



International Journal of Psychological Research and Reviews
(ISSN:2639-6041)



Elderly Problems During COVID-19: A Narrative Review

Tiffany Field, PhD

University of Miami/Miller School of Medicine and Fielding Graduate University

ABSTRACT

This narrative review summarizes published research on psychological problems of the elderly during COVID-19. This includes brief reviews of 54 studies that have focused on loneliness, anxiety, depression and/or sleep problems and their comorbidities. Risk factors for these problems have included pre-existing conditions, infection, inactivity, fear of COVID, fear of death, and lack of social media skills. Buffers for the problems have included exercise, cognitive behavior therapy, acupuncture and melatonin. Limitations of this literature are that the studies are typically surveys, they focus on infections or psychological problems but rarely on the combination of those problems, and they are highly variable on recruitment during lockdown and non-lockdown periods as well as varying on their measures, precluding the use of meta-analyses.

Keywords: Elderly, COVID, anxiety, depression, sleep problems, inactivity

*Correspondence to Author:

Tiffany Field, PhD
University of Miami/Miller School
of Medicine and Fielding Graduate
University

How to cite this article:

Tiffany Field. Elderly Problems
During COVID-19: A Narrative Re-
view. International Journal of Psy-
chological Research and Reviews,
2022, 5:59.

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This narrative review is based on studies on problems of the elderly during COVID-19 that have appeared on PubMed for the years 2019-2022. The terms elderly and COVID-19 were entered into the advanced search which yielded 586 papers. Inclusion criteria were peer-reviewed studies and exclusion criteria were case reports, non-English papers and research that was exclusively focused on the COVID infection. Following these criteria, 54 papers were selected for this review. Following a brief section on COVID infection studies, the review is organized around the primary psychological problems of the elderly in the COVID literature including loneliness, anxiety, depression and sleep problems. These are followed by sections on risk factors including inactivity, fear of COVID and death, and lacking social media skills. Buffers are discussed including exercise, cognitive behavior therapy, acupuncture and melatonin. And the review concludes with limitations of the literature and suggested future directions.

Comparisons of Effects of COVID Infection on the Elderly and Younger Adults

Most of the COVID literature on the elderly is focused on the infection. Only a few of those studies have also highlighted psychological problems. The studies that are focused on the elderly contrast elderly groups, typically greater than 60-years-old, with groups that are younger than 60-years-old. And, in most studies infection is more prevalent in the older group. In a comparison of the young and elderly (N=187), for example, more asymptomatic and severe cases were seen in the elderly and those numbers increased across 10-year age groups (Mori et al, 2021) And, a correlation was noted between age group and duration of COVID disease. In a study from Wuhan (N=273), the older group surprisingly showed decreased C-reactive protein (CRP) while the younger group showed increased CRP (Liu et al, 2020). This was surprising inasmuch as CRP is a marker for inflammation that is typically seen in COVID-19 infection. It is possible that because the elderly

are typically asymptomatic or severely ill, grouping those two extremes resulted in lower CRP levels than those noted for the younger group. In any case, the younger group was given an inflammatory corticosteroid while cardiovascular protection was provided for the older group.

In another elderly/young group comparison, also from Wuhan (N=222), a 28-day follow-up of those who had been hospitalized showed that the greater than 70-year-old group had more dyspnea, chronic cardiovascular disease, diabetes, a greater death rate, a longer hospital stay and they were lower socioeconomic status (Zhang et al, 2020). The death rate in the greater than 70 group was related to dyspnea, muscle ache, increased myocardial enzymes and elevated C3. Not surprisingly, the same predictors of hospitalization for the elderly were the predictors of death for the elderly. Likely, the severity of symptoms was just greater in the case of death. Similarly, in a sample of 204 elderly folks, the risk factors that were independently associated with death again included not only older age but also dyspnea, neutrophilia and cardiac troponin (Song et al, 2020). And, the comorbidities that were reported for this sample were similar to those of other samples including hypertension, cardiovascular disease and COPD, although, again, the data were not analyzed for the relative contribution these variables made to the disease severity and mortality outcomes.

In a study from South Korea (N=488) on severe COVID cases, a comparison again between the old and the young suggested that the old group had more severe COVID, underlying disease and a greater mortality rate (Seong et al, 2021). The risk factors for COVID severity were again the same as those for mortality including not only age but also acute physiology, diabetes, COPD, high white blood cell count, low neutrophil-lymphocyte ratio, a “do not resuscitate” order and invasive mechanical ventilation. In a significantly larger sample (N= 5746) from the International Hope- COVID-19 Registry

Multicenter, the mortality rate was 32% for the greater than 65-year-old group and 7% for the less than 65-year-old group (Pepe et al, 2021). In this sample, the therapeutic approaches for the elderly were more conservative.

Most of the COVID-19 infection studies were focused on prognostic factors for mortality. In a study from South Korea, activities of daily living impairment, comorbidity, fever and increased CRP were associated with death (Hwang et al, 2020). In this sample (N=340), 35% had severe pneumonia which was associated with impairment of activities of daily living, fever, infiltration of the chest, and increased CRP. Fifteen percent of the sample died. In another study on risk factors, a nomogram was formed from the combination of risk factors for severe versus non-severe COVID infection (Zeng et al, 2020). The risk factors included albumin, d-dimer and onset to hospitalization time. The decision curve analysis confirmed this nomogram.

It is perhaps not surprising that Long COVID has rarely appeared in this literature on the elderly given that as many as 80% of those older than 65 in some samples have been noted to die (Lee et al, 2020). In one review on Long COVID, the long-term effects included polyneuropathy, cerebrovascular disease, CNS infection, cognitive deficits and fatigue (Krupp et al, 2021). These symptoms are very similar to those that have been noted for chronic fatigue syndrome prior to COVID-19 (Aly et al, 2021). According to the review paper, the neurocognitive symptoms of Long COVID have been correlated not only with older age but also with severity of the disease, hypertension and renal failure. Underlying mechanisms were also addressed including hypoxic-ischemic brain injury and immunopathological mechanisms.

Some have argued that focusing health resources on COVID emergencies of the elderly has left major elderly medical areas uncovered including oncology and time-dependent and degenerative diseases (Iodice et al, 2021). Further, these authors suggested that larger

numbers have psychological problems that need to be evaluated for their cognitive and behavioral effects.

Psychological Problems of Infected Elderly

Daily COVID deaths have been correlated with depression (.36), anxiety (.50), suicide (.10) and insomnia (.10) (Rana, 2020). And, in that sample from India, mental health issues increased by 40% during the lockdown. The prevalence of psychological problems in elderly survivors of COVID infection has also been high in a sample that was collected two weeks post discharge (N= 69) (Mowla et al, 2022). The Geriatric Anxiety Scale and the Geriatric Depression Scale were administered in that study. The high prevalence being reported may relate to greater sensitivity of these scales that were specifically designed for the elderly. They may be more reliable for identifying these problems in the elderly than the more traditional anxiety and depression scales.

When an elderly group of survivors (65 years plus) was compared to an age-matched control group, those who were survivors, not surprisingly, had higher anxiety and depression scale scores (Mowla et al, 2022). Ninety-three per cent of the survivor group reported anxiety versus 60% of the age-matched control group and 87% reported depression versus 47% of the control group. The high rates of psychological problems in these studies highlight the prevalence of anxiety and depression not only in survivors of the infection but also in the non-infected folks who were experiencing the pandemic. In another study on COVID survivors (N =402), several psychological problems were reported in addition to anxiety (42%), and depression (31%) including insomnia (40%), post-traumatic stress disorder (32%) and obsessive-compulsive disorder (20%) (Mazza et al 2021). Females were noted to have more depression and anxiety despite their lower inflammatory markers which might relate to the typical two to one ratio of females to males reporting depression. In addition to having a previous psychiatric history, inflammatory

markers were also predictors of depression and anxiety at the follow-up assessment of this sample, but gender was not.

As some have noted, psychological/psychiatric disorders in the elderly accentuate the inflammatory state or in themselves are considered persistent inflammatory states that have been labeled immunosenescence (Grolli et al, 2021). Examples, including dementia, major depressive disorder and anxiety are notably more prevalent in the elderly. The immune and psychological problems are likely reciprocal/bidirectional.

Psychological Effects of the Pandemic on Non-Infected Elderly

Some have suggested that the number of those psychologically affected by the pandemic exceeds those physically affected by the infection during COVID (Lee et al, 2020). According to those authors, more than 20% of those older than 60 in the world have psychological problems. Nonetheless, the literature on psychological problems of the elderly comprises less than 10% of the published COVID-19 research. The most commonly researched psychological problems have included loneliness, fear of COVID, fear of death, anxiety, depression and sleep disturbances.

Loneliness

A study from Poland on the elderly suggested that as many as 59% were experiencing loneliness (Dziedzic et al, 2021). In this sample, significantly fewer people (19%) were experiencing depression. However, loneliness and depression were significantly correlated, as were loneliness and anxiety, which are frequently comorbid problems in this literature. Loneliness may have been reported more frequently not only because it is less severe than depression but also because it is less stigmatic than depression. And, the elderly who are often living alone and socially isolated might expect to be lonely and report it accordingly.

In a cross-sectional study from China (N=568), 34% reported being lonely and 16% severely lonely (Ju et al, 2022). The risk factors for loneliness in this study were poor quality sleep, inactivity and low socioeconomic status, although the relative variance of these was not reported. And, a comparison between the lonely and the non-lonely groups on these variables would have been informative.

In contrast to the high rates of loneliness in the previous samples, as many as 75% reported low loneliness in a phone survey from Austria (N=521) (Heidinger et al, 2020). In this longitudinal study that included pre-pandemic and during the pandemic assessments, loneliness slightly increased, although it remained rather low. Surprisingly, loneliness increased for folks living with someone else but not for those living alone. Conceivably, folks who were living alone were used to being alone and did not report being lonely or were not lonely because they were more frequently contacted during the lockdown because they were alone. These findings are seemingly inconsistent with several elderly loneliness studies in the literature, although at least one other comparison between loneliness in the young (20-40 years-old) and old (60-80 years-old) reported that the young living alone were more lonely than the old living alone (Field et al, 2020). And, loneliness increased across the course of the lockdown, as was predicted.

Loneliness has also been related to death anxiety. In a study from Turkey, the Loneliness Scale for the Elderly and The Death Anxiety Scale were administered to 354 participants (Guner et al, 2021). Moderate levels of loneliness and death anxiety were reported with as many as 75% experiencing increased levels of worry during COVID. Other data from this study suggested that those who were single and those with chronic conditions had higher loneliness scale scores. In addition, the authors reported that 46% had sufficient knowledge of COVID, 69% communicated with relatives and 49% had no hobby at home, factors that might

have contributed to their loneliness, death anxiety and increased levels of worry. The high levels of loneliness may have related to the Loneliness Scale for the Elderly being more sensitive to elderly reports and the high levels of worry would certainly relate to death anxiety given the prevalence of death in the elderly who have been infected. And death anxiety may be greater in those who live alone and are lonely because they do not want to die alone.

Loneliness has been a significant predictor of other problems as well. For example, in a study on sleep, loneliness was noted in 50% of older adults and, not surprisingly, mental health comorbidities overlapped (Parveen et al, 2021). In this study, loneliness was said to contribute to sleep problems, although this relationship was likely bidirectional. In another study from Turkey, the UCLA Loneliness Scale and the Insomnia Severity Index were administered (N=412) (45). The results suggested that loneliness and insomnia were significantly correlated, again a likely bidirectional relationship.

In a study from Hungary (N=589), both loneliness and intolerance of uncertainty led to mental health problems (Labadi et al, 2021). The relationship between Intolerance of uncertainty and fear of COVID would have been an interesting question to address in this study. Loneliness was the primary problem in a review of seven studies on the elderly during COVID (Kasar & Karaman, 2021). The authors concluded that technological opportunities and cognitive behavior therapies were needed for loneliness prevention. Although technology education would seemingly be more cost-effective than cognitive behavior therapies, that issue was not addressed in this review.

Fear of COVID and Fear of Death

Fear of Covid and fear of death are significant psychological problems that have been experienced during COVID-19. The prevalence warranted the development of a 7-item scale called The Scale of Fear of COVID-19 Infection. In a study from Poland (N = 500), elderly with higher anxiety levels scored higher on the fear

scale (Agrawal et al, 2021). In addition, females and patients taking anticoagulants were higher-scoring. The question arises as to how much fear of COVID infection predicts the fear of death in the elderly, although this was not addressed in this study.

In another study using the Scale of Fear of COVID-19, pre-existing conditions were negatively correlated with scores on the scale (Yadav et al, 2021). In this study from Nepal (N=847), those who had pre-existing conditions may have been more worried about their pre-existing conditions than about COVID infection. Not surprisingly, remoteness of a health facility was positively related to the fear of COVID infection. In still a third study using the Fear of COVID Scale, older isolated adults in Bangladesh who had friends or relatives who had been infected were more fearful which was not surprising (Mistry et al, 2021). A surprising finding for the COVID fear scale was that as the fear of COVID infection increased, self-care decreased which is the opposite of what would be expected and difficult to interpret (Sharifi et al, 2021). In a similar study, death anxiety and death-related depression were correlated with each other (N= 344) (Erbesler et al, 2022). This was not surprising given that depression and anxiety are typically comorbid.

Anxiety and Depression

The prevalence of anxiety and depression has varied across cultures. These mood states are often considered together given their comorbidity. In a theoretical review from Korea, 37% of the elderly experienced depression or anxiety (Lee et al, 2020). The authors suggested that fear and anger should also be considered as the two are often comorbid with anxiety and depression. These findings are tentative given that this was a theoretical not a systematic review based on data.

A slightly greater prevalence has been noted in a sample from Italy at 45% depression, anxiety or anger (Maggi et al, 2021). The authors noted that resilience mediated the relationship between these problems and the fear of COVID.

The sample (N=334) was, surprisingly, noted to have a similar prevalence of depression during the quarantine (time one of the study) and two months after the quarantine (time two). However, severe depression at time one was associated with post-traumatic stress symptoms at time two, although it was unclear how much of the variance in posttraumatic stress was explained by depression. The measurement of anger was unique to this COVID study which is surprising given that aggression was prevalent during COVID which often derives from anger (Field, 2021) and has also been comorbid with anxiety and depression (Field et al, 2003). The measurement of post-traumatic stress in the elderly was also unique to this study. Conceivably it was rarely addressed in this literature because post-traumatic symptoms often don't appear until after the stress situation subsides.

In a study involving telephone interviews by family medicine residents, 38% of participants reported depression (Levkovich et al, 2021). A significant amount of the variance in depression was explained by a lack of optimism and social support (29%). A significantly lower rate of depression (14%) was reported in another study based on the Geriatric Depression Scale (Kurniawidjaja et al, 2022). However, an additional 40% reported a "tendency for depression". The combined prevalence of depression and the "tendency for depression" in this survey study was linked to retirement and income as well as illness, family and social support.

The Geriatric Depression Scale has typically yielded a greater prevalence of depression which may relate to its inclusion of those with a "tendency for depression". Also it has typically been assessed via survey as opposed to telephone interviews that were used in the study just noted with lower prevalence (Levkovich et al, 2021). Folks may feel less stigmatized reporting depression via survey than via phone interviews given that surveys are typically anonymous.

In a study on anxiety in the elderly (>65-years-old) from Turkey (N=278), 32% scored above the cutpoint on the Geriatric Anxiety Inventory (Sirin et al, 2021). The risk factors were not only age but also female gender (38% in females versus 24% in males), economic loss, uncertainty and time watching news on COVID. The authors mistakenly referred to their sample as having generalized anxiety disorder based on the survey inventory rather than a diagnostic interview. Surprisingly, in a longitudinal study no change was reported for affective or anxiety disorders between time one at the beginning of the lockdown and time two which was four months later (Seethaler et al, 2021). In this telephone interview study, an increase was noted in psychosocial support and demand for sports, OT, PT and psychotherapy. It was surprising that no change occurred across these time periods even though less stress would be expected following the end of the lockdown and especially with the additional supports and therapies that were experienced. Perhaps even more surprisingly, only mild negative emotions were noted in most of a large sample study (N=1278) from 31 provinces in China (Zhou et al, 2021). In this study, chronic diseases and BMI index were noted to affect depression, neurasthenia, fear, anxiety and hypochondria. It would appear that the pre-existing conditions, i.e. the chronic diseases and BMI index outweighed the negative effects of the pandemic in this large sample from China which is not surprising especially if those with pre-existing conditions worried more about their pre-existing condition than about the risk for COVID infection. And in other surprising findings, stress, anxiety and depression were the same for quarantine and non-quarantine age-matched controls (Ouanes et al, 2021). This sample from Qatar again considered the elderly anyone older than 60 years. Higher scores were noted in females but the scores were not linked to any other variables including age, psychiatric history, duration of the quarantine or religiosity. The lack of quarantine effects on these emotions and the

Table 1. COVID-19 infection symptoms in elderly versus young groups (and first authors)

Symptoms	First authors
More frequent asymptomatic and severe cases	Mori
Lower levels C-reactive protein	Liu
Greater prevalence dyspnea	Zang, Ping
Greater mortality	Seong, Pepe
Greater prevalence pneumonia	Hwang, Lee
Higher levels d-dimer	Zeng
Greater prevalence Long COVID	Aly, Krupp, Iodice

Table 2. Psychological problems in infected elderly during COVID-19 (and first authors)

Problems	First author
Anxiety	Rana, Morola, Mazza
Depression	Rana, Morola, Mazza
Insomnia	Rana, Mazza
Post-traumatic stress disorder	Mazza
Inflammatory markers	Mazza, Grolì

Table 3. Psychological problems in non-infected elderly during COVID-19 (and first authors).

Problems	First authors
Loneliness	Dziedzic, Ju, Heidinger, Field, Guner, Parveen, Labadi, Kasar
Fear of COVID and death	Agrawal, Yadav, Mistry, Erbesler
Anxiety and depression	Lee, Maggi, Levkovich, Kurnidirdjaja, Garcia-Fernandez, Gangwar, Field
Suicide	Rana, Chou
Sleep disturbances	Parveen, Kasar, Amicucci, Yazici, Field
Lower levels melatonin	Ozturk

Table 4. Behavior problems in the elderly during COVID-19 (and first authors).

Problems	First authors
Inactivity	Hofmann, Oliveira, Champonniere, Takunbo
Lacking social media skills	Delgado, VanJaarsveld, Lorente-Barrero, Yildirin

Table 5. Buffers for elderly problems during COVID-19 (and first authors).

Buffers		First authors
Personal Qualities		
Optimism		Levkovich, Sardella
Resilience		Lee
Behaviors		
Exercise		Cruz, Kasar, Tokunbo, Colucci
Therapies		
Cognitive behavior therapy		Kasar
Acupuncture		Zhao
Melatonin		Cardinali, Ozturk

lack of links to all variables except gender raises questions about limited variability on these factors and/or limited statistical power.

In a study that compared a greater than 60-year-old with a younger than 60-year-old group (N=639), the older group reported less stress and depression than the younger group (Garcia-Fernandez et al, 2020). These findings from a Spanish sample are consistent with those from a survey study in the U.S. (Field et al, 2020). In the U.S. study (N= 167), the young (20-40-years-old) and especially the young living alone experienced greater stress and depression than the older sample (60-80 years-old). And, in a study from India (N=119), the younger participants also reported more anxiety and depression than the elderly group (Gangwar et al, 2021). An interesting variable called “number days of lifestyle change” was also predictive of depression and anxiety.

Despite the significant variability across studies on the elderly being more or less depressed than young adults, depression can be a serious problem that has resulted in suicides in the elderly. In a study from India, suicide was significantly correlated with daily COVID deaths (a significant correlation of .20) (Rana, 2020). The only other paper that relates to suicide in this literature was a discussion of the different suicide theories including interpersonal, three-step and hopelessness theories (Chou et al, 2020). The authors concluded that interviews with the elderly should match the intrinsic belief of the suicide attempter, highlighting the significance of identifying depression in the elderly.

Sleep Disturbances

Sleep disturbances have also been a prevalent problem for the elderly during COVID-19 (Parveen et al, 2021). In this review of studies on sleep problems during COVID, 50% of the elderly reputedly suffered from sleep problems. Sleep disturbances were noted to relate to social isolation and loneliness, as might be expected. And, mental health issues and comorbidities were overlapping. Although the authors referred

to them as overlapping, they are likely reciprocal as well as overlapping problems. In another review, sleep quality was notably inferior in the elderly, especially the older living alone (Kasar & Karaman, 2021).

In a very unusual comparison between adolescents and the elderly in Italy during COVID-19, the adolescents were noted to have more severe insomnia, worse sleep quality, longer sleep latency, daytime dysfunction, greater disruption of sleep habits including bedtime, risetime and naptime and greater depression and stress (Amicucci et al, 2021). The elderly, in contrast, were noted to have shorter sleep duration, lower sleep efficiency and greater use of sleep medications which might at least explain their lesser insomnia and latency to sleep. Despite the significant age difference between these two groups with the adolescents averaging 19 and the elderly averaging 68, the sample sizes are extremely unequal with the number of adolescents being twice the number of elderly, statistically limiting these results.

At least two research groups have reported significant relationships between poor sleep quality and loneliness. In one study from Turkey (N =412), loneliness and insomnia were correlated based on the UCLA Loneliness Scale and the Insomnia Severity Index (Yazici et al, 2022). This seemingly was a bidirectional relationship. And, in the study from China, sleep quality was considered a risk factor for loneliness (Ju et al, 2022). However, loneliness would be expected to affect sleep quality, again in a bidirectional relationship.

In a review paper on melatonin in the elderly, sleep problems were associated with decreasing melatonin (Ozturk et al, 2020). Notably, melatonin has significant effects on circadian rhythms including sleep which was highlighted in this review that unfortunately did not include illustrative data.

Behavior Problems in Non-Infected Elderly

Two of the most prevalent and frequently studied behavior problems for the elderly during COVID-19 are inactivity and lack of social media skills. Although inactivity has been widespread and a significant problem for all age groups during COVID-19, the lack of social media skills seems to be unique to the elderly.

Inactivity

In a study from the Netherlands (N = 5777), as many as 59% did not meet World Health Organization criteria for physical activity during COVID-19 (Hofman et al, 2021). In this study there was a steadily low trajectory based on latent class trajectory analysis of three different time points. Those who were less active were also older, less educated, had poorer health, were more depressed, had a less healthy diet, engaged in more smoking and less drinking and were less often retired. Unfortunately, the relative significance of these variables was not determined. The lesser activity in the non-retired individuals may have related to their doing desk work at home with less time for physical activity. In a systematic review of 25 studies (14 cross-sectional and 11 cohort studies) on physical activity and physical fitness, decreases in physical activity and physical fitness were noted along with increased sedentary lifestyle during COVID-19 (Oliveira et al, 2022). It's not clear how directionality was determined based on so many cross-sectional studies and a meta-analysis apparently could not be conducted because of the three different types of measures that were used across studies.

Just as for adolescents during COVID-19 (Field, 2021), the decreased activity noted in the elderly was also related to increased screen time. In a study from France, for example, physical inactivity and sedentary behavior were noted to increase during lockdown in a sample of 1178 elderly participants (Chambonniere et al, 2021). Those who met physical activity recommendations before lockdown experienced a greater decrease in physical activity during lockdown, as might be expected.

In a paper with the interesting title "COVID-19 sitting is the new smoking", a review of studies revealed that more activity during COVID-19 was associated with fewer falls, less osteoarthritis and cancer, decreases in depression and anxiety, decreases in inflammatory markers including IL-6, TNF-alpha and C-reactive protein as well as an increase in IL-6, IL-15 and brain derived neurotrophic factor (Tokunbo et al, 2021). The authors interpret the paradoxical finding that IL-6 was both a pro-inflammatory and an anti-inflammatory by saying that IL-6 can be considered pro-inflammatory if expressed by macrophages and anti-inflammatory if expressed by muscle cells. The decrease in IL-15 is significant inasmuch as it can regulate metabolic diseases including obesity and diabetes, which have both been significant pre-existing conditions for COVID-19 infection.

Lacking social media skills

Some have called social media during COVID-19 an "infodemic". In a scoping review of 33 articles, younger adults and females were most affected by exposure time to COVID-19 social media (Delgado et al, 2021). More exposure time to COVID-19 information led to greater anxiety, depression and stress in the younger adults versus the elderly. This was not a systematic review but the conclusions are consistent with other literature on excessive exposure to social media by the youth (Field, 2021).

In contrast, social media for the elderly has been referred to as a "digital divide" or the "gray digital divide" and the importance of closing the digital divide was noted by this author (Van Jaarsveld, 2020). Data were also cited in this paper that 40% of the elderly are unprepared to use telehealth. In a study exploring risk factors in the elderly, a structural equations analysis revealed that insufficient knowledge about the pandemic led to being worried about the negative effects on family in turn leading to loneliness, boredom, distress and depression (Yildirim et al, 2021).

Others have highlighted the importance of information and communication technology for the elderly (Llorente-Barroso et al, 2021). These authors claim that both information and communication technology would “prevent infection, provide access to entertainment and hobbies and improve self-esteem”, although the degree of the effectiveness of these technologies for the elderly has not been assessed.

Buffers for Elderly Problems During COVID-19

Several buffers for elderly problems have been reported in the COVID-19 literature. These include the personal qualities of optimism, self-worth, self-efficacy and resilience. Behaviors that have been studied as buffers for problems of the elderly during COVID-19 include emotion-focused coping, religiosity and exercise. Effective therapies have included cognitive behavior therapy, acupuncture and melatonin.

Personal Qualities as Buffers

Optimism has been noted as a buffer for elderly problems in at least two COVID-19 studies. In a longitudinal study on 141 outpatients both before and during a lockdown, optimism was noted to contribute to the mental component of The Quality of Life Scale (Sardella et al, 2021). In another study, optimism combined with social support led to less depression with a combination of these variables contributing to 29% of the variance in depression (Levkovich et al, 2021). In a theoretical review, several personal qualities were considered buffers including self-esteem, self-efficacy and resilience (Lee et al, 2020).

Behaviors as Buffers

Exercise has had buffering effects in a few studies for inactivity of the elderly during COVID-19. In one study it was viewed as a buffer against all mental health problems (Cruz et al, 2021). In a study on elderly living alone and experiencing loneliness, several behaviors/activities in addition to exercise were recommended as buffers (Kasar & Karaman, 2021). These

included laughter, meditation, gardening therapy, dance and yoga. Surprisingly, one of the most popular activities of the elderly, namely tai chi, was not mentioned. Importantly, in a review on inactivity in the elderly, activity was noted for its significant role in reducing inflammatory markers including IL-6, TNF-alpha and C-reactive protein, markers that have been associated with COVID-19 (Tokunbo et al, 2021).

Physical activity was also a significant predictor variable for changes that occurred pre-lockdown to lockdown periods (Colucci et al, 2022). In this study pre-lockdown was compared to 3 months after the start of a lockdown and during a second lockdown in healthy elderly individuals (N =72). Although there were differences between pre-lockdown and the first lockdown and between pre-lockdown and the second lockdown, there were no differences between the first and the second lockdown on quality of life. Physical activity buffered these changes along with levels of energy, happiness, and memory. Although these are interesting variables, It's not clear why these variables were selected except that they were of interest to the researchers just as many of the study variables are selected for that reason.

Therapies as Buffers

The intervention literature for elderly problems during COVID-19 has been very limited. Cognitive behavior therapy, acupuncture and melatonin have received some attention. In a review paper on seven studies on loneliness in the elderly during lockdowns, the authors suggested cognitive behavior therapy and technology opportunities as potential buffers (Kasar & Karaman, 2021). Seemingly, education on technology for the elderly would lead to more communication and less loneliness and would be less costly than cognitive therapy, but these interventions have not yet been tested.

Emotional therapy has also been suggested and assessed in a study that compared emotional therapy with a combination of emotional therapy plus acupuncture (Zhao et al, 2021). Not

surprisingly, the combined therapy group versus emotional therapy alone showed a decrease in depression at three, six, nine and 12 weeks following the therapy. Surprisingly, the researchers didn't include an acupuncture only group.

Melatonin as therapy has been the focus of at least two studies probably following on the sleep disturbances that have been noted in the elderly during COVID-19. In one study, the elderly are considered a high risk COVID group for diminished melatonin that occurs with age (Cardinali et al, 2020). Melatonin counteracts infection as an antioxidant, anti-inflammatory and immunomodulatory antiviral. Chronotherapy by melatonin restores the optimal circadian pattern of the sleep-wake cycle. In that sense melatonin would be considered a mediating variable for the restorative sleep effects on immune function. In a review paper, melatonin effects have also been related to neuroendocrine and cardiovascular functions (Ozturk et al, 2020). The authors concluded that melatonin can prevent age-related oxidative stress that would have implications for COVID risk.

Methodological Limitations of this Literature

Starting with the type of studies that are frequently conducted, surveys are limited to computer-literate elderly samples which are not representative. Surveys might be compared to phone interviews to determine whether older and less computer-literate individuals might be more frequently recruited by phone interviews. Although, the elderly might be more self-revealing on surveys than phone interviews because surveys are typically anonymous and the elderly might not feel as much stigma reporting moods like depression on anonymous surveys.

The 60-year-old cut-off for the elderly for most studies may be on the young side given that many sixty and seventy-year-olds are still working and active as well as being computer-literate. The relatively young cut-off might be masking elderly/youth differences. Some have

said, for example, that the elderly responses to the pandemic have been similar to that of folks in their 50s based on responses they received in 27 countries (Daoust et al, 2020).

Other types of variability in recruitment including infected versus non-infected individuals and lockdown versus non-lockdown periods are limiting in terms of conducting systematic reviews and meta-analyses. Surprisingly, these groups have rarely been compared even though differences would be expected with infected looking worse than non-infected groups and lockdown groups being more affected than non-lockdown groups.

A reporting bias might also exist for the elderly. For example, they might have a greater inclination to report loneliness if they are living alone when loneliness might be expected. Or, they they might be less inclined to report depression because depression was seemingly more stigmatic in their earlier years.

Regarding measures, a comparison between traditional and geriatric measures, for example, for depression and anxiety might reveal differences in the severity level being assessed. It's conceivable that because the geriatric measures of depression and anxiety are more specific to that age group, they may be more sensitive in detecting those problems than the traditional measures like the State Anxiety Inventory or the Beck Depression Inventory. In any case, the variability on the measures being used has contributed to the literature lacking systematic reviews and meta-analyses.

The pre-existing conditions or comorbidities that the elderly typically experience may contribute to their anxiety in addition to their worry about COVID infection. Knowing that their age and pre-existing condition compounds their risk for infection may contribute to additional stress. In that sense, these are more than confounding covariate variables which may be need to be considered as group comparison, mediating or moderating variables.

Mediators have rarely been assessed in the COVID-19 literature on elderly problems. Mediator/moderator analyses may be more appropriate than correlation analyses and even hierarchical regression analyses. The most frequent focus on prevalence has led to the primary use of hierarchical regression analyses. Using more complex data analyses such as structural equation modeling, although rarely used in this literature, may be desirable for determining complex relationships between multiple variables.

Etiology and mechanism research has less frequently appeared in this literature that has focused mainly on prevalence data. An example of the benefits of mechanism research comes from the sleep/melatonin data revealing that melatonin is needed to restore the natural sleep cycle which has been interrupted during the COVID-19 pandemic for many elderly people.

Despite these methodological limitations, this literature on COVID-related problems in the elderly has alerted providers of their risk not only for COVID infection but for psychological and behavior problems deriving from the pandemic lockdown and non-lockdown periods. Further, it will likely help inform prevention/intervention research and clinical programs that are needed to reduce the pandemic-related problems for the elderly.

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