Narrative Review

The Impact of Isolation During COVID-19 on Chronic Musculoskeletal Pain in the Geriatric Population: A Narrative Review

Morgan E. Gonder, MD, Walter N. Orr, MPH, and Talal W. Khan, MD

From: Department of Anesthesiology, University of Kansas Medical Center, Kansas City, KS

Address Correspondence:
Morgan E. Gonder, MD
Department of Anesthesiology, University of Kansas Medical Center
3901 Rainbow Blvd, MS 1034
Kansas City, KS 66160 USA
E-mail: mgonder@kumc.edu

Disclaimer: There was no external funding in the preparation of this manuscript.

Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

Manuscript received: 07-15-2021
Revised manuscript received: 11-09-2021
Accepted for publication: 11-17-2021

Free full manuscript: www.painphysicianjournal.com

Background: During the COVID-19 pandemic, social distancing has been employed to decrease the spread of COVID-19, especially within the geriatric population; however, the resulting loneliness and isolation carry their own detrimental effects. Loneliness resulting from the COVID-19 pandemic may also have negative implications on those with chronic musculoskeletal pain.

Objectives: The aim of this review was to identify the role of loneliness specific to the recent COVID-19 pandemic as it relates to the prevalence and severity of chronic pain in the geriatric population and to provide an overview for clinicians.

Study Design: Narrative review.

Methods: A literature search was conducted using combinations of relevant search terms. Databases included PubMed and relevant grey literature sources. Reference lists of selected articles were also searched for additional relevant literature.

Results: Recent literature supports that social isolation and loneliness stemming from the COVID-19 pandemic have negative implications on chronic musculoskeletal pain. Loneliness has been well documented to have deleterious effects on physical and mental health, and it is increasingly linked to worsening debility and pain interference for those with chronic musculoskeletal pain. This has been found to be most prominent in the geriatric population, who are at the greatest risk for social decline and loneliness. Loneliness has also been found to have negative effects on cardiovascular disease, infectious disease, and mental health, as well as cognitive decline.

Limitations: Potential selection bias due to the narrative review design. Some included studies required the use of online questionnaires, which may not be accessible for the geriatric population, those without technology literacy, or low socioeconomic status populations. Future studies should emphasize screening patients for access to technological devices and reliable internet while partnering with community programs focused on digital literacy and resource access.

Conclusions: A myriad of deleterious effects stemming from social isolation and loneliness have been documented, of which geriatric populations are especially susceptible. Both early identification of at-risk patients and safe interventions are essential to mitigate loneliness and stop the progression of debility. Further resources and research are necessary to illuminate how best to proceed, both in the setting of the ongoing pandemic and how interventions can be applied to alleviate suffering in those with limited ability to receive hospital or clinic-based care.

Key words: Chronic pain, musculoskeletal pain, social isolation, loneliness, geriatric, COVID-19 pandemic, mental health, pain medicine

Pain Physician 2022: 25:E185-E191

The coronavirus (COVID-19) pandemic, at the time of this paper, has played a role in over 733,800 deaths, with over 45,300,000 cases in the United States alone (1). Since the beginning of the COVID-19 pandemic, it became quickly apparent that protective measures were necessary in order to

slow the spread of the virus. Among these preventive measures, social isolation became upheld as a low-risk, low-cost intervention especially for the geriatric population and those with chronic medical conditions. Due to the likelihood of increased comorbidities with aging, the geriatric population is believed to be at risk for more severe cases of COVID-19, and those over the age of 80 have been found to have a greater risk of death compared to younger patients (2). The geriatric population are also at increased risk of immobility, functional deterioration, depression, and anxiety as a result of social disconnection (3,4). While many were able to adapt to isolation with the aid of technology, this was not the case for those without the means or knowledge to use various media platforms, thus leading to increased risk for social isolation and loneliness. While social isolation is regarded as a decrease in the size of one's social network with fewer numbers of social contacts, loneliness is the psychological embodiment of social isolation. Loneliness thus represents an individual's subjective dissatisfaction in the quantity or quality of their social network, a condition which has become vastly more prevalent during the COVID-19 pandemic (5,6).

While many groups have been negatively affected by pandemic-mandated social isolation, the geriatric have likely been the most affected. Broadly, a recent questionnaire found that 13.6% of US adults reported symptoms of serious psychological distress during the pandemic compared to just 3.9% in 2018 (7). However, a national survey from August 2020 noted that 61% of the elderly experienced social isolation during the pandemic (8). While these surveys represent populations of adults irrespective of the presence of pain, chronic pain increases the risk of social isolation and psychological distress both at baseline and as a result of societal changes during the pandemic (9-13). With a prevalence of approximately 20% across European, United States, and Canadian populations, chronic pain represents a significant health challenge during the pandemic as this predominantly geriatric population is restricted from pain management facilities, treatments, and support due to social distancing policies (11,14).

Although loneliness has historically been shown to have a negative effect on both disease processes and mental health (5,15,16), the pandemic has created a unique emphasis on isolation, allowing us to better analyze this specific social determinant of health. Broadly, social determinants of health are thought to account for 80% to 90% of health outcomes, a statistic that has not been lessened despite advancements in medicine and health care (8). This fact highlights the need for careful evaluation of loneliness and social isolation during this unprecedented time to gain an understanding of the relationship between isolation and chronic musculoskeletal pain in our most vulnerable population: the elderly (8,17). The aim of this narrative review was to identify the role of loneliness specific to the recent COVID-19 pandemic as it relates to the prevalence and severity of chronic pain in the geriatric population, and furthermore, to provide an overview for clinician readers given the breadth of this topic and its corresponding lack of published research.

Methods

A literature search was conducted using combinations of the following terms: isolation, loneliness, social isolation, social support, SARS-CoV-2, pandemic, COVID-19, mental health, psychosocial, social determinant of health, geriatric, chronic pain, pain, pain disorder, musculoskeletal pain, pain condition, and pain management. Databases searched included PubMed and relevant grey literature sources. Reference lists of selected articles were also searched for additional relevant literature. The search included articles from inception to March 2021. We limited our review to chronic pain in the geriatric due to the increased prevalence of chronic pain in this population, though we recognize that loneliness and isolation can also impact chronic pain in younger populations.

Isolation and Chronic Pain

Although often overlooked, social factors such as loneliness play an important role in the manifestation of pain as part of a biopsychological model for chronic pain (17). The science behind this connection and the brain processes affected by loneliness have been ellusive, yet research suggests that inflammation may be responsible for the link (18-20). Most social species experience isolation as an unpleasant experience, resulting in chronic activation and dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and chronically increased cortisol levels (21,22). The effects of chronic cortisol elevation increase the risk of cardiovascular disease, cognitive decline, and immune system dysregulation via effects from corticosterone binding to the hippocampus (21). Although HPA activation resulting from chronic social isolation is variable, both young and older adults that identify as lonely have been found to generally have increased chronic activa-

tion of the HPA compared to individuals who do not report feeling social deficits (23). While the biochemical and mechanical origins of chronic musculoskeletal pain are diverse, the release of pro-inflammatory cytokines by the central nervous system glial cells is thought to play a significant role in the maintenance of chronic pain in addition to continuous peripheral nociceptive input (24).

While more research is necessary to better delineate the role of inflammation from loneliness and its role in chronic musculoskeletal pain, several studies prior to COVID-19 foreshadowed the importance of social factors and the effect of isolation on this population. For those suffering from arthritis, studies have shown that the presence of more social support is associated with lower levels of disability and depressive symptoms (25). Additionally, Oliveira et al (26) specifically looked at social isolation as a prognostic factor for low back pain and found that perceived social isolation in a group of older Dutch patients (mean age 53) was a statistically significant predictor of increased disability and pain at 6-month follow-up in patients with any duration of lower back pain. Furthermore, analysis in the same study showed statistical significance regarding increased pain, depression, and fatigue over a 1-year period if loneliness was present. Oliveira et al not only showed an important link between chronic pain outcomes and loneliness but also highlighted the need for further studies to evaluate the effect of biopsychological interventions compared to general conventional interventions alone (26).

Physical Consequences of Isolation as a Risk Factor for Chronic Pain Exacerbation

Isolation can also have an impact on physical health which can, in turn, exacerbate chronic musculoskeletal pain by means of deconditioning, lack of exercise, weight gain, and insufficient sleep (27,28). Heinberg et al report that while the loss of regular routines and decreased support have physical effects on health due to isolation, loneliness also puts one at amplified risk for unhealthy coping strategies such as binge eating and increased alcohol consumption that can have a cumulative effect on exacerbating pain (27). During the pandemic, a health behavior study conducted by Flanagan et al (29) found that 33.4% of obese and 24.7% of normal-weight patients reported weight gain during the pandemic. Causes of this increase in weight were undoubtedly multifactorial, but this nonetheless supports research suggesting the negative impact caused by disrupted routines and poor coping strategies as a result of increased social isolation. During the pandemic, people with impaired mobility or impairment in their ability to complete activities of daily living, a category that encompasses many with chronic pain, were found to be at increased risk of poor sleep quality and overall decreased quality of life (30). Recent studies have also shown that social distancing and isolation have been directly linked to an increasingly sedentary lifestyle and an elevated risk for systemic deconditioning and worsening of chronic health conditions (31,32). Cardiovascular health is one example of this, as loneliness has been found to be a statistically significant factor in greater Atherosclerotic Cardiovascular Disease Risk Scale (ASCVDRS) scores for both men and women (33). Unsurprisingly, based on the physical effects of isolation on exacerbations of pain as well as chronic medical conditions, meta-analyses have shown that those reporting social isolation have a 29% higher mortality rate even after controlling for other demographics and health risk factors (34). While it is of great importance to target the psychological effects of loneliness, methods should also be employed to curb the physical effects of loneliness that have been shown to not only exacerbate pain but worsen health (35,36). Targeted interventions to meet these goals should include physical activity in addition to resilience training and strategies to reduce loneliness, thereby decreasing the risk of chronic pain exacerbation (36).

Isolation as an Effect of Chronic Pain

The connection between chronic pain as a risk factor for the development of loneliness and depression also exists (37). Hawthorne et al (12) found that social isolation had a prevalence of 43% in a population of those with chronic lower back pain compared to just 24% percent in the general population. This is concordant with a large cohort study of adults over age 50 that found those with chronic musculoskeletal pain were at greater risk of being lonely but at less risk of being socially isolated (5). This study, published in 2018 prior to the COVID-19 pandemic, emphasizes the significance of subjective loneliness. Although those with chronic pain may be surrounded by more people such as family, friends, or others in caretaker roles, they were shown to perceive less quality in their social interactions due to a lack of understanding of their pain or feeling a need to hide their true condition (5). This was echoed in a recent study that found that perceived social support moderated the association between pain

intensity and depression in older patients with chronic pain (38). However, a decrease in social network size has also been found to be associated with chronic pain and, in turn, has been found to be an important negative factor in the onset and progression of chronic pain in the geriatric population (13). This is particularly concerning in light of the COVID-19 pandemic, as those who began the pandemic with less social support may be particularly vulnerable to further loneliness and associated exacerbation of pain and disability (10).

Isolation's Effect on Chronic Pain During COVID

Among the multitude of challenges faced by geriatric chronic pain patients during the COVID-19 pandemic, imposed social isolation represents a formidable challenge. Everything from family visits to multidisciplinary care, physical therapy, and pain interventions were put on hold in an attempt to reduce the risk of spreading COVID-19 to this vulnerable population. While social isolation limited the spread of COVID-19, it came at the cost of loneliness, depression, increased chronic pain, and functional decline (3). One month after the initiation of severe social distancing rules in Israel, it was found that those with orthopedic/pain conditions reported a statistically significant decline in their physical and mental self-rated health when compared to patients with mental, metabolic, or cardiovascular conditions (39). This finding was corroborated by Sole et al 2020, who found that isolation had a moderately statistically significant and positive association with pain interference (14). Pain interference, or the extent to which pain hinders engagement in daily cognitive or physical activities, as a result of social isolation was also examined in a cross-sectional survey study of 150 patients with chronic pain from Massachusetts (40). These 150 patients had established diagnoses of chronic spine, fibromyalgia, and postsurgical pain. One to 2 months after initiation of distancing, patients on average reported feeling 54% more physically isolated, 42% more socially isolated, and had an 8% increase in pain severity. The patients also described increased pain interference compared to before social distancing. Notably, older age was found to be associated with greater pain interference but not pain severity. Factors found to correlate with the greatest increase in pain severity as a result of loneliness were female sex, nonwhite race, lower education, disability, fibromyalgia, and higher pain catastrophizing. When queried regarding the cause of increased pain during the pandemic, 66.7% of study patients agreed that social distancing was an important reason for their increased pain. Hruschak et al also looked at the significance of treatment restriction during the pandemic and reported that 70.7% of patients agreed this played a significant role in increasing their chronic pain (40). Chronic pain patients in Spain were also found to alter their pain management style, including more than half of patients in one study requiring increased pain medication after social isolation was put into effect (11). These patients experienced an increase in pain intensity, frequency of pain episodes, pain interference, and increased distress caused by pain; however, support received from others was seen to increase after the start of the lockdown without assessment of changes in loneliness. These findings, taken in light of the previously discussed Smith et al study (5), may reflect the observation that chronic pain patients experience an adequate social network size, yet due to the quality and understanding in those relationships, still, often experience loneliness. Certainly, in both scenarios, the dramatic changes in accessibility to treatment modalities and health care support significantly affected those with chronic pain (11). These studies show the dramatic changes those with chronic musculoskeletal pain have experienced as a result of the pandemic and highlight the need for cost-effective and remotely-accessible medical resources in response. While these measures are acutely necessary, they also foreshadow our potential ability to provide outreach for issues of isolation and logistical barriers for improved care of chronic pain patients in the future.

Pioneering Solutions

As discussed, the COVID-19 pandemic is shedding light on the complex relationship between loneliness and chronic musculoskeletal pain; however, the solution to effectively alleviate this problem is not easily addressed. This represents a challenge that many institutions will continue to face considering the ongoing threat of COVID-19 variants and the need for social distancing. Many institutions have already begun to make strides to address loneliness. For example, Northwestern and Rush University in Chicago have implemented phone call outreach programs to overcome social isolation for either the geriatric at risk or those who meet criteria based on a screening tool (8,41). Other programs across the United States have placed an increased emphasis on telemedicine and eHealth to take the place of in-person doctor's visits and tackle loneliness (42). In early 2020, only approximately 0.1% of outpatient visits were completed

using telemedicine; however, this statistic increased to 13.8% by mid-April 2020 due to the ongoing COVID-19 pandemic, with 20.5% of adults over the age of 18 in the US completing a telemedicine related encounter in September 2021(43,44).

Health care-mediated online pain management programs, as well as online cognitive behavioral therapy (CBT), also hold promise for alleviating loneliness in chronic pain patients (45,46). A recent systematic review found that online CBT improved the quality of life among patients with chronic pain, with one study showing online CBT to be as effective at improving coping as in-person sessions (47). Beyond just CBT, Bannon et al demonstrated that patients with chronic musculoskeletal pain experienced improved emotional and physical functioning as well as decreased pain interference related to decreased social isolation (15). Patients took part in a group-based mind-body physical activity program with 9 weekly sessions focusing on content specific to social relationships, cultivating empathy, group dynamics, and maintaining group cohesion. The findings of this study show the importance of treating social isolation as a mechanism for improving emotional and physical functioning in chronic pain patients instead of only an outcome of chronic pain (15,48). The United Kingdom (UK) serves as a prime example of how an entire community and government can combat the detrimental effects of isolation through their appointed Ministries of Loneliness. This Ministry strives to improve how preexisting organizations and services connect to people at risk of loneliness. It also shares awareness and teaches skills for coping, reaches out to those in need via a "Safe and Connected" program, and even employs postal workers to call on lonely older people who have signed up for visits and reside on their delivery routes. The Ministry employs a simple questionnaire to assess for loneliness, including a single, direct question of "How often do you feel lonely?" followed by the University of California, Los Angeles 3-item scale: "How often do you feel that you lack companionship? How often do you feel left out? How often do you feel isolated from others?" (49). This simple set of questions could easily be integrated into chronic pain visits both in-office and via telemedicine to better screen for those in need of isolation services as part of their multimodal pain evaluation given the great potential for benefit as described. The promise that peer support can improve both coping and chronic pain management can be seen as a beacon of hope, serving to inspire us to strive to incorporate these techniques into our current practice as safely as possible.

Limitations and Future Directions

Limitations to this review include the limited scope of research given the chosen format of a narrative review, which could potentially introduce selection bias regarding articles chosen for inclusion. While future systematic reviews and meta-analyses could be performed regarding the role of loneliness as it relates to the prevalence and severity of chronic pain in the geriatric, this paper aimed to give clinician readers a brief overview of this topic with a focus on literature specific to the recent COVID-19 pandemic, in which increased social isolation and loneliness may have further impacted the experiences of geriatric populations living with chronic pain. It should be acknowledged that some studies that were discussed included limited statistical analysis based on age and contributing confounders, while others lacked data from those without access to technology. Many of the discussed studies required the use of online questionnaires, which may not be accessible for the elderly, those without technology literacy, or populations of low socioeconomic status. Unfortunately, these are exactly the populations that are at the highest risk for increased pain interference and debility. However, this limitation may be prevalent in literature focusing on the impacts of the COVID-19 pandemic, as researchers may have made efforts to incorporate technology to conduct studies remotely due to social distancing policies and the need to limit exposure to the virus in this vulnerable population. Furthermore, challenges surrounding the inclusion of socially disadvantaged groups in research are not limited to this subset of literature, as numerous barriers to research participation for these populations have been previously identified, and no single solution to this problem exists (50). Future studies should incorporate intentional efforts to include diverse populations that may not have access to technology, especially as a systematic review found a lack of research surrounding the use of electronic, mobile, and telehealth interventions in vulnerable populations with chronic disease (51). To address these disparities, emphasis should be placed on screening patients for access to technological devices and reliable internet, in addition to partnering with community organizations that provide programs focused on increasing digital literacy and access to devices (52).

Ultimately, there is room for future research to account for this high-risk population, address the effectiveness of various strategies to combat loneliness based on age and background pain condition, and

create a system of reimbursement to encourage health systems to screen and appropriately treat loneliness. Looking beyond the COVID-19 pandemic, future research could also investigate how best to apply the benefits of socialization and cognitive behavioral principles to populations at risk of isolation based on comorbid conditions and geographic isolation, or as a way to create connectivity for those with debilitating pain that hinders their ability to physically connect with others.

Conclusion

The COVID-19 pandemic is certainly one of the greatest societal and health care challenges of the last century that, with the ongoing threat of virus variants, may prove to be continuous. With this in mind, it is more important than ever to assess the effects of our methods for prevention, namely those resulting from social isolation. While social isolation represents a seemingly low-risk method for curtailing the spread of the virus, the loneliness that results is far from benign. Loneliness has been well documented to have deleterious effects on physical and mental health, and it is increasingly being linked to worsening debility and pain interference for those with chronic musculoskeletal pain. This has been found to be most prominent in the geriatric population, who are at the greatest risk for social decline and loneliness. For this reason, both early identification of at-risk patients and safe interventions are essential to stop the progression of debility. While the need to address social isolation and loneliness is most striking during the pandemic, these issues should continue to be addressed, especially for those hindered by geographic isolation or severe debility prohibiting mobility. As technology becomes both more affordable and accessible, addressing these issues may also one day contribute to reductions in health care disparities by reaching underserved populations, who likely represent those most affected by the interplay of social isolation, loneliness, and chronic pain. Further research and resources are necessary to illuminate how best to proceed.

References

1. COVID Data Tracker. Centers for Disease Control and Prevention. Available at: https://covid.cdc.gov/covid-data-tracker. Accessed November 2, 2021.
2. Perrotta F, Corbi G, Mazzeo G, et al. COVID-19 and the geriatric: insights into pathogenesis and clinical decision-making. *Aging Clin Exp Res* 2020; 32:1599-1608.
3. Chan DX, Lin XF, George JM, Liu CW. Clinical challenges and considerations in management of chronic pain patients during a COVID-19 pandemic. *Ann Acad Med Singap* 2020; 49:669-673.
4. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the geriatric. *Lancet Public Health* 2020; 5:e256.
5. Smith TO, Dainty JR, Williamson E, Martin KR. Association between musculoskeletal pain with social isolation and loneliness: analysis of the English Longitudinal Study of Ageing. *Br J Pain* 2019; 13:82-90.
6. van Tilburg TG, Steinmetz S, Stolte E, van der Roest H, de Vries DH. Loneliness and mental health during the COVID-19 pandemic: a study among Dutch older adults. *J Gerontol B Psychol Sci Soc Sci* 2021; 76:e249-e255.
7. McGinty EE, Presskreischer R, Han H, Barry CL. Psychological distress and loneliness reported by US adults in 2018 and April 2020. *JAMA* 2020; 324:93-94.
8. Escalante E, Golden RL, Mason DJ. Social isolation and loneliness: imperatives for health care in a post-COVID world. *JAMA* 2021; 325:520-521.
9. Katz J, Rosenbloom BN, Fashler S. Chronic pain, psychopathology, and DSM-5 somatic symptom disorder. *Can J Psychiatry* 2015; 60:160-167.
10. Karos K, McParland JL, Bunzli S, et al. The social threats of COVID-19 for people with chronic pain. *Pain* 2020; 161:2229-2235.
11. Nieto R, Pardo R, Sora B, Feliu-Soler A, Luciano JV. Impact of COVID-19 lockdown measures on Spanish people with chronic pain: an online study survey. *J Clin Med* 2020; 9:3558.
12. Hawthorne G, de Morton N, Kent P. Back pain and social isolation: cross-sectional validation of the friendship scale for use in studies on low back pain. *Clin J Pain* 2013; 29:245-252.
13. Leung YY, Teo SL, Chua MB, Raman P, Liu C, Chan A. Living arrangements, social networks and onset or progression of pain among older adults in Singapore. *Geriatr Gerontol Int* 2016; 16:693-700.
14. Solé E, Racine M, Tomé-Pires C, Galán S, Jensen MP, Miró J. Social factors, disability, and depressive symptoms in adults with chronic pain. *Clin J Pain* 2020; 36:371-378.
15. Bannon S, Greenberg J, Mace RA, Locascio JJ, Vranceanu AM. The role of social isolation in physical and emotional outcomes among patients with chronic pain. *Gen Hosp Psychiatry* 2021; 69:50-54.
16. Steptoe A, Shankar A, Demakakos P, Wardle J. Social isolation, loneliness, and all-cause mortality in older men and women. *Proc Natl Acad Sci USA* 2013; 110:5797-5801.
17. van Hecke O, Torrance N, Smith BH. Chronic pain epidemiology and its clinical relevance. *Br J Anaesth* 2013; 111:13-18.
18. Hackett RA, Hamer M, Endrighi R, Brydon L, Steptoe A. Loneliness and stress-related inflammatory and neuroendocrine responses in older men and women. *Psychoneuroendocrinology* 2012; 37:1801-1809.
19. Jaremka LM, Fagundes CP, Peng J, et al. Loneliness promotes inflammation during acute stress. *Psychol Sci* 2013; 24:1089-1097.
20. Marchand F, Perretti M, McMahon SB. Role of the immune system in chronic pain. *Nat Rev Neurosci* 2005; 6:521-532.

21. McEwen BS. Protective and damaging effects of stress mediators. *N Engl J Med* 1998; 338:171-179.
22. Lee CR, Chen A, Tye KM. The neural circuitry of social homeostasis: consequences of acute versus chronic social isolation. *Cell* 2021; 184:1500-1516.
23. Arnetz BB, Theorell T, Levi L, Kallner A, Eneroth P. An experimental study of social isolation of geriatric people: psychoendocrine and metabolic effects. *Psychosom Med* 1983; 45:395-406.
24. Clauw DJ. Diagnosing and treating chronic musculoskeletal pain based on the underlying mechanism(s). *Best Pract Res Clin Rheumatol* 2015; 29:6-19.
25. Luqmani R, Hennell S, Estrach C, et al. British Society for Rheumatology and British Health Professionals in Rheumatology guideline for the management of rheumatoid arthritis (after the first 2 years). *Rheumatology (Oxford)* 2009; 48:436-439.
26. Oliveira VC, Ferreira ML, Morso L, Albert HB, Refshauge KM, Ferreira PH. Patients' perceived level of social isolation affects the prognosis of low back pain. *Eur J Pain* 2015; 19:538-545.
27. Heinberg LJ, Steffen K. Social isolation and loneliness during the COVID-19 pandemic: impact on weight. *Curr Obes Rep.* 2021; 10:365-370.
28. McLay L, Jamieson HA, France KG, Schluter PJ. Loneliness and social isolation is associated with sleep problems among older community dwelling women and men with complex needs. *Sci Rep* 2021; 11:4877.
29. Flanagan EW, Beyl RA, Fearnback SN, Altazan AD, Martin CK, Redman LM. The impact of COVID-19 stay-at-home orders on health behaviors in adults. *Obesity (Silver Spring)* 2021; 29:438-445.
30. Steptoe A, Di Gessa G. Mental health and social interactions of older people with physical disabilities in England during the COVID-19 pandemic: a longitudinal cohort study. *Lancet Public Health* 2021; 6:e365-e373.
31. Nicoletti CF, Esteves GP, Genario R, et al. Nutritional inadequacies among post-bariatric patients during COVID-19 quarantine in Sao Paulo, Brazil. *Obes Surg* 2021; 31:2330-2334.
32. Carter SJ, Baranauskas MN, Fly AD. Considerations for obesity, vitamin D, and physical activity amid the COVID-19 pandemic. *Obesity (Silver Spring)* 2020; 28:1176-1177.
33. Hu J, Fitzgerald SM, Owen AJ, et al. Social isolation, social support, loneliness and cardiovascular risk factors: a cross-sectional study among older adults. *Int J Geriatr Psychiatry* 2021; 36:1795-1809.
34. Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. *PLoS Med* 2010; 7:e1000316.
35. Treichler EBH, Glorioso D, Lee EE, et al. A pragmatic trial of a group intervention in senior housing communities to increase resilience. *Int Psychogeriatr* 2020; 32:173-182.
36. Creese B, Khan Z, Henley W, et al. Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020. *Int Psychogeriatr* 2021; 33:505-514.
37. Rapo-Pylkkö S, Haanpää M, Liira H. Chronic pain among community-dwelling geriatric: a population-based clinical study. *Scand J Prim Health Care* 2016; 34:159-164.
38. Park J, Newman D, Engstrom G, Hammar LM, Swall A. The moderating and covarying effects of social support and pain intensity on depressive symptomology among racially and ethnically diverse older adults. *Pain Manag* 2017; 7:19-32.
39. Elran-Barak R, Mozeikov M. One month into the reinforcement of social distancing due to the COVID-19 outbreak: subjective health, health behaviors, and loneliness among people with chronic medical conditions. *Int J Environ Res Public Health* 2020; 17:5403.
40. Hruschak V, Flowers KM, Azizoddin DR, Jamison RN, Edwards RR, Schreiber KL. Cross-sectional study of psychosocial and pain-related variables among patients with chronic pain during a time of social distancing imposed by the coronavirus disease 2019 pandemic. *Pain* 2021; 162:619-629.
41. Office EE, Rodenstein MS, Merchant TS, Pendergrast TR, Lindquist LA. Reducing social isolation of seniors during COVID-19 through medical student telephone contact. *J Am Med Dir Assoc* 2020; 21:948-950.
42. Clauw DJ, Häuser W, Cohen SP, Fitzcharles MA. Considering the potential for an increase in chronic pain after the COVID-19 pandemic. *Pain* 2020; 161:1694-1697.
43. Wahezi SE, Kohan LR, Spektor B, et al. Telemedicine and current clinical practice trends in the COVID-19 pandemic. *Best Pract Res Clin Anaesthesiol* 2021; 35:307-319.
44. Telemedicine Use: Household Pulse Survey. Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/nchs/covid19/pulse/telemedicine-use.htm. Accessed November 2, 2021.
45. Eccleston C, Blyth FM, Dear BF, et al. Managing patients with chronic pain during the COVID-19 outbreak: considerations for the rapid introduction of remotely supported (eHealth) pain management services. *Pain* 2020; 161:889-893.
46. Mariano TY, Wan L, Edwards RR, Lazaridou A, Ross EL, Jamison RN. Online group pain management for chronic pain: Preliminary results of a novel treatment approach to teletherapy. *J Telemed Telecare* 2021; 27:209-216.
47. Mariano TY, Wan L, Edwards RR, Jamison RN. Online teletherapy for chronic pain: a systematic review. *J Telemed Telecare* 2021; 27:195-208.
48. Matthias MS, Kukla M, McGuire AB, Bair MJ. How do patients with chronic pain benefit from a peer-supported pain self-management intervention? A qualitative investigation. *Pain Med* 2016; 17:2247-2255.
49. A connected society: a strategy for tackling loneliness - laying the foundations for change. Department for Digital, Culture, Media and Sport. United Kingdom National Archives; 2018. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936725/6.4882_DCMS_Loneliness_Strategy_web_Update_V2.pdf. Accessed May 27, 2021.
50. Bonevski B, Randell M, Paul C, et al. Reaching the hard-to-reach: a systematic review of strategies for improving health and medical research with socially disadvantaged groups. *BMC Med Res Methodol* 2014; 14:42.
51. Parker S, Prince A, Thomas L, et al. Electronic, mobile and telehealth tools for vulnerable patients with chronic disease: a systematic review and realist synthesis. *BMJ Open* 2018; 8:e019192.
52. Sieck CJ, Rastetter M, McAlearney AS. Could telehealth improve equity during the COVID-19 pandemic? *J Am Board Fam Med* 2021; 34(Suppl):S225-S228.