


Impact of COVID-19 ‘Stay Home, Stay Healthy’ Orders on Function among Older Adults Participating in a Community-Based, Behavioral Intervention Study

Journal of Aging and Health
2021, Vol. 0(0) 1–11
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/0898264321991314
journals.sagepub.com/home/jah


Leah M. Adams, PhD¹, Nancy M. Gell, PhD, MPH² ,
Elise V. Hoffman, BS³, Laura E. Gibbons, PhD⁴, Elizabeth A. Phelan,
MD, MS^{5,6}, John A. Sturgeon, PhD³, Dennis C. Turk, PhD³,
and Kushang V. Patel, PhD, MPH^{3,5} 

Abstract

Background: Early mitigation orders for COVID-19 halted participation in community-based programs. We examined the early impact of “Stay Home, Stay Healthy” orders on functioning in older adults participating in a behavioral intervention study involving community-based exercise. **Methods:** A quasi-natural experiment, using mixed methods ($n = 39$). Participants completed interviews and questionnaires after 3–4 weeks of the Stay Home, Stay Healthy directive. PROMIS-29 outcomes were compared to pre-COVID-19 responses. **Results:** Participants had a mean age of 74.1 (6.5) years, 79.5% were women, and 20.5% were racial/ethnic minorities. Compared to pre-COVID-19, there was a significant increase in anxiety and decrease in fatigue and social participation. Thematic analysis revealed five main themes related to disruption of daily life, the emotional and physical impact of stay-at-home orders, unexpected positive outcomes, and perspectives on messaging surrounding the pandemic. **Conclusions:** Efforts to curb the spread of COVID-19 have substantially impacted the lives of older adults participating in community-based exercise.

Keywords

COVID-19, older adults, health-related quality of life, pandemic, quarantine

Introduction

In a matter of weeks, the novel coronavirus (COVID-19) infection, the disease caused by a novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Bedford et al., 2020), drastically changed the way people live. At this time (December 31, 2020), there are over 83 million confirmed cases of infection worldwide, with the largest share of cases, and subsequent deaths, occurring in the United States (US) (World Health Organization, 2020a). The first case of COVID-19 was identified in the United States in a suburb of Seattle, Washington, where an early outbreak in a skilled nursing facility was ultimately linked to over two dozen deaths (Roxby et al., 2020). In early March 2020, King County and the City of Seattle declared states of emergency, and on March 11, the World Health Organization declared the coronavirus outbreak a pandemic (see timeline in Figure 1) (Washington State Office of the Governor, 2020).

Although mortality due to COVID-19 occurs across the life span, older adults (age ≥ 65 years) are particularly vulnerable to

the virus (Shahid et al., 2020). Case-fatality rates increase with advancing age, and outcomes are typically worse for individuals with comorbid conditions, which are more numerous and severe among older adults (Shahid et al., 2020; WHO, 2020b). In

¹Departments of Psychology and Women & Gender Studies, George Mason University, Fairfax, USA

²Department of Rehabilitation and Movement Science, University of Vermont, Burlington, USA

³Department of Anesthesiology and Pain Medicine, University of Washington, Seattle, USA

⁴Division of General Internal Medicine, University of Washington, Seattle, USA

⁵Division of Gerontology and Geriatric Medicine, University of Washington, Seattle, USA

⁶Department of Health Services, University of Washington, Seattle, USA

Corresponding Author:

Kushang Patel, Department of Anesthesiology and Pain Medicine, University of Washington, 1959 NE Pacific Street, Seattle 98195-6540, WA, USA.

Email: kvpatel@uw.edu

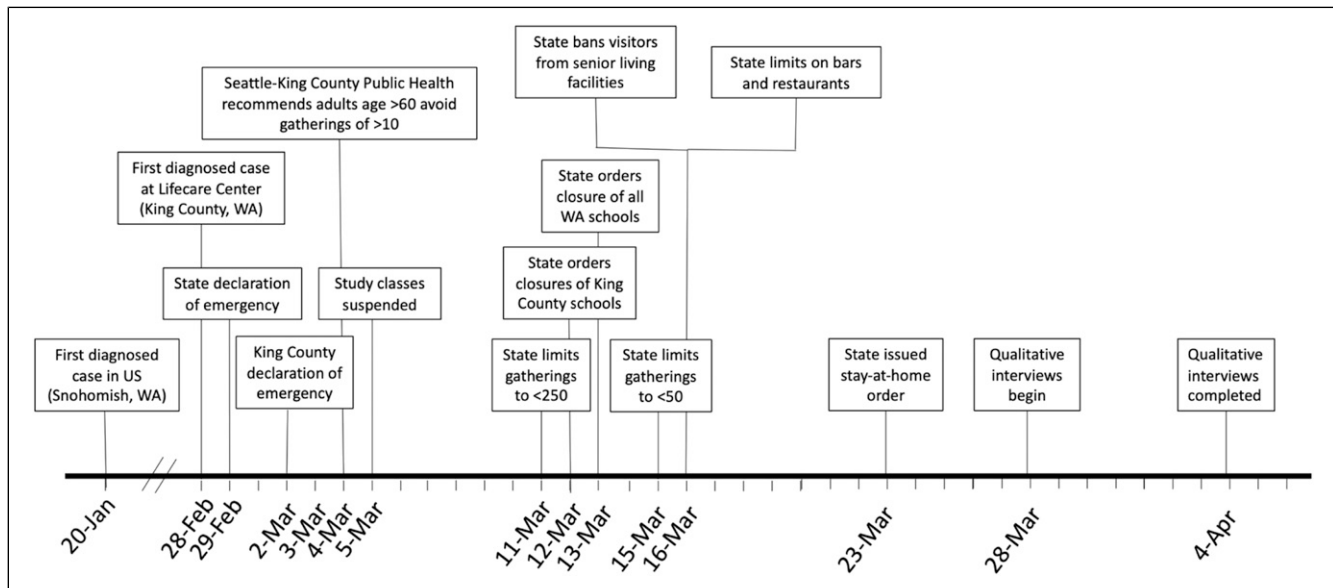


Figure 1. Timeline of COVID-19-related events in Washington state and study interviews (between January-April 2019).

addition to being disproportionately affected by COVID-19 itself, efforts to quell the virus may also have an unequal impact on older adults. Early interventions to “flatten the curve,” or slow the spread of coronavirus, centered on government mandates, such as Washington state’s “Stay Home, Stay Healthy” order issued on March 23, 2020 to: (1) close nonessential businesses, (2) stay-at-home, and (3) engage in social (physical) distancing whenever outside (Nikolich-Zugich et al., 2020). Given that a growing proportion of older adults live alone (Vespa & Schondelmyer, 2015), requirements to limit physical interaction with others and to stay at home may contribute to social isolation and poor health (Cudjoe & Kotwal, 2020).

The Impact of Social Distancing on Older Adults

Social connection and integration are critical components of well-being, particularly for older adults (Cudjoe et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020). Individuals who perceive themselves to have strong social support and to be connected to others report greater satisfaction with life, more holistic well-being, and fewer mental health concerns (Golden et al., 2009). Feelings of loneliness and social isolation are prevalent among older adults, despite the availability of new technologies that bridge physical distance between people (Cornwell & Waite, 2009). Although a majority of adults over age 64 (73%) years use the internet, rates of use in this group are lower than younger people’s, and the degree to which the internet is used for social engagement versus general tasks (e.g., news) is unclear (Gell et al., 2015; Pew Research Center, 2019). In the context of COVID-19, it is also unclear how social distancing and stay-at-home orders will affect social relationships in this group.

Beyond its potential impact on social relationships, COVID-19 and efforts to curb its spread may disrupt older

adults’ general health-related activities. The restrictions on nonessential health care, businesses, and activities may reduce the frequency with which older adults schedule and access routine, nonemergency medical care and may have an impact on their participation in community activities and use of open spaces to exercise including their participation in group-based exercise classes (Schrack et al., 2020). Indeed, some healthcare professionals and researchers have expressed concern that older adults may experience increases in sedentary time and reduction in physical activity in an effort to prevent exposure to COVID-19. For older adults with health conditions that are treated or partially controlled via physical activity, reductions in exercise may result in poorer health (Shrack et al., 2020). Unfortunately, data that directly address whether older adults are changing their physical activity in response to COVID-19 are limited (Sallis et al., 2020).

The Current Study

To contribute to understanding how COVID-19 has affected the lives of older adults in the United States, we leveraged data from an active, NIH-funded, randomized controlled clinical trial of a combined group-based exercise intervention and group-based behavioral health (or health education) program on physical activity among older adults with knee osteoarthritis (OA). Structured exercise programs are a core treatment for OA (Kolasinski et al., 2020; Nelson et al., 2014), and components of our intervention target two key concerns highlighted as potentially affected by COVID-19 as it promotes social connection via the group format of the intervention and provides scheduled physical activity via the group, community-based exercise classes three days a week.

We believe that the present study is also well positioned to highlight a different segment of the older adult population. To

date, much of the public discussion about older adults and COVID-19 has framed them as frail, helpless, or even as an impediment to return to “normal” life (Ayalon et al., 2021; Jimenez-Sotomayor et al., 2020). Such portrayals are not only inaccurate but also fail to recognize the heterogeneity within the older adult population (Pew Research Center, 2020). The sample of older adults enrolled in this study, actively managing a chronic health condition while still living in the community, represents a growing segment of the population (Deshpande et al., 2016; Hootman et al., 2016). Further, our study’s location in Seattle, Washington, offers a unique vantage point for understanding the initial impact of the pandemic in the United States as the older adults enrolled were some of the first in the country to experience the mitigation strategies and mandates (including the halting of the clinical trial) that were ultimately enacted throughout much of the United States. Finally, our access to pre-COVID-19 measures of health-related quality of life, supplemented by in-depth semi-structured interviews closely following the implementation of the stay-at-home order, provides a pseudo-naturalistic experiment to examine the impact of the outbreak on these older adults’ social, emotional, and physical health. To this end, the present study was conducted with the intent to understand the impact of COVID-19 and its mitigation efforts on older adults’ psychological, social, and physical functioning.

Method

Participants and Parent Study Procedures

Participants were enrolled in a randomized clinical trial (NCT04099394) comparing the combination of a community-based, group exercise program (Enhance[®]Fitness) with either a group-based cognitive-behavioral skills training (behavioral health) program or a group-based health education program among older adults with knee OA. Eligible participants were: (1) aged ≥ 65 years; (2) community-dwelling; (3) English-speaking; (4) diagnosed with knee OA by a physician; (5) experiencing knee pain almost daily for at least the three months prior to enrollment; (6) reporting knee pain-related difficulty with walking or climbing stairs; and (7) acknowledging knee stiffness < 30 minutes in the morning. Participants were ineligible if they had: (1) prior participation in cognitive-behavioral therapy for pain; (2) moderate to severe cognitive impairment; (3) significant, non-corrected visual or hearing impairment; (4) plans to move out of the area in the next 12 months; (5) inability to walk a quarter of a mile without assistance from another person or mobility device (use of a straight cane is acceptable); or (6) significant medical event within the past six months (e.g., heart attack, cancer, and hip fracture). Exercise classes involved strength, endurance, and balance training three days a week for 1 hour for 16 weeks. The behavioral health and health education programs each involved 10, 1-hour classes held once per week over a 12-week period (eight weekly classes followed by two biweekly ones). All

interventions were delivered at local senior centers in Seattle. Recruitment was initiated in October 2019, and interventions began for the initial cohort of participants in December 2019. Study interventions were suspended on March 5, 2020 because of Seattle-King County Public Health’s recommendation that adults aged ≥ 60 years should not gather in groups of 10 or more individuals. At that time, there were 40 older adults participating in the interventions (13 were in study week 12 and 27 were in week 5).

Procedures

Older adults enrolled in the trial were invited to participate in a semi-structured telephone interview to be conducted from March 28 through April 4, 2020, after the parent study had been suspended due to the stay-at-home order and other social distancing mandates. Participants provided consent to participate in this supplemental study, along with consent to having the interview audio recorded. Thirty-nine of the forty participants (98%) consented to participate in the COVID-19-focused interview. The interview protocol was developed by the research team and included eight open-ended questions about the impact of COVID-19, Seattle’s social distance mandate and stay-at-home order, and the suspension of the parent study on participants’ daily lives and health, along with their perspectives about how COVID-19 should be managed. Interviews were conducted by two trained study research coordinators (including EH), and all interviews were audio recorded and transcribed. The duration of the interviews was approximately 22 minutes (range: 11–38 minutes). At the conclusion of the interview, participants completed a series of self-report measures administered over the phone by study staff who directly entered responses into a REDCap database. All study procedures were reviewed and approved by the University of Washington Institutional Review Board.

Quantitative Measures

Demographics. Participants reported their age, gender, race or ethnicity, and educational attainment at study enrollment.

Baseline health status and physical activity. During the baseline assessment in the parent study, participants reported their smoking history and health conditions, and body mass index (BMI) was calculated from measured weight and height. Baseline walking capacity was assessed with the 6-minute walk test (6MWT) (Enright, 2003), which measures the distance walked (in meters) on a flat and firm surface in six minutes, and physical activity was measured with a thigh-worn activPAL3 micro accelerometer device that assessed steps per day, averaged over the course of the week preceding the exercise component of the intervention.

Health-related quality of life. Participants completed the Patient-Reported Outcomes Measurement Information System 29-Item

profile measure (PROMIS-29 v2.0) (Hays et al., 2018) at baseline and again during the COVID-19 phone interview. The PROMIS-29 assesses health-related quality of life across seven domains: anxiety, depression, fatigue, sleep disturbance, satisfaction with participation in social roles, physical functioning, and pain interference (Hays et al., 2018). Each domain includes four items with responses that range from 1 to 5; an additional pain intensity item is assessed on a 0 (no pain) to 10 (worse pain imaginable) scale. Raw scores for each domain are transformed into T scores, in which scores have a mean of 50 and a standard deviation (SD) of 10 for the general population of the United States, drawn from the 2000 US Census. Higher PROMIS T scores indicate greater endorsement of the construct being assessed; as a result, higher scores on the anxiety scale indicate more severe anxiety, while higher scores on the satisfaction with participation in social roles scale represent greater satisfaction. PROMIS-29 scale scores have demonstrated strong psychometric properties across several studies, including those with samples of older adults with multiple chronic conditions (Patel et al., in press; Working group on health outcomes for older persons with multiple chronic conditions, 2012).

Perceived risk of COVID-19. Three questions were adapted from the Perceived Risk of HIV Scale (Napper et al., 2012), which was originally designed to assess perceived vulnerability to HIV infection. The three items selected from the original scale (worry about infection, vulnerability to infection, and perceived chance of infection) had the best ability to discriminate between different levels of perceived risk in the item pool used in item response theory analyses during the measure's development. The scale has been previously adapted to measure perceived risk of Ebola infection (Kim et al., 2016).

Perceived protection efficacy against COVID-19. Participants rated their level of agreement with three statements about the ability to protect oneself from COVID-19 at three ecological levels (self, community, and country). Each item was rated on a 1 (strongly disagree) to 7 (strongly agree) scale. These items have been used previously to assess protection efficacy against Ebola (Kim et al., 2016).

Quantitative Analysis

Descriptive statistics were computed for all variables. We examined changes in health-related quality of life domains from baseline to follow-up using a series of paired t-tests. All statistical analysis was conducted with Stata SE 15 (College Station, Texas).

Qualitative Analysis

Transcripts were analyzed using an inductive approach in which themes were identified over the course of analysis (Thomas, 2006). Coding of all of the transcripts was done by the third author (EH). To calibrate our approach to analysis

given the multidisciplinary training backgrounds of our research team (e.g., psychology, gerontology, public health, and exercise science), LA, NG, and KP each independently coded the first interview and met to discuss their findings. Following this initial interview, the four authors involved in data analysis (LA, NG, EH, and KP) independently coded two additional interviews, and the codes identified were discussed and refined. Consensus was high among the coders with minor discrepancies in specific terminology used, possibly owing to our diverse backgrounds. Through discussion, agreement on acceptable terms for coding was reached, and a codebook was created based on the initial three transcripts. EH used this codebook in coding the remaining transcripts. Additional codes that emerged after the analysis of this first set of interview transcripts were discussed with the analysis team (LA, NG, EH, and KP) throughout the process. Once all transcripts were coded by EH, an additional set of transcripts ($n = 8$; 20%) was randomly selected to be coded by LA, NG, and KP. Minimal discrepancies in coding were noted during this reliability check. The analysis team met and arranged the individual codes into broader themes, which are described in the Results.

Results

Characteristics of Participants

Participants were aged 65–91 years (mean = 74.1, $SD = 6.5$ years), with 41% over age 75 years. As shown in Table 1, the sample was predominantly white, educated beyond high school, and most participants were women. Consistent with multiple morbidity rates reported among the older Medicare population in general (K. V. Patel et al., 2019), over three-quarters of the sample reported three or more health conditions. The most commonly reported health conditions, beyond OA, were high blood pressure or hypertension (56%), cancer history (39%), and osteoporosis (28%). Based on their BMI, two-thirds of the sample would be classified as obese. Baseline physical activity was moderately low, indicating participants were likely not achieving recommended physical activity levels prior to starting the exercise classes (Tudor-Locke et al., 2011). Performance on the 6-MWT also indicated that participants, on average, had moderate functional limitations.

Changes in Health-Related Quality of Life from Baseline to One-Month of Stay-At-Home Orders.

At baseline, participants reported more problems with physical functioning and pain interference than the general population (Table 2), with average scores indicating functioning .6–.8 SD poorer than the general population average of 50. Scores on all other PROMIS-29 subscales were comparable with the general population's average at baseline. There were no statistically significant changes in participants'

Table 1. Participant Characteristics.

Characteristic	No. (%) or Mean (SD)
Age in years, no. (%)	
65–74	23 (58.9)
75–84	12 (30.8)
≥85	4 (10.3)
Gender, no. (%)	
Women	31 (79.5)
Race/Ethnicity, no. (%)	
White	31 (79.5)
Black	4 (10.3)
Hispanic	2 (5.1)
Other	4 (10.3)
Education, no. (%)	
9–11 years	1 (2.6)
High school graduate	2 (5.1)
Some college/vocational	8 (20.5)
College graduate	13 (33.3)
Masters or higher degree	15 (38.5)
Smoking history, no. (%)	
Never smoked	19 (48.7)
Former smoker	19 (48.7)
Current smoker	1 (2.6)
Steps per day, mean (SD)	4292 (1552)
Body mass index, no. (%)	
18.5–24.9 kg/m ²	5 (12.8)
25.0–29.9 kg/m ²	8 (20.5)
30–34.9 kg/m ²	13 (33.3)
35.0 kg/m ²	13 (33.3)
Osteoarthritis, no. (%)	39 (100)
Rheumatoid arthritis, no. (%)	2 (5.1)
Osteoporosis, no. (%)	11 (28.2)
History of cancer, no. (%)	15 (38.5)
Asthma, no. (%)	8 (20.5)
Lung disease, no. (%)	1 (2.6)
Diabetes, no. (%)	6 (15.4)
High blood pressure or hypertension, no. (%)	22 (56.4)
Heart attack or myocardial infarction, no. (%)	2 (5.1)
Other cardiac and vascular, no. (%)	5 (12.8)
History of stroke, no. (%)	3 (7.7)
Other medical conditions, no. (%)	11 (28.2)
Total no. of medical conditions, no. (%)	
1	3 (7.7)
2	6 (15.4)
3	16 (41.0)
≥4	14 (35.9)
Six-minute walk test, meters	335.9 (90.1)

depressive symptoms, sleep disturbance complaints, reported physical function, or pain interference between their enrollment in the study and one month after the start of the stay-at-home orders.

After one month of the stay-at-home orders, participants endorsed significantly more symptoms of anxiety, less fatigue, and less satisfaction with participation in their social roles than they endorsed at baseline (Table 2). Average scores for fatigue and anxiety one month from the start of the stay-at-home period were within the normal range when compared to the general population's average. Change in satisfaction with participation in social roles reflected a nearly 1 *SD* decrease, with average scores after the stay-at-home orders .5 *SD* below the general population mean.

Perceived Risk of and Protection Against COVID-19

At the time of the interviews, 18% of the sample had a close friend or family member diagnosed with COVID-19. Participants varied in their degree of worry about infection, with half reporting that they never or rarely worried, and the remaining half worrying some of the time to all of the time (Table 3). The majority of participants (78.4%) endorsed at least some agreement that they were vulnerable to COVID-19 infection, although most (86.4%) reported that their chance of infection was zero to small. On average, participants were most confident in their ability to protect themselves from COVID-19, slightly less confident in their local community's ability, and least confident in the country's ability to protect itself from infection.

Qualitative Findings

Five main themes emerged from the phone interviews: (1) the significant disruption of social engagement and daily life due to the pandemic; (2) the emotional toll of COVID-19; (3) the physical impact of stay-at-home orders; (4) unexpected positive aspects of the COVID-19 mitigation efforts; and (5) perspectives on leadership and messaging surrounding the pandemic.

Disruption of Social Engagement and Daily Life

Many participants discussed the impact of COVID-19 on their ability to connect with others. They shared that social distancing and stay-at-home orders prevented them from spending time with other people, including new acquaintances, friends, and family members. Many participants relied on different technologies (e.g., videoconferencing and smartphones) to support continued social connection, although some experienced challenges when using these tools. When discussing the impact on their social lives, several participants specifically noted the unique impact of losing time with their grandchildren:

“Well, traditionally, every Friday night I would go to my son's house to visit his family and that would include a seven and nine-

Table 2. Change in PROMIS-29 Profile T-Scores (v2.1) from the Pre-COVID-19 (baseline) Period to when Stay-At-Home Orders were Implemented.

Domain	Pre-COVID-19 Period Mean (SD)	Stay-At-Home Period Mean (SD)	Mean Difference (95% CI)	p Value
Anxiety	49.1 (7.2)	52.9 (9.5)	3.9 (1.3, 6.6)	.005
Depression	48.3 (8.2)	49.2 (8.4)	.8 (−1.7, 3.2)	.52
Fatigue	50.9 (8.5)	47.6 (10.3)	−3.3 (−5.9, −.6)	.02
Sleep disturbance	48.7 (9.1)	49.3 (9.2)	.6 (−2.7, 3.9)	.70
Satisfaction with participation in social roles	52.4 (8.1)	45.1 (8.7)	−7.3 (−10.5, −4.10)	<.001
Physical function	42.4 (5.7)	43.1 (6.0)	.8 (−.8, 2.4)	.31
Pain interference	56.4 (6.0)	54.6 (7.5)	−1.8 (−4.1, .5)	.12

Table 3. Perceived Risk of COVID-19 and Protection Efficacy From Infection.

	Mean (SD)	n (%)
Perceived risk of COVID-19^a		
<i>I worry about getting infected with COVID-19</i>	3.0 (1.4)	
None of the time/rarely		19 (51.4)
Some of the time/a moderate amount of the time		12 (32.4)
A lot of the time/all of the time		6 (16.2)
<i>I feel vulnerable to COVID-19 infection</i>	4.2 (1.4)	
Strongly disagree/disagree/somewhat disagree		8 (21.6)
Somewhat agree		8 (21.6)
Agree/strongly agree		21 (56.8)
<i>I think my chances of getting infected with COVID19 are...</i>	2.7 (0.9)	
Zero/almost zero		16 (43.2)
Small		16 (43.2)
Moderate/large		5 (12.5)
Perceived protection efficacy from infection^b		
<i>I feel confident that I can protect myself from COVID-19</i>	5.0 (1.1)	
<i>I feel confident that my local community can protect itself from COVID-19</i>	3.9 (1.3)	
<i>I feel confident that my country can protect itself from COVID-19</i>	2.8 (1.4)	

^aQuestion items are italicized with response choices shown underneath; some responses were combined due to small numbers.

^bQuestion items are italicized; response options were a 1–7 scale, where 1 represents strongly disagree while 7 represents strongly agree.

year-old, the grandchildren, “the grandses” I call them. I’m not doing that because I don’t want to expose myself to whatever germs they may have or have picked up. And they’re really good, but I know that they have more exposure than I do to the outside world...It’s especially bad on Fridays when I know that’s the day. And now, I don’t allow myself to think about, “Hey, I could see them every day because they’re not in school.”

Contributing to the disruption of their social life, participants reported that they had difficulty maintaining their routine activities given the many business limits and closures. Participants discussed having to adjust how they engaged in daily tasks, such as grocery shopping, and even having to delay or cancel a range of activities, such as preventive medical care and volunteer activities. Several participants noted that this disruption left them routineless. One participant likened the experience of businesses closing

and other COVID-19 mitigation strategies to her world getting smaller:

“Like the library closed that was a blow to me socially. I love the library, anyway. And I just thought, ‘Ah, your world’s going to shrink. The whole world is going to shrink.’ And I instantly recognized that this was global, and we were all in the war with the virus.”

Emotional Toll of COVID-19

Many participants noted an emotional toll of the pandemic, highlighting uncertainty about the virus, fear of becoming infected, and the loss of structure in their daily lives as causes of increased worry and anxiety. For some, frequent consumption of news coverage of the pandemic contributed to

their stress. Several participants noticed a hypervigilance on symptoms that could denote infection:

“Yeah, and a couple of days ago I felt like I had a slight cough in the evening. I had a little bit of a cough, which now I think was probably allergy, just seasonal allergy. But at the time, I thought, ‘Oh my God, is this COVID?’”

Although no participants in the study had been diagnosed with COVID-19 at the time of the interviews, several had friends or family members diagnosed with the virus, and one participant’s friend died as a result. This participant reported that, in addition to managing typical grief, the measures put in place to mitigate the spread of COVID-19, such as social distancing and sheltering-in-place, added to their distress:

“But it’s hard when I’ve had such a personal direct impact on me...But things are still so much up in the air because of the shelter-in-place requirements and you can’t do what’s considered nonessential activities. So nobody has been able to do anything about my friend’s possessions. His apartment is basically locked down, and nobody can go in there and finally resolve—take care of his effects. It’s just horribly disconcerting. So that’s a personal thing for me, and I can’t be the only person in that kind of situation.”

Worries about COVID-19 extended beyond concerns of becoming infected with the virus. Some participants shared that they were worried that the measures used to prevent the spread of the virus would have lasting effects on society:

“I’m feeling very, very sad for the upcoming generations because I think some of the habits that we’re forming now are going to stay even long after we find a cure or a vaccine for this...But for me, it’s not going to—I’m old, so it’s not going to affect me, but I’ve got seven grandkids that I’m afraid their life is going to change.”

However, not all participants endorsed increased worry or stress due to the pandemic. These participants acknowledged that, while the experience of living through COVID-19 was difficult, they made conscious efforts not to dwell on their discontent or negative emotions.

Physical Impact of Stay-At-Home Orders

Participants varied with regard to their pain experiences during the pandemic; some reported increases in pain flare-ups, while others reported decreased arthritic pain. Many noted that their physical activity decreased once the stay-at-home orders were issued and the study was suspended. Some participants reported that they were able to mitigate this effect by incorporating outdoor walking into their daily routines. This strategy, however, had mixed success, as a proportion of

participants who attempted to maintain their activity through outdoor walking were limited by fear of infection:

“I am aspiring to walking every day but then there is the, ‘Oh, my gosh. I’m going outside. Someone might breathe on me. Oh, dear.’ And then it gets too late so I am not getting as much exercise as I was which is absolutely, totally clear from those of you who can look at my steps per day.”

Other participants reported difficulty finding the motivation to regularly engage in physical activity, despite having access to other methods of exercise that could be done without leaving their home:

“I have not been getting enough exercise. I have amazingly, twice, but only twice, gotten an exercise video off the internet. It’s a program that the YMCA is doing with exercise for seniors. And it’s not dissimilar from the Enhance exercise program and actually gotten a chair out and turned the computer on and grabbed my weights and done the thing twice. Not every day, not three times a week, but twice.”

Unexpected Positive Aspects of COVID-19 Mitigation Efforts

Without prompting for positive outcomes, several participants spontaneously shared that changes stemming from the pandemic yielded some unexpected benefits. Participants reported that, with the help of technology (e.g., Zoom and Facebook), they were able to find support and forge deeper connections with their loved ones, and others were able to reconnect with people they had lost touch with:

“And I kind of went to my telephone list of names and people that I just have lost contact with over the last couple of years. I’d just send also a message to them and ask them how they’re doing, and say, ‘I’m sorry we’ve lost touch.’ And I’ve gotten some very warm responses from that.”

Some participants also shared that the stay-at-home orders and social distancing mandates provided them with more time and opportunity to engage in hobbies, to start new routines, and to complete tasks that they had been putting off:

“Well, I get to spend a lot more time exercising. I’ve exercised more in the last month than I have in my life and I feel the benefits of that. And I’ve filed my taxes on time this year for the first time in four years. I didn’t ask for an extension. I’ve gotten a lot of reading done that I’ve been wanting to do. I’m so thankful for the online library e-books; it’s fantastic. I’m fortunate that I have Amazon Prime here. So I’ve gotten to watch a lot of shows I’ve wanted to see on both that and Netflix. So and my days have gone really well.”

Perspectives on Leadership and Messaging Surrounding the Pandemic

The phone interview included a question inquiring about participants' reactions to the local and national responses to the pandemic. The majority of participants were supportive of initial social distancing recommendations, and praised the local and state governments' early responses to COVID-19. However, several participants expressed their anger and frustration at a perceived inadequate federal response to the virus:

"I think the Federal Government has just completely fallen down when we identified the first case, the index case. I mean, it was very different from how we handled Ebola...I felt that the whole response was just weak. And so we're starting at the Federal Government and then making so many people feel complacent."

In general, participants reported a desire for stronger and broader social distancing mandates to curb the spread of the virus. Participants emphasized that collective action was required to manage the virus, and several shared their frustrations regarding others' decisions not to adhere to mitigation efforts. Participants noted the strong emphasis on older adults' risks of infection as both warranted given the information available and ultimately damaging, as it may have contributed to lower perceptions of risk and less uptake of preventive measures among younger people. One participant highlighted her perception of younger adults' limited perspective on surviving a pandemic by placing COVID-19 in the context of other illnesses that have spread in her lifetime:

"Well, I would have liked to see far more assertive actions at every level earlier on. I mean, if we would have stayed home in the beginning and had aggressive action, I think that it would've really helped. I honestly think [EH], it may be more apparent to those of us who are older. Who went to school with— my best friend got polio. Who went to school with kids with heavy braces on. My mother almost went blind who had measles. It's not kind of a new thing to be afraid of something just sweeping through."

Not all participants favored the expansion of mitigation efforts. A minority of participants were distrustful of information about the virus and believed that responses to it were an overreaction. In considering how the country should move forward, some participants discussed the importance of balancing economic and social concerns and discussed return to pre-COVID life as an individual choice. One participant's response encapsulated the many considerations that others discussed when addressing this complex issue:

"Wow, I'm so torn about that question. I am so torn because I'm so worried about our economy, our way of living, and for so many people, that's so bad. I don't know. I just don't know the answer to that. I mean, to me, as bad as it is, I think we should self-quarantine for another— maybe take it week by week and see when we can ease back into it."

Discussion

This study examined the impact of the initial coronavirus mitigation efforts on a group of older adults with OA pain living in Seattle, Washington, the site of some of the first documented cases of COVID-19 in the United States. The results suggest that efforts to curb the spread of COVID-19 have had a significant impact on these adults' lives across multiple domains. Most participants perceived themselves to be vulnerable to the virus, highlighting that public messaging around COVID-19 adequately conveyed the risks associated with contracting the virus for older adults. Despite acknowledging their vulnerability, participants expressed low perceived risk of infection, varied in their degree of worry about becoming infected, and expressed confidence in their own ability to prevent infection. This seemingly contradictory set of results is consistent with findings from a recent survey of 6666 US adults that showed that older age was associated with higher perceived risk of dying after COVID-19 but lower perceived risk of infection (Bruine de Bruin, 2021). With low availability of testing for the virus at the time of our study and limited information about their own risk of exposure, this pattern of findings may represent an "optimistic bias" or the perception of being less susceptible to a medical consequence than others (Weinstein, 1980). It is also possible that participants recognized their age-associated vulnerability (Shahid et al., 2020) but felt safe from infection given their adherence to stay-at-home orders and social distancing mandates put in place in Seattle, emphasizing their individual risk over aggregated group-based risk (Montibeller & von Winterfeldt, 2015). Notably, none of the older adults in this sample reported nonadherence to the coronavirus mitigation efforts.

Researchers and healthcare practitioners have documented the importance of maintaining social connections for mental and physical health, and the need to closely monitor how older adults are faring in this regard as the pandemic continues (Cudjoe & Kotwal, 2020). This concern appears well founded as older adults in our sample reported on the detrimental impact the mitigation efforts had on their social engagement. For example, participants in this study lost several hours of face-to-face peer group activity (e.g., exercise and behavioral health) per week when the parent study was halted. Although a good deal of attention has focused on finding ways for people to stay connected to their family and friends during the pandemic, it is important to consider that some older adults do not have such social circles available (Cudjoe & Kotwal, 2020). In our study, some participants shared their disappointment at having fewer people to interact with or having fewer spontaneous conversations because of canceled appointments and social distancing. As such, efforts to address social isolation among older adults in the context of COVID-19 should also consider the roles of these unplanned, spur-of-the-moment opportunities for social connection for older adults' well-being.

Older adults in our study tended to report depression symptoms within normal limits at baseline and during the first month of the pandemic, which is consistent with a US-based study that found that, relative to younger adults, older adults reported better mental health in the initial weeks of the pandemic (Bruin de Bruin, 2020). Older adults in our study did report a statistically significant increase in their symptoms of anxiety between baseline and the first month of the pandemic. This increase was further detailed in their qualitative interviews in which participants endorsed being hypervigilant about potential symptoms of COVID-19 or of consuming a great deal of media about the pandemic, further exacerbating symptoms of anxiety. Participants varied in the degree to which they were distressed by the pandemic, and this variability highlights the uncertainty about how the pandemic will affect older adults' mental health in the long term.

There is reason to believe that the specific mitigation strategies in place to curb the spread of COVID-19 could lead to worse mental health outcomes among this group via the effects of social isolation. For example, a multi-wave longitudinal study spanning from 2005 to 2016 of over 3000 adults aged 57–85 years found evidence for the mediating role of increased social isolation through bidirectional relationships between social disconnectedness and depression and anxiety symptoms (Santini et al., 2020). However, it is also possible that older adults' mental health will fare better than their younger counterparts' as older adults reported less distress and more adaptive coping techniques following previous events such as the SARS epidemic and the 9/11 terrorist attacks (Fung & Carstensen, 2006). Indeed, older adults in the present study reported unexpected positive outcomes associated with the mitigation efforts, including opportunities to reconnect with former friends and with former hobbies. Given the potential for such a wide range of mental health outcomes among older adults, it is important to find ways to identify who is experiencing mental health challenges in the wake of the pandemic, along with identifying factors associated with resilience during this time.

Our findings support the recent calls for policy initiatives and proactive outreach that can help older adults maintain their physical activity to manage their mental and physical health (Sallis et al., 2020). While some older adults were able to find ways to engage in physical activity, others had difficulty finding the motivation to do so or trouble identifying safe alternatives to their exercise routines. Sallis and colleagues (2020) note that it may be helpful to evaluate and provide messaging about safe places where older adults can be active during the pandemic while still adhering to COVID-19 mitigation efforts. Although there were no significant changes in pain interference as measured by the PROMIS scale or consistent reports about worsening pain in our participants' interviews, targeting opportunities to increase physical activity may be an especially important tool for pain management as a recent study found that perceived decreases in physical activity during the pandemic independently

predicted perceptions of increased pain among people with chronic pain (Fallon et al., 2020).

Participants' overall low confidence that the United States could protect itself from the spread of COVID-19 has been substantiated by the continued rise in new cases throughout the country. Their desire for broader, more strongly enforced mitigation efforts also aligns with recent event study data showing that adoption of government-mandated shelter-in-place orders and business closures (e.g., bars, restaurants, and entertainment) had a direct influence in slowing the spread of COVID-19 between March 1 and April 27 (Courtemanche et al., 2020). Still, at least one month into the pandemic, there was some dissent among older adults with regard to the perceived need for such measures, reinforcing the need to examine the individual beliefs and behaviors within this population, rather than viewing them as a monolithic group.

Limitations

Our findings should be considered in light of several limitations. First, the data were collected early in the epidemic, just as other states were beginning to put COVID-19 mitigation efforts in place. As a result, the impact of the pandemic could be different now than it was in March–April 2020, and data we present here should be viewed as a “snapshot” of these older adults' functioning. Second, our data are drawn from a single city. While this provides a unique vantage point given that this location was also the site of the early cases of COVID-19, results from the study may not generalize to older adults living in other parts of the country with different mitigation strategies enacted. Third, the sample was comprised predominantly white, non-Hispanic, and highly educated women; it is unclear if conclusions drawn from this sample generalize to older adults who represent other demographic groups. For example, although the older adults in the current study were generally confident in their ability to control their risk of COVID-19 infection, public health messaging early in the pandemic in communities of color, where mistrust prevails and resources and fluency in English are more limited, might not have been as effective. Further research on self-perceptions of COVID-19 infection risk, barriers to infection control, and public health messaging on risk mitigation are needed in older racial and ethnic minority populations. Fourth, older adults in this study were part of a multicomponent, intensive clinical trial, and those willing to enroll in such a study may not be representative of other older adults who share similar medical comorbidities. Relatedly, while some older adults in the study reported a history of mental health disorders, on average, participants in our sample did not report clinically significant mental health distress, and the impact of COVID-19 on this group may be different from older adults living with mental illness. Future work should explore how the pandemic may differentially affect these segments of the older adult population.

Conclusions

To date, much of the conversation about older adults and COVID-19 has characterized them as frail, vulnerable, and passive in the face of the pandemic (Ayalon et al., 2021; Jimenez-Sotomayor et al., 2020). Our study highlights the full lives of many older adults, the multiple ways in which they have been affected by the COVID-19 pandemic, and their resilience. Our findings have implications for how to support older adults' health and well-being in the ensuing months as efforts to curb the spread of the coronavirus continue. Given that this population, older adults living independently and with multiple chronic health conditions, are an increasingly large segment of the population, targeted efforts to promote their adaptation to this public health crisis are needed. Findings from our study demonstrate some strategies community-dwelling older adults may use to cope with the challenges of the COVID-19 pandemic. In addition, the measures used in the current study to assess perceived risk of and protection against COVID-19 might provide useful tools for future clinical and population-based investigations of risk mitigation behavior as well as decision-making on testing and vaccinations.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Research reported in this article was supported by the National Institute on Aging of the National Institutes of Health under award number R01AG060992.

ORCID iDs

Nancy M. Gell  <https://orcid.org/0000-0002-3172-8040>
Kushang V. Patel  <https://orcid.org/0000-0002-8443-2876>

Supplemental Material

Supplemental material for this article is available online.

References

- Ayalon, L., Chasteen, A., Diehl, M., Levy, B. R., Neupert, S. D., Rothermund, K., Tesch-Römer, C., & Wahl, H.-W. (2021). Aging in times of the COVID-19 pandemic: Avoiding ageism and fostering intergenerational solidarity. *The Journals of Gerontology: Series B*, 76(2), e49-e52. doi:10.1093/geronb/gbaa051
- Bedford, J., Enria, D., Giesecke, J., Heymann, D. L., Ihekweazu, C., Kobinger, G., Lane, H. C., Memish, Z., Oh, M.-d., Sall, A. A., Schuchat, A., Ungchusak, K., & Wieler, L. H. (2020). COVID-19: Towards controlling of a pandemic. *The Lancet*, 395(10229), 1015-1018. doi:10.1016/S0140-6736(20)30673-5.
- Bruine de Bruin, W. (2021). Age differences in COVID-19 risk perceptions and mental health: Evidence from a national U.S. survey conducted in March 2020. *The Journals of Gerontology: Series B*, 76(2), e24-e29. doi:10.1093/geronb/gbaa074
- Cornwell, E. Y., & Waite, L. J. (2009). Social disconnectedness, perceived isolation, and health among older adults. *Journal of Health and Social Behavior*, 50(1), 31-48. doi:10.1177/002214650905000103
- 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. *Health Affairs*, 39(7), 1237-1246. doi:10.1377/hlthaff.2020.00608
- Cudjoe, T. K. M., & Kotwal, A. A. (2020). "Social distancing" amid a crisis in social isolation and loneliness. *Journal of the American Geriatrics Society*, 68(6), E27-E29. doi:10.1111/jgs.16527
- Cudjoe, T. K. M., Roth, D. L., Szanton, S. L., Wolff, J. L., Boyd, C. M., & Thorpe, R. J. (2020). The epidemiology of social isolation: National Health and Aging trends study. *The Journals of Gerontology: Series B*, 75(1), 107-113. doi:10.1093/geronb/gby037
- Deshpande, B. R., Katz, J. N., Solomon, D. H., Yelin, E. H., Hunter, D. J., Messier, S. P., Suter, L. G., & Losina, E. (2016). Number of persons with symptomatic knee osteoarthritis in the US: Impact of race and ethnicity, age, sex, and obesity. *Arthritis Care & Research*, 68(12), 1743-1750. doi:10.1002/acr.22897
- Enright, P. L. (2003). The six-minute walk test. *Respiratory Care*, 48(8), 3.
- Fallon, N., Brown, C., Twiddy, H., Brian, E., Frank, B., Nurmikko, T., & Stancak, A. (2020). Adverse effects of COVID-19 related lockdown on pain, physical activity and psychological well-being in people with chronic pain. *MedRxiv*. doi:10.1101/2020.06.04.20122564
- Fung, H. H., & Carstensen, L. L. (2006). Goals change when life's fragility is primed: Lessons learned from older adults, the september 11 attacks and sars. *Social Cognition*, 24(3), 248-278. doi:10.1521/soco.2006.24.3.248
- Gell, N. M., Rosenberg, D. E., Demiris, G., LaCroix, A. Z., & Patel, K. V. (2015). Patterns of technology use among older adults with and without disabilities. *The Gerontologist*, 55(3), 412-421. doi:10.1093/geront/gnt166
- Golden, J., Conroy, R. M., Bruce, I., Denihan, A., Greene, E., Kirby, M., & Lawlor, B. A. (2009). Loneliness, social support networks, mood and wellbeing in community-dwelling elderly. *International Journal of Geriatric Psychiatry*, 24(7), 694-700. doi:10.1002/gps.2181
- Hays, R. D., Spritzer, K. L., Schalet, B. D., & Cella, D. (2018). PROMIS-29 v2.0 profile physical and mental health summary scores. *Quality of Life Research*, 27(7), 1885-1891. doi:10.1007/s11136-018-1842-3
- Hootman, J. M., Helmick, C. G., Barbour, K. E., Theis, K. A., & Boring, M. A. (2016). Updated projected prevalence of self-reported doctor-diagnosed arthritis and arthritis-attributable activity limitation among US adults, 2015-2040. *Arthritis & Rheumatology*, 68(7), 1582-1587. doi:10.1002/art.39692
- Jimenez-Sotomayor, M. R., Gomez-Moreno, C., & Soto-Perez-de-Celis, E. (2020). Coronavirus, ageism, and twitter: An evaluation of tweets about older adults and COVID-19. *Journal of the*

- American Geriatrics Society*, 68(8), 1661-1665. doi:10.1111/jgs.16508
- Kim, H. S., Sherman, D. K., & Updegraff, J. A. (2016). Fear of Ebola. *Psychological Science*, 27(7), 935-944. doi:10.1177/0956797616642596
- Kolasinski, S. L., Neogi, T., Hochberg, M. C., Oatis, C., Guyatt, G., Block, J., Callahan, L., Copenhaver, C., Dodge, C., Felson, D., Gellar, K., Harvey, W. F., Hawker, G., Herzig, E., Kwoh, C. K., Nelson, A. E., Samuels, J., Scanzello, C., White, D., ... Reston, J. (2019). American College of Rheumatology/Arthritis Foundation guideline for the management of osteoarthritis of the hand, hip, and knee. *Arthritis & Rheumatology*, 72(2), 220-233. doi:10.1002/art.41142
- Montibeller, G., & von Winterfeldt, D. (2015). Cognitive and motivational biases in decision and risk analysis. *Risk Analysis*, 35(7), 1230-1251. doi:10.1111/risa.12360
- Napper, L. E., Fisher, D. G., & Reynolds, G. L. (2012). Development of the perceived risk of HIV scale. *AIDS and Behavior*, 16(4), 1075-1083. doi:10.1007/s10461-011-0003-2
- National Academies of Sciences, Engineering, and Medicine. (2020). Social isolation and loneliness in older adults: Opportunities for the health care system. The National Academies Press.
- Nelson, A. E., Allen, K. D., Golightly, Y. M., Goode, A. P., & Jordan, J. M. (2014). A systematic review of recommendations and guidelines for the management of osteoarthritis: The chronic osteoarthritis management initiative of the U.S. bone and joint initiative. *Seminars in Arthritis and Rheumatism*, 43(6), 701-712. doi:10.1016/j.semarthrit.2013.11.012
- Nikolich-Zugich, J., Knox, K. S., Rios, C. T., Natt, B., Bhattacharya, D., & Fain, M. J. (2020). SARS-CoV-2 and COVID-19 in older adults: What we may expect regarding pathogenesis, immune responses, and outcomes. *GeroScience*, 42(2), 505-514. doi:10.1007/s11357-020-00186-0
- Patel, K., Amtmann, D., Jensen, M., Smith, S., Veasley, C., & Turk, D. (in press). *Clinical outcome assessment in clinical trials of chronic pain treatments*. *Pain reports*.
- Patel, KV, Guralnik, JM, Phelan, EA, Gell, NM, Wallace, RB, Sullivan, MD, & Turk, DC (2019). Symptom burden among community-dwelling older adults in the United States. *Journal of the American Geriatrics Society*, 67(2), 223-231. doi:10.1111/jgs.15673
- Pew Research Center. (2019). Millennials stand out for their technology use, but older generations also embrace digital life. Pew Research Center. <https://www.pewresearch.org/fact-tank/2019/09/09/us-generations-technology-use/>
- Pew Research Center. (2020). Experiences with the COVID-19 outbreak can vary for Americans of different ages. Pew Research Center. <https://www.pewresearch.org/fact-tank/2020/06/16/experiences-with-the-covid-19-outbreak-can-vary-for-americans-of-different-ages/>
- Roxby, A. C., Greninger, A. L., Hatfield, K. M., Lynch, J. B., Dellit, T. H., James, A., Taylor, J., Page, L. C., Kimball, A., Arons, M., Munanga, A., Stone, N., Jernigan, J. A., Reddy, S. C., Lewis, J., Cohen, S. A., Jerome, K. R., Duchin, J. S., & Neme, S. (2020). Outbreak investigation of COVID-19 among residents and staff of an independent and assisted living community for older adults in Seattle, Washington. *JAMA Internal Medicine*, 180(8), 1101-1105. doi:10.1001/jamainternmed.2020.2233
- Sallis, J. F., Adlakhia, D., Oyeyemi, A., & Salvo, D. (2020). An international physical activity and public health research agenda to inform coronavirus disease-2019 policies and practices. *Journal of Sport and Health Science*, 9(4), 328-334. doi:10.1016/j.jshs.2020.05.005
- Santini, Z. I., Jose, P. E., York Cornwell, E., Koyanagi, A., Nielsen, L., Hinrichsen, C., Meilstrup, C., Madsen, K. R., & Koushede, V. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): A longitudinal mediation analysis. *The Lancet Public Health*, 5(1), e62-e70. doi:10.1016/S2468-2667(19)30230-0
- Schrack, J. A., Wanigatunga, A. A., & Juraschek, S. P. (2020). After the COVID-19 pandemic: The next wave of health challenges for older adults. *The Journals of Gerontology: Series A*, 75(9), e121-e122. doi:10.1093/gerona/glaa102
- Shahid, Z., Kalayanamitra, R., McClafferty, B., Kepko, D., Ramgobin, D., Patel, R., Aggarwal, C. S., Vunnam, R., Sahu, N., Bhatt, D., Jones, K., Golamari, R., & Jain, R. (2020). COVID -19 and older adults: What we know. *Journal of the American Geriatrics Society*, 68(5), 926-929. doi:10.1111/jgs.16472
- Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, 27(2), 237-246. doi:10.1177/1098214005283748
- Tudor-Locke, C., Craig, C. L., Aoyagi, Y., Bell, R. C., Croteau, K. A., De Bourdeaudhuij, I., Ewald, B., Gardner, A. W., Hatano, Y., Lutes, L. D., Matsudo, S. M., Ramirez-Marrero, F. A., Rogers, L. Q., Rowe, D. A., Schmidt, M. D., Tully, M. A., & Blair, S. N. (2011). How many steps/day are enough? For older adults and special populations. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 80. doi:10.1186/1479-5868-8-80
- Vespa, J., & Schondelmyer, E. (2015). A gray revolution in living arrangements. <https://www.census.gov/newsroom/blogs/random-samplings/2015/07/a-gray-revolution-in-living-arrangements.html#:~:text=The%20last%2050%20years%20have,time%20since%20World%20War%20II.&text=Rising%20life%20expectancy%20helps%20explain,in%20living%20with%20a%20spouse>
- Washington State Office of the Governor. (2020). Inslee announces 'Stay Home, Stay Healthy' order [Press Release]. <https://www.governor.wa.gov/news-media/inslee-announces-stay-home-stay-healthy%20order>
- Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39(5), 806-820. doi:10.1037/0022-3514.39.5.806
- Working group on health outcomes for older persons with multiple chronic conditions. (2012). Universal health outcome measures for older persons with multiple chronic conditions. *Journal of the American Geriatrics Society*, 60(12), 2333-2341. doi:10.1111/j.1532-5415.2012.04240.x
- World Health Organization. (2020a). Coronavirus disease (COVID-19). <https://covid19.who.int>
- World Health Organization. (2020b). WHO Virtual press conference on COVID-19, https://www.who.int/docs/default-source/coronaviruse/transcripts/who-audio-emergencies-coronavirus-press-conference-full-and-final-11mar2020.pdf?sfvrsn=cb432bb3_2