	**
t Tests (of prior to current loneliness)	$t(75) = -6.0^{***}$	$t(28) = -2.4^{*}$	$t(46) = -5.8^{***}$	

Notes: Age: age was calculated based on reported birthdate. Sex: participants identified their sex as male (1) or female (2). Education: participants reported their highest level of education in accordance with six categories (1 = less than high school, 2 = high school graduate/GED, 3 = some college, 4 = associate/technical degree, 5 = Bachelor's degree, 6 = graduate education) and these categories were later converted to years. Race: participants indicated their race and ethnicity with instructions to select all that apply. A dichotomous variable of White/not was subsequently created. Marital status: participants reported their marital status with five categories (1 = married, 2 = living with partner, 3 = widowed, 4 = divorced/separated, and 5 = never married), which was later recoded to married/partnered (1) or not (0). Lives alone: participants reported the number of people living in their home, which was subsequently dichotomized into lives alone (1) or not (0). Employment status: participants reported their employment status with six categories (1 = employed full-time, 2 = employed part-time, 3 = homemaker, 4 = retired, 5 = unemployed, 6 = other), which was subsequently dichotomized into employed (1) or not (1). Rurality: participants reported their zipcodes, which were subsequently categorized into rural or not based on census tracts. Loneliness: summed scores could range from 3 to 9; the observed range for prior loneliness was 3–8 and for current loneliness was 3–9. n.s. = not significant.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

distancing and shelter-in-place recommendations for both states. The first cases of community-spread COVID-19 were detected on March 15 in MN and March 18 in ND (Beer, 2020). MN implemented a stay-at-home order from March 25 to May 18; whereas ND never implemented a stay-at-home order, but nonessential businesses were ordered closed from March 28 to April 29 (Kaiser Family Foundation, 2020)

Measures

Loneliness

The three-item UCLA Loneliness Scale was used to assess loneliness (Hughes et al., 2004). Participants rate how often they feel: they lack companionship, left out, and isolated from others. Possible responses include: *hardly ever* (1), *some of the time* (2), and *often* (3). Responses are summed, with higher scores indicating greater loneliness. Participants were first instructed to think about their life prior to COVID-19 and these retrospective responses were labeled *Prior Loneliness* (Cronbach's alpha = 0.64). They later responded based on their current life during the pandemic which was labeled *Current Loneliness* (Cronbach's alpha = 0.78).

Rurality

Zip codes were used to determine rurality based on zip code tabulation areas at the census tract level (U.S. Census Bureau, 2020). Our goal was to examine community size, not county size or distance from metropolitan areas; thus, participants were categorized as rural for towns <50,000 residents and nonrural for towns >50,000 residents. State and rurality were not significantly correlated ($r(75) = -0.10$, $p = .933$).

Results

Change in Loneliness

We first examined change in loneliness from before to during COVID-19 social distancing among the entire sample. As shown in Table 1, a *t* test revealed significant difference ($t(75) = -6.0$, $p < .001$) between Prior ($M = 3.51$) and Current ($M = 4.68$) loneliness. On average, older adults expressed increased loneliness during early social distancing. However, only 54% of participants had increases in loneliness, whereas 35% had no change and 11% had decreased loneliness.

Participants were encouraged to explain their responses to the loneliness scale. Their explanations were analyzed and themes were identified to contextualize their perceptions of loneliness during COVID-19 (Ryan & Bernard, 2003). Distinct themes emerged and relevant quotations representing varying perspectives are presented in Table 2. Two themes arose for those experiencing increased feelings of loneliness: *lack of control* and *feelings of loss*. For *lack of control*, participants commented on their struggles related to being forced into isolation as opposed to making their own choice to be alone. The *feelings of loss* theme suggested participants felt they were missing out or losing key aspects of their social engagement due to the pandemic. For those experiencing decreased or no change in feelings of loneliness, two themes arose: *accustomed to being alone* and *staying connected using phones/technology*. The *accustomed to being alone* theme consisted of comments related to feeling comfortable with solitude or being used to independence. Participants noted the ability to stay connected through phone calls, videochat, social media, and texting as protective for their sense of loneliness in the theme *staying connected using phones/technology.*

Effects of Rurality

The second research question examined whether changes in loneliness varied for older adults based on rurality. Loneliness change scores were calculated by subtracting Prior Loneliness from Current Loneliness (mean = 1.17, $SD = 1.70$). Rural participants (mean = 0.55, $SD = 1.24$) had lower mean loneliness change scores than nonrural participants (mean = 1.55, $SD = 1.84$). A sensitivity power analysis conducted in G*Power 3.1 (Faul et al., 2009) determined that with $N = 76$, alpha = 0.05, and power = 0.80, an effect size $f^2 = 0.08$ could be detected with nine predictors in linear regression. Linear regression analysis indicated significant changes in loneliness in that current loneliness increased more when participants had higher education, were not employed, and were nonrural (Table 3). Thus, rural participants had lower risk of increasing loneliness than nonrural participants. Change in loneliness did not vary by age, sex, White (race/ethnicity), married, or lives alone.

Discussion

The current study confirms expectations that older adults' loneliness would increase due to social isolation resulting from COVID-19 (Vahia et al., 2020); yet, simultaneously these findings highlight variability in experiences, emphasizing the importance of recognizing individual differences among older adults. On average, loneliness increased, suggesting that barriers to social participation impact older adults' loneliness risk (Rantakokko et al., 2014). However, approximately half of the sample reported increased loneliness, indicating diversity of individual experiences. By highlighting such nuanced experiences, our findings support calls from gerontologists emphasizing the need to recognize variability among older adults during this pandemic (Ayalon et al., 2020).

By examining participants' qualitative comments, these findings provide depth and meaning to differences in older adults' perceptions. Sentiments of lacking control and loss were

Table 2. Qualitative Quotes of Participant Perceptions to Contextualize Change in Loneliness

Representing increased feelings of loneliness	Representing unchanged or decreased feelings of loneliness
Lack of control:	**Accustomed to being alone:**
"We really weren't concerned about not being with people. Because we had a choice if we wanted to be alone that day or if we wanted to do things that day. But now when we can't do it, it's very difficult … I could stay in my home for two or three days at a time and never even think about not being able to go out, but now when I can't go out it's very difficult."	"Well, I don't really think I lack [companionship] because I can always call someone. And it's not that much different than it was before except that I don't want to go and expose myself and bring something home. So I don't …. being left out and just knowing that there's no possibility are two different things. I guess I don't really feel left out because I know it's not the thing to do."
"Because we can't be with people or go to things, you feel very alone, and it's nothing about you, it's just that's the way it is right now … When you're used to doing things and going places and all of a sudden you can't, and I think ... If I were home and I wasn't under quarantine, I probably wouldn't even think about it, but because we're under quarantine and I can't do it, I think about it more … Under normal circumstances you probably wouldn't even think about not going anyplace or doing anything or something, but because you can't do it you think about it more."	"It's really not a whole lot more different with this pandemic than my life ordinarily is. You know? As far as the socialization."
	"That doesn't bother me at all because I'm used to being alone. Even when I was married, I was alone because he was always gone. So I've always been all by myself except for my son, and I was always alone, so I always had to take care of myself. I'm very independent."
	"Sometimes I feel like I've been included too much. Like I said, sometimes I get included a little bit more than I'd like."
Feelings of loss:	**Staying connected using phones/technology:**
"Well, I don't like being alone all the time, no. But I can cope, I hope. I hope I can keep on coping. I think I have been for three weeks now. But it's not the way I like it because I like people, and I like to be around people …"	"… As long as I'm getting calls. Because when they come to visit, they can't stay that long anyhow. Because they've got lives of their own, and ... I miss it a little bit, sure. But I don't cry over it. I'm telling you right now, I'm not crying over anything, yet. The time might come if it goes on too long. Who knows?"
"Well, you know that's also a symptom of aging. There's nothing but losses one after the other … So I don't think that I felt it as abruptly to begin with. Because, I still had the internet, I had FaceTime, I could call my kids. It was not a feeling that was extreme isolation back then."	"Well, I'm not really lacking companionship. You can't say that you are when you can talk to people on the phone. You still have companionship, you just literally can't see them. Yeah. I don't even feel sorry for myself. The whole world's in this boat."
"I would liken it to being somebody that had their freedom and their home, and then all of a sudden have to go to a nursing home and having all that freedom taken away … I think that's how older people that end up in nursing homes sometimes feel that there's a lot of things that have been taken away from them because of this. So that's kind of the way I liken it."	"I don't really feel left out. I think there are so many things, whether it's through Facebook or through just texting or whatever, that we can connect that I don't need that physical necessarily connection."

prevalent perceptions among older adults expressing increasing feelings of loneliness due to COVID-19. These were perceptions after a short time; it is important to examine whether these individuals continue to feel elevated or worsening loneliness over time. This is especially significant given that prior research indicated that older adults' long-term loneliness due to the Severe Acute Respiratory Syndrome epidemic in China resulted in increased suicide risk (Cheung et al., 2008). In contrast, older adults whose loneliness remained stable expressed an ability to adapt well and stay connected virtually, or noted that social distancing had not drastically changed their social participation. Future research should explore characteristics of adaptability and resilience that may be protective against loneliness during social distancing.

Interestingly, reports of change in loneliness differed by place, with nonrural older adults reporting greater increases in loneliness than their rural counterparts. This may be consistent with recent research suggesting lower loneliness in small towns compared to urbanized or very rural locations (Henning-Smith et al., 2019). Most rural participants do not live in remote rural areas, but rather in small towns located within 60 min of an urban area. In this context, they may benefit from the close-knit community of a small, rural town, but also accessibility to urban resources such as health care or social services. Small-town living may be protective for older adults during this pandemic, perhaps due to greater independence, lower expectations of social interaction, or better community responsiveness. However, it is important to note that variability in definitions and measurement of rurality may affect findings. Further research is needed to understand the nuanced ways geographical differences impact older adults' coping and well-being during COVID-19.

Table 3. Relationship of Rurality With Loneliness Change Score Controlling for Other Sociodemographic Factors

	Loneliness change score		
	B	*SE B*	β
Age	–0.01	0.03	–0.03
Sex (*1 = male*, *2 = female*)	–0.16	0.46	–0.04
Education	0.34	0.14	0.33*
White (*1 = White race*, *0 = not*)	1.21	0.96	0.14
Married (*1 = married*, *0 = not*)	0.82	0.66	0.23
Lives alone (*1 = alone*, *0 = not*)	0.39	0.63	0.11
Employed (*1 = employed*, *0 = not*)	–2.36	0.80	–0.34**
Rurality (*1 = rural*, *0 = not*)	–0.93	0.40	–0.27*
R^2	0.26**		

Notes: Loneliness change score was calculated by subtracting prior loneliness from current loneliness.
*$p < .05$. **$p < .01$.

Despite the strengths of this mixed-methods study, there are limitations. While we purposely designed this study to recruit older adults of varying ages and technology-access levels (Sands et al, 2020), this sample is small, not nationally representative, and has few men. Another limitation is the retrospective nature of the prior loneliness variable used for addressing change in loneliness. Understanding participant perceptions of change is valuable, yet comparing loneliness scores at multiple timepoints would be less subjective. Moreover, while we did not detect differences, it is important to note that interview timing (i.e., Week 1 vs 4) could affect findings. As we follow-up with participants we anticipate examining longitudinal loneliness changes during COVID-19. Furthermore, the qualitative analysis presented here is preliminary, and we anticipate analyzing these data in more depth.

In sum, these findings indicate increases in older adults' loneliness during early weeks of the pandemic. While these findings suggest nuanced experiences among older adults, it is imperative to track the implications of isolation and loneliness due to social distancing over time among diverse samples of older adults. Future research should examine interventions to reduce loneliness related to COVID-19, such as whether internet technologies like videochat or traditional communication like phone trees or letter writing are protective. This study provides valuable insight not only for researchers, but also for public health and social services practitioners, by highlighting older adults' diverse needs and experiences as well as their potential for resilience.

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Conflict of Interest

None declared.

Author Contributions

Both authors designed the study, collected data, conducted data analysis, and wrote the paper.

References

Ayalon, L., Chasteen, A., Diehl, M., Levy, B., Neupert, S. D., Rothermund, K., Tesch-Römer, C., & Wahl, H. W. (2020). Aging in times of the COVID-19 pandemic: Avoiding ageism and fostering intergenerational solidarity. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. Advance online publication. doi:10.1093/geronb/gbaa051

Barg, F. K., Huss-Ashmore, R., Wittink, M. N., Murray, G. F., Bogner, H. R., & Gallo, J. J. (2006). A mixed-methods approach to understanding loneliness and depression in older adults. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **61**(6), S329–S339. doi:10.1093/geronb/61.6.s329

Beer, R. (2020). Coronavirus: A timeline for our region. *The Fargo Forum*. https://www.inforum.com/lifestyle/health/5008322-Coronavirus-A-timeline-for-our-region

Burholt, V., & Scharf, T. (2014). Poor health and loneliness in later life: The role of depressive symptoms, social resources, and rural environments. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **69**(2), 311–324. doi:10.1093/geronb/gbt121

Cheung, Y. T., Chau, P. H., & Yip, P. S. (2008). A revisit on older adults suicides and Severe Acute Respiratory Syndrome (SARS) epidemic in Hong Kong. *International Journal of Geriatric Psychiatry*, **23**(12), 1231–1238. doi:10.1002/gps.2056

Courtemanche, C., Garuccio, J., Le, A., Pinkston, J., & Yelowitz, A. (2020). Strong social distancing measures in the United States reduced the COVID-19 growth rate: Study evaluates the impact of social distancing measures on the growth rate of confirmed COVID-19 cases across the United States. *Health Affairs*, **39**(7), 1237–1246. doi:10.1377/hlthaff.2020.00608

Drennan, J., Treacy, M., Butler, M., Byrne, A., Fealy, G., Frazer, K., & Irving, K. (2008). The experience of social and emotional loneliness among older people in Ireland. *Ageing & Society*, **28**(8), 1113–1132. doi:10.1017/S0144686X08007526

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, **41**(4), 1149–1160. doi:10.3758/BRM.41.4.1149

Hawkley, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, **40**(2), 218–227. doi:10.1007/s12160-010-9210-8

Hawkley, L. C., & Kocherginsky, M. (2018). Transitions in loneliness among older adults: A 5-year follow-up in the national social life, health, and aging project. *Research on Aging*, **40**(4), 365–387. doi:10.1177/0164027517698965

Henning-Smith, C., Moscovice, I., & Kozhimannil, K. (2019). Differences in social isolation and its relationship to health by rurality. *The Journal of Rural Health*, **35**(4), 540–549. doi:10.1111/jrh.12344

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging*, **26**(6), 655–672. doi:10.1177/0164027504268574

IBM Corp. 2019. *IBM SPSS Statistics for Macintosh, version 26.0*. Author.

Johns Hopkins University. (2021). *Coronavirus resource center*. https://coronavirus.jhu.edu/map.html

Kaiser Family Foundation. (2020). *State data and policy actions to address coronavirus*. https://www.kff.org/health-costs/issue-brief/state-data-and-policy-actions-to-address-coronavirus/

Luo, Y., Hawkley, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine (1982)*, **74**(6), 907–914. doi:10.1016/j.socscimed.2011.11.028

Menec, V. H., Newall, N. E., Mackenzie, C. S., Shooshtari, S., & Nowicki, S. (2019). Examining individual and geographic factors associated with social isolation and loneliness using Canadian Longitudinal Study on Aging (CLSA) data. *PLoS One*, **14**(2), e0211143. doi:10.1371/journal.pone.0211143

Promislow, D. E. L. (2020). A geroscience perspective on COVID-19 mortality. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, **75**(9), e30–e33. doi:10.1093/gerona/glaa094

Rafnsson, S. B., Orrell, M., d'Orsi, E., Hogervorst, E., & Steptoe, A. (2020). Loneliness, social integration, and incident dementia over 6 years: Prospective findings from the English Longitudinal Study of Ageing. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **75**(1), 114–124. doi:10.1093/geronb/gbx087

Rantakokko, M., Iwarsson, S., Vahaluoto, S., Portegijs, E., Viljanen, A., & Rantanen, T. (2014). Perceived environmental barriers to outdoor mobility and feelings of loneliness among community-dwelling older people. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, **69**(12), 1562–1568. doi:10.1093/gerona/glu069

Rural Health Information Hub. (2020). *Medicare and rural health*. https://www.ruralhealthinfo.org/topics/medicare

Ryan, G. W., & Bernard, H. R. (2003). Techniques to identify themes. *Field Methods*, **15**(1), 85–109. doi:10.1177/1525822X02239569

Sands, L. P., Albert, S. M., & Suitor, J. J. (2020). Understanding and addressing older adults' needs during COVID-19. *Innovation in Aging*. Advance online publication. doi:10.1093/geroni/igaa019

Savikko, N., Routasalo, P., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, **41**(3), 223–233. doi:10.1016/j.archger.2005.03.002

U.S. Census Bureau. (2020). *ZIP Code Tabulation Areas (ZCTAs)*. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/zctas.html

Vahia, I. V., Blazer, D. G., Smith, G. S., Karp, J. F., Steffens, D. C., Forester, B. P., Tampi, R., Agronin, M., Jeste, D.V., & Reynolds, C. F. (2020). COVID-19, mental health and aging: A need for new knowledge to bridge science and service. *The American Journal of Geriatric Psychiatry*. Advance online publication. doi:10.1016/j.jagp.2020.03.007

Vogelsang, E. M. (2016). Older adult social participation and its relationship with health: Rural–urban differences. *Health & Place*, **42**, 111–119. doi:10.1016/j.healthplace.2016.09.010