

The Impact of Social Distancing on an Aging Population During a Pandemic: The Relationship Between
Social Connection and Mental Health Symptomatology

by

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Abstract

In past research, social connection, as defined by its functional, qualitative, and structural aspects, has been shown to positively impact older adults' mental and physical health. Considering the tremendous public health issue SARS-CoV-2 (also called COVID-19) has become, examining these factors is needed during an active wave of the pandemic. In the current study, two social connection constructs—social isolation assessed with the Social Network Index and loneliness evaluated with the University of California, Los Angeles Loneliness Scale—were administered along with the Geriatric Depression Scale: Short Form and the Geriatric Anxiety Inventory. These surveys, along with a COVID-19 related survey and demographic questionnaire, were completed by 63 older adults. Multiple regression analyses were conducted to evaluate how well the connection measures predicted depression and anxiety scores. Loneliness significantly predicted both mental health variables in the regression analyses; however, social isolation did not, which indicated perceived connection might have more impact on mental health than the number of people in one's network and frequency of contact. Thus, quality and perception of relationships could be a more efficacious area of focus in intervention plans than structural social connection (i.e., CBT model).

Keywords: loneliness, social isolation, aging, depression, anxiety, COVID-19

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Table of Contents

CHAPTER I.....	8
1 « Introduction ».....	8
<u>Literature Review</u>	
1.1 « Disease Outbreaks and Mental Health Impacts ».....	10
1.2 « Social Connections ».....	12
1.3 « The Impact of Social Connections on Overall Health ».....	14
1.4 « The Impact of Social Connections on Mental Health».....	15
1.5 « Possible Interventions ».....	16
1.6 « Current Study ».....	17
1.7 « Hypotheses ».....	18
CHAPTER II.....	21
2 « Method ».....	21
2.1 « Participants ».....	21
2.2 « Measures ».....	21
2.3 « Procedure ».....	23
CHAPTER III.....	24
3 « Results ».....	24
<u>Overview</u>	
3.1 « Description of the Sample ».....	24
3.1 « Descriptive Statistics ».....	26
3.2 « Hypothesis Testing ».....	27
3.3 « Additional Analyses ».....	31
CHAPTER IV.....	34

4. « Discussion ».....	35
4.1 «Limitations».....	39
4.2 «Conclusions and Future Directions ».....	40
References.....	43
Appendices.....	57

List of Tables

Table 1: Demographic Characteristics of the Sample.....	25
Table 2: Descriptive Statistics for the Social Connections and Mental Health Variables.....	26
Table 3: Bivariate Correlations Between the UCLA Loneliness Scale, the SNI Subscales, GAI and GDS: SF.....	27
Table 4: Summary of Finding and Standardized Beta Coefficients for Forced Entry Regression Analyses of Social Connection Measures and Depression.....	31
Table 5: Summary of Finding for Stepwise Regression Analysis—The Prediction of Depression from Social Connection Measures	30
Table 6: Summary of Finding and Standardized Beta Coefficients for Forced Entry Regression Analyses of Social Connection Measures and Depression.....	30
Table 7: Summary of Finding for Stepwise Regression Analysis—The Prediction of Anxiety from Social Connection Measures	31
Table 8: Bivariate Correlations Between Anxiety, Depression, Medical Health, COVID-Worry Variables, Satisfaction with COVID-19 Related Information, and Confidence in the Medical Community.....	32

List of Appendices

Appendix A: Demographic Questionnaire.....	57
Appendix B: COVID-19 Survey.....	58
Appendix C: The UCLA Loneliness Scale.....	60
Appendix D: The Social Network Index.....	63
Appendix E: Geriatric Anxiety Inventory.....	66
Appendix F: Geriatric Depression Scale: Short Form.....	68

The Impact of Social Distancing on an Aging Population During a Pandemic: The Relationship Between Social Connection and Mental Health Symptomatology

According to data from the 2019 revision of the World Population Prospects, worldwide, one in eleven people are currently over 65, and one in six people are projected to be 65 or older by 2050 (United Nations, 2019). During this period of life, one is most at risk of health decline and various other psychosocial concerns. Thus, when considering the rapid growth in the aging population, research directed at improving the latter period of one's life requires more attention. There is currently an increased interest in research of the like (Fakoya et al., 2020), and health concerns in older adults are being examined more closely due to the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2/ COVID-19) pandemic. From the emergence of this disease in December 2019 until now (December 28, 2021), there have been over 282.6 million COVID-19 infections and about 5.4 million resultant deaths (Johns Hopkins University, 2021). Those most at risk of complications from COVID-19 are older adults (Novel Coronavirus Pneumonia Emergency Response Epidemiology Team, 2020), particularly those in congregate living settings (Applegate & Ouslander, 2020; Le Couteur et al., 2020)—individuals who also appear to be at an increased risk for depression (Valliant & Asu, 1985; Valliant & Furac, 1993).

This is particularly concerning—not only are older adults more at risk of requiring medical attention from this virus (due to comorbidities and frailty), but the mental health challenges that may result from fear and lack of social support and interaction are also alarming (Steinman et al., 2020). Without strong containment measures, it was estimated that 40-70% of the population could become infected with COVID-19 (Anderson et al., 2020). Because of the risk of spread, several countries declared states of emergency and implemented mass quarantines (Khanna et al., 2020). Among many precautionary procedures, a minimum of one-meter distance between individuals who reside in separate households was recommended

(World Health Organization, 2020). During the height of the pandemic, schools and workplaces were closed, and public gatherings were prohibited (Kupferschmidt & Cohen, 2020; Lippold et al., 2020). Because of the high-risk status among aging individuals, most old-age homes suspended non-essential visits, and many older adults who resided at home opted to cease non-essential in-person contact with others to stay safe (Morrow-Howell et al., 2020). The closure of common meeting centers and churches also contributed to a lack of socialization among older individuals (Parlapani et al., 2020). Unfortunately, this led to the cancellation of routine medical visits (Schrack et al., 2020), more isolation, reduced physical activity and a lack of support and knowledge to manage daily activities—especially for those in community dwellings (Mills et al., 2020). Some people adapted to social distancing recommendations by utilizing online tools to obtain information and communicate with friends, family, and health care systems. However, differences in abilities (i.e., cognitive decline, hearing loss), as well as comfort with, knowledge of (Steinman et al., 2020) and access to technology (Morrow-Howell et al., 2020), could make this difficult for an aging population (Monahan et al., 2020).

Being that researchers have previously linked factors related to social connection (i.e., social isolation, loneliness, quality of relationships) to adverse mental-(Domenech-Abella et al., 2019) and physical-health outcomes in an older population (Holt-Lunstad et al., 2010), it would stand to reason that these impacts may be exacerbated during circumstances where physical distancing is required. Previous research examining the mental health impacts during infection outbreaks (i.e., the 2003 SARS outbreak) has highlighted an increase in psychological morbidity during such times (Rubin et al., 2010; Van Bortel et al., 2016; Leung, 2003). That said, a pandemic of this magnitude is a rarity and literature regarding how this may impact the mental health of an aging population is still relatively sparse (Vahia et al., 2020; Wang et al., 2020).

A summary of the existing literature on the mental health impacts noted during previous outbreaks and preliminary research related to the COVID-19 pandemic and mental health is outlined below.

Literature Review

Disease Outbreaks and Mental Health Impacts

As aforementioned, data pertaining to previous disease outbreaks can help inform researchers. As such, articles related to the mental health impacts of the 2003 SARS epidemic have been examined. Research investigating the psychological impact of the outbreak showed worsening social relationships (Lau et al., 2005) and higher levels of emotional distress and psychological morbidity after the epidemic (Leung et al., 2003; Maunder et al., 2003; Nickell et al., 2004). There was also an increase in general stress and post-traumatic stress symptoms (Lau et al., 2005; Wu et al., 2009), which were two to three times more likely in those who were quarantined, worked with SARS patients, or had friends or family who contracted SARS (Wu et al., 2009). Even in areas with low spread levels (Canada & the United States), the outbreak had a significant psychological impact (Blendon et al., 2003). Increased rates of suicide among older adults during the epidemic should also be noted (Chan et al., 2006). Yip et al. (2010) reported social disengagement, fears of burdening family members, stress, and anxiety contributing to SARS-related suicide deaths among an aging population.

Research conducted at the beginning of the COVID-19 pandemic headed similar results, demonstrating that along with physical health, mental health impacts should be attended to during disease outbreaks, especially ones of this magnitude (Brooks et al., 2020; Shigemura et al., 2020). Di Giuseppe et al. (2020) conducted a study during the first week of lockdown in Italy (one of the countries most severely impacted by the pandemic early on). They found that about 30-50% of scores on distress, depression, anxiety, and PTSD measures were within clinical

ranges. Similarly, during the height of the epidemic in China, moderate to severe psychological impact, depressive symptoms and anxiety were reported by 1,210 participants at rates of 53.8%, 16.5% and 28.8%, respectively (Wang et al., 2020). This is a drastic increase from the DSM-V reported 1-5% prevalence rate of major depressive disorder among community-living samples of adults aged 65 and older (American Psychological Association, 2013). Females reported a more significant psychological impact, higher stress, anxiety, and depression overall (Wang et al., 2020). Women reported more fear and distress related to COVID-19 in studies by Di Giuseppe et al. (2020), Lippold et al. (2020), and Sadikovic et al. (2020). Considering that women are typically more anxious than men (Toufexis, 2006), these results were expected. Other populations that appeared to be most at risk of psychosocial concerns based on the literature were adults 60 years of age and older (Qiu et al., 2020; Sadikovic et al., 2020) with chronic medical conditions and low socioeconomic status (Marazziti & Stahl, 2020), as well as disabled people, psychiatric patients, and their caregivers (Qui et al., 2020). Impacts appeared to be most severe in those older and socioeconomically disadvantaged (Churchill et al., 2021). During enforced quarantine, individuals with dementia also showed worsening or new anxiety, depression, and insomnia symptoms (Cohen et al., 2020). Primary worries identified included isolation and the restrictions on one's daily activities, financial troubles, and other economic-related things, as well as family and friends becoming infected (Shapiro et al., 2020).

Additionally, job security and, in turn, the economic stability of older adults has shown to have been impacted by social distancing restrictions (Statistics Canada, 2020; U.S. Department of Labour Statistics, 2019), with older individuals being less likely to own smartphones or have access to the Internet and many occupations being filled by this demographic unable to transition to telework (i.e., positions that require manual labour; Anderson & Perrin, 2017). According to Monahan et al. (2020), early retirement has also

increased throughout the COVID-19 pandemic, which may result in an even greater likelihood of anxiety and depression.

A clear relationship has been demonstrated between mental health factors (i.e., psychological distress, depressive symptoms, anxiety, insomnia, social detachment, etc.) and social distancing—with social detachment being particularly distressing for older individuals living alone or receiving home care (Parlapani et al., 2020). Based on previous research, it is also evident that government-imposed social restrictions increase the risk of isolation, loneliness, and boredom (Banerjee & Bhattacharya, 2020), factors that are already more likely to occur in late life (Thakur & Jain, 2020).

This study examines these factors during an unprecedented time, where social isolation is amplified. Outlined below is a detailed explanation of social connections as defined in this research and the various health impacts associated with low social connections as seen in the literature.

Social Connections

Social isolation and loneliness in older adults have been studied separately and together to a large degree. Factors that seemingly play a role in disconnectedness include things like chronic illness, retirement (Capcioppo & Hawkey, 2003), divorce, death and institutionalization of friends and family, as well as increased likelihood of living alone (Li & Ferraro, 2005; Sundstrom et al., 2020; Valliant, 2019). Ostensibly as the years go on, advances in technology and globalization would promote social connections; however, according to a study by McPherson et al. (2006), the number of Americans who report having no confidant has tripled in the past 20 years. Tang et al. (2019) also highlighted a twofold increase in persons living alone in Canada over the past 35 years. Additionally, during this time, there has also been a reduction in intergenerational living, marriages are now occurring later in life, and there are many more dual-

career families, as well as single-residence households—all of which point towards a continued trend of decreased social connection (McPherson et al., 2006). When this already existing trend is compounded by the government-imposed social restrictions that have been in place for the past two years, the importance of understanding these social factors is highlighted.

To examine the impact that these factors have on mental health symptomatology during the COVID-19 pandemic, a definition of social connection was obtained from the Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults (National Academies of Sciences, Engineering, and Medicine, 2020)—an ad hoc committee tasked to examine the literature on social isolation, loneliness, and health in older adults. As such, social connection, as it pertained to this research, refers to a term covering the structural, functional, and qualitative aspects of how people connect. The committee thoroughly examined the literature, and it was determined that being alone (social isolation) and loneliness are separate things that, although related, based on past research, are not significantly correlated (National Academies of Sciences, Engineering, and Medicine, 2020; Hughes et al., 2004). Thus, even though feeling lonely can be associated with the physical separation from others, one can often be alone and not feel lonely, as well as feel lonely when in the presence of others, depending upon relationship factors like emotional support and closeness (Cornwell & Waite, 2009).

According to the committee, social isolation is viewed as an indicator of social connection that is structural in nature, based on the existence of relationships. To be socially isolated, one is objectively physically separated from others with infrequent social contact and limited social network ties (National Academies of Sciences, Engineering, and Medicine, 2020). On the other hand, loneliness is viewed as a more functional indicator of social relationships based on perceived connection, support, and inclusion (Cohen & Wills, 1985). Therefore, to be lonely, one would experience the subjective distress of feeling alone due to a discrepancy

between desired and actual social connections (Luo et al., 2021). It is well recognized that humans are inherently social beings that require a sense of belonging. Thus, loneliness can be viewed as an adaptive response, encouraging the development and maintenance of social relationships (Baumeister & Leary, 1995). As examples, the qualitative aspects of connection would then be the positives and negatives experienced in social relationships, like relationship strain or marital satisfaction. However, because the committee identified the qualitative aspects of connection as deeper level factors that influence loneliness (National Academies of Sciences, Engineering, and Medicine, 2020), this aspect of social connection will not be measured separately.

The Impact of Social Connections on Overall Health

Results of several studies indicate a relationship between social factors and increased risk for adverse physical health outcomes (Menec et al., 2020), including cardiovascular disease, stroke (Valtorta et al., 2016), elevated blood pressure (Cacioppo et al., 2002), impaired sleep (Cacioppo et al., 2002), impaired cognition, and dementia (Penninkilampi et al., 2018). According to Holt-Lunstad et al. (2010), the health impacts of isolation and loneliness are comparable to established risk factors recognized by health care systems like lack of physical activity, smoking and obesity. This appears to be a reciprocal relationship—being lonely or socially isolated affects health and health conditions that arise, increasing social isolation and loneliness. Robust evidence in the literature also suggests an association between the absence of social connections and an inflated risk for premature mortality from all causes. Additionally, those who feel lonely may have weakened immune cells (Cole et al., 2015; Valliant, 2019), making it difficult to fight off viruses and increase vulnerability to infectious diseases (Cole et al., 2015). These things position this already high-risk population at an elevated risk for contracting COVID-

19 and other illnesses and experiencing more severe symptoms. The mental health impacts of social disconnectedness are also noteworthy and are outlined in the next section.

The Impact of Social Connections on Mental Health

Functional magnetic resonance imaging (fMRI) studies examining lonely vs. non-lonely individuals demonstrated increased attention to non-social stimuli and diminished pleasure derived from social stimuli in lonely individuals (Gable, 2006). In negative circumstances, lonely individuals focus on their own needs and self-protection. They are more likely to expect bad social outcomes and subsequently are more motivated to avoid them and less likely to expect or approach good results. This introduces attentional, confirmatory, and memory biases, contributing to ongoing social expectations (i.e., hypervigilance to social threats, negativity) and motivations (i.e., avoidance, withdrawal, etc.) and facilitates a downward spiral of negative affect and depressive and anxious symptomatology (Cacioppo et al., 2009; Gable, 2006). Accordingly, the literature shows that greater loneliness is associated with clinically significant anxiety, depression, suicidal ideation (Chang et al., 2017) and parasuicide (Stravyn-ski & Boyer, 2001) when controlling for age, gender, socioeconomic status, partnership (Beutel et al., 2017; Cacioppo et al., 2006), hostility and perceived stress. A systematic review by Choi and colleagues (2015) also demonstrated associations between loneliness and depression in seven of eight cross-sectional studies and depression and low social engagement in one of eight. Additionally, negative assessments of relationships have been shown to covary with the endorsement of loneliness and more significant depressive symptoms in studies by Dell et al. (2019) and Bekhet and Zauszniewski (2012). A reciprocal relationship between depression and loneliness has also been demonstrated in a community sample of older adults (≥ 50) when controlling for traumatic life events. As such, loneliness has been identified as an essential risk factor for adverse mental health (Cacioppo et al., 2010). Considering depression and loneliness commonly co-occur and

have been strongly correlated, it is valid to question whether one can untangle the causal influence one has on the other. To speak to this, Michela et al.'s (1980) study was examined, which used a combined longitudinal and structural equation methodology to demonstrate that although loneliness and depression are correlated, they are different constructs.

Possible Interventions

According to the literature, effective interventions to reduce loneliness include increasing opportunities for social contact (i.e., social recreation intervention), enhancing social support (e.g., mentoring programs, conference calls), social skills training (i.e., speaking on the phone, improving communication skills), and addressing maladaptive social cognition (i.e., cognitive behavioural therapy). Among these four types, interventions designed to address maladaptive social cognition were associated with the most significant effect size. To explore why this is, Schoenmakers et al.'s research (2011; 2012; 2015) was examined. This research suggested two ways of coping with loneliness: emotion-focused coping—involving regulative efforts to decrease the emotional consequences of a stressor—and problem-focused coping—steps to eliminate or manage a stressor and change negative person-environment relationships. Thus, one can cope with loneliness by changing expectations (i.e., not expecting frequent visitors) or improving social relationships (i.e., making new friends). Ostensibly, the latter method may be more efficacious by removing the stressor (lack of satisfying relationships) rather than changing feelings about loneliness and failing to address its source. Unfortunately, the persistently lonely more frequently utilize emotion-focused strategies, which can lead to a circular process of lowering expectations, resulting in more loneliness, and so on. Additionally, simply increasing opportunities for social interaction and having many contacts is not equivalent to high-quality relationships (Masi et al., 2011). Again, hypervigilance for social threats can lead to negativity and withdrawal. Cacioppo et al. (2016) suggested targeting attentional,

confirmatory, and memory biases by focusing on perspective-taking, empathy, and identifying and evaluating the validity of automatic negative thoughts about others and social interactions. The meta-analysis suggests interventions designed to modify maladaptive social cognition may be essential focus areas; however, more research is needed.

The Current Study

There is no question that the 2019 novel coronavirus pandemic has had a tremendous impact on numerous individuals in countries worldwide (Banerjee & Bhattacharya, 2020; Lippold et al., 2020). The scale of this virus is much larger than anything we have seen in recent decades (Wilder-Smith et al., 2020), and this is an unknown and unpredictable time. Thus, various emotional, physiological, and behavioural reactions are expected. For health officials to adequately respond to a global infectious disease outbreak, education is needed on mental health impacts (Blendon et al., 2003). Research is currently lacking on the consequences of social distancing and isolation, particularly in an aging population during an active wave of a pandemic.

Considering the apparent influence of the functional, structural, and qualitative aspects of social connections on health, improved understanding of these factors in general and populations most at risk and possible intervention strategies are of interest. In the past, social isolation and loneliness have predominantly been examined separately; however, because they are separate things, they should be examined together to understand better the strength of their impacts on health and how they may interact to influence health outcomes. This study will add to the literature by looking at isolation and loneliness together. This research is timely as this pandemic is ongoing, and there is no clear answer as to when it will end. We will likely be dealing with the impacts of this outbreak for a long time; thus, to inform intervention strategies, we must understand precisely how older adults are being affected—for instance, does social

isolation or loneliness have more of an impact on the mental health of older adults during an active wave of the COVID-19 pandemic? Additionally, do additional factors like health status, COVID-19-related worry, confidence in and satisfaction with available information and the medical community play a role? It is the hope that this information will help inform the most promising options for intervention strategies to help improve mental and physical health as they relate to social connections (Rubin et al., 2020).

Hypotheses

There are two main sets of hypotheses for the current study. The first set of hypotheses reflects predicted relationships between the two mental health variables (depression and anxiety) and the structural aspect of social connection (social isolation). The second set of hypotheses reflects the predicted relationships between the two mental health variables and the functional aspect of social connection (loneliness).

Hypothesis 1a

During an active wave of the COVID-19 pandemic, higher depression scores were expected in those who are more socially isolated (the structural aspect of social connection). Those who do not have many relationships wherein they speak to the individual at least once every two weeks, those with fewer people they have regular contact with, and those currently active in fewer network domains are expected to be more depressed as assessed with the GDS: SF.

Hypothesis 1b

During an active wave of the COVID-19 pandemic, higher anxiety scores were expected in those who are more socially isolated (the structural aspect of social connection). Those who do not have many relationships wherein they speak to the individual at least once every two

weeks, those with fewer people they have regular contact with, and those currently active in fewer different network domains are expected to be more anxious as assessed with the GAI.

Hypothesis IIa

During an active wave of the COVID-19 pandemic, higher depression scores were expected in those who were more lonely (the functional aspect of social connection). To expand, a more considerable reported perceived discrepancy between actual and desired quality, connection, and support received from one's social network was expected in those who reported higher depression scores. Negative cognitive processes have been shown to mediate relationships between various variables and depression; thus, it was expected that this negative mental evaluation would predict depression scores when social connections are thought to be less intense.

Hypothesis IIb

During an active wave of the COVID-19 pandemic, higher anxiety scores were expected in those who were reportedly more lonely (the functional aspect of social connection). A more considerable reported perceived discrepancy between actual and desired quality, connection, and support from one's social network was expected in those who reported higher anxiety scores.

The University of California, Los Angeles Loneliness Scale was used to assess levels of disconnectedness from others (loneliness: functional indicator). The Social Network Index assessed social isolation (structural indicator). Depression was assessed using the Geriatric Depression Inventory: Short Form (GDI: SF). Anxiety was assessed using the Geriatric Anxiety Inventory (GAI).

Additional Analyses

Various health-related questions were included in the study to examine whether health status—and resultant increased risk of contracting and experiencing more serious COVID-19 symptoms—related to or could account for some differences in anxiety and depression scores. Questions relating to one's consumption of COVID-19-related information, one's confidence in the medical community, and contact with those who have contracted the disease were also included to speak to differences in depression and anxiety scores.

It was expected that higher depression and anxiety scores would be reported by individuals who were more at risk (i.e., those who said poorer health status), as well as those who reported more contact with COVID-19 positive individuals, and those who reported consuming COVID-19 related information from less reliable sources. Individuals who reported having less confidence in the medical community and more worry about COVID-19 were also expected to have higher depression and anxiety scores.

CHAPTER II Method

Participants

The sample consisted of 63 older adults (23 males and 40 females) recruited through Facebook advertisements and word of mouth. Individuals were permitted to participate in the study if they were 60 years of age or older. Participants had a mean age of 69.57 ($SD = 7.66$). Participants were entered in a draw for a \$50.00 gift card as an incentive for participating in the study.

Measures

Demographic information

Participants answered eight questions on a demographic survey relating to age, gender, ethnicity, and health status (see Appendix A).

Knowledge and Concerns related to COVID-19

Participants answered questions on a COVID-19 survey (see Appendix B) focusing on virus contact history, concerns about the virus, knowledge about the virus and where they obtain their COVID-19 related information (i.e., national news networks, social media, news websites/ newspaper, etc.).

UCLA Loneliness Scale

The UCLA Loneliness Scale is recommended by the Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults to assess the functional aspect of social connection (National Academies of Sciences, Engineering, and Medicine, 2020). It is a 20-item self-report measure developed to assess an individual's level of disconnectedness from others (see Appendix C). Participants are asked to indicate how often they feel the way described in the statements (e.g., "How often do you feel that you lack companionship?" or "How often do you feel that your interests and ideas are not shared by those around you?") by

indicating frequency on a 4-point Likert-type scale from 1 = never to 4 = always. To counteract the response set, “often” indicates loneliness on half the items. On average, this questionnaire takes approximately 3-5 minutes to complete. Scores are calculated by averaging respondent’s ratings, with higher scores indicating more loneliness. The scale has been demonstrated to be reliable, with a Cronbach’s alpha ranging from 0.89 to 0.94, and test-retest reliability of $r = 0.73$ over one year. Significant correlations also showed convergent validity with other measures of loneliness (Russell, 1996).

The Social Network Index

The Social Network Index is recommended by the Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults to assess the structural aspect of social connection (National Academies of Sciences, Engineering, and Medicine, 2020). It is a 22-item self-report questionnaire designed to determine an individual’s participation in 12 social relationships (see Appendix D). The scale measures *Network Diversity* (number of high contact roles); one point is given for each type of relationship the participant has wherein they speak to the individual at least once every two weeks, with scores ranging from 0-to 12. The *number of people* the respondent has regular contact with is measured by simply summing the numbers identified for each role. Finally, the *number of embedded networks* an individual has is considered and calculated by adding the number of different network domains the respondent is active in. Eight is the maximum possible score (Cohen et al., 1997).

Geriatric Anxiety Inventory

The Geriatric Anxiety Inventory (GAI) is a 20-item commonly used self-report questionnaire targeted at older adults, developed to assess typical anxiety symptoms (see Appendix E). Participants are asked to either agree or disagree on items; this dichotomous format allows those who may be mildly cognitively impaired to respond more easily. Items are

given a score of 0 or 1, and the total score is calculated by summing the score of each item, with higher scores indicating more anxiety. The authors identified a clinical cut-off of > 8 to detect the presence of any anxiety disorder in geropsychiatric patients. The questionnaire takes approximately 7-10 minutes to complete. The measure is reported to have good reliability with Chronbach's alpha of 0.94, split-half reliability of 0.94 and test-retest reliability of 0.85. The measure also has good convergent and discriminant validity and internal consistency of 0.91-0.93 (Balsamo et al., 2018).

The Geriatric Depression Scale: Short Form

The Geriatric Depression Scale: Short Form (GDS: SF) is a 15-item self-report measure of depression commonly used for an older population (see Appendix F). It is reportedly psychometrically sound (92% sensitivity, 89% specificity when evaluated against diagnostic criteria), with good reliability and validity. Participants are asked to answer either "yes" or "no" to the items (*e.g.*, "do you feel that your life is empty?" or "are you afraid that something bad is going to happen to you?") based on how they have felt over the past week. One point is given when "yes" is endorsed for questions 2, 3, 4, 6, 8, 9, 10, 12, 14 and 15, or when "no" is selected for questions 1, 5, 7, 11 and 13. This questionnaire takes approximately 5-7 minutes to complete. Scores of 5 or more suggest a depressive episode and warrant follow-up. Scores greater than or equal to 10 almost always indicate a major depressive episode (Sheikh & Yesavage, 1986).

Procedure

The Laurentian University Research Ethics Board granted ethical approval for the current study. Due to social distancing restrictions and safety procedures, questionnaires were completed online between March and July of 2021 (around the third wave of the pandemic). Participants clicked on a hyperlink that opened the QuestionPro research website, outlining

information about the research procedure. Participants were then required to give informed consent before being directed to the survey. The administration of tests was counterbalanced to control for order effects. It took approximately 10-15 minutes for the participants to complete the study. Various mental health resources were outlined at the end of the survey for participants to use at their discretion.

CHAPTER III

Results

Overview

This chapter has been organized into four sections. The first section describes the sample. The second section presents the descriptive statistics, the third section presents the inferential statistics used in testing hypotheses, and the fourth section addresses the additional testing.

Description of the Sample

The participants were selected through voluntary participation in response to advertised Facebook recruitment posters and word of mouth. There were 90 participants in the study, with 27 dropouts. After eliminating incomplete data, participants consisted of 63 adults between the ages of 60 and 91 with a mean age of 69.57 and an $SD = 7.66$ (36.5% males and 63.5% females). Of the 63 total participants, only 11 (17.5%) indicated a pre-existing mental health disorder, eight identified depression diagnoses (12.7%). The sample was also relatively healthy, with 66.7% ($N = 42$) of participants indicating they had no pre-existing medical conditions. Of the total 63 participants, seven (11%) reported having multiple medical conditions, five (7.9%) reported having heart disease, four (6.3%) reported being obese, three (4.8%) indicated they had diabetes. One individual reported to have respiratory disease. One reportedly had a weakened immune system. Most of the sample reported getting their COVID-19-related

information through national news networks or online or print news articles. Only one individual reported to have contracted COVID-19, and 27% of the sample reported that they knew someone personally who had contracted COVID-19 at the time of the study.

Table 1

Demographic Characteristics of the Sample

Variable	Category	Frequency	Percentage
Gender	Female	40	63.5
	Male	23	36.5
Pre-existing MHD	None	51	80.1
	Depression	8	12.7
	Anxiety	3	4.76
	BPD	1	1.6
Pre-existing HC	None	42	66.7
	Obesity	4	6.3
	Immunocompromised	1	1.6
	Diabetes	3	4.8
	Heart Disease	5	7.9
	Respiratory Disease	1	1.6
	Multiple	7	11.1

Note. $N = 63$. MHC = Mental Health Condition. HC = Health Condition. BPD = Borderline Personality Disorder

COVID-19 Attitudes

Variable	Category	Frequency	Percentage
Contact History	Contracted COVID-19	1	1.6
	Know someone with COVID	17	27
Concern for Self	Not at all	9	14.3
	Somewhat	35	69.8
	Fairly	10	15.9
	Very	9	14.3
Concern for Others	Not at all	1	1.6
	Somewhat	29	46
	Fairly	15	23.8
	Very	18	28.6
COVID Knowledge	Not at all	6	9.5
	Somewhat	19	30.2
	Fairly	24	38.1
	Very	14	22.2
Satisfaction info	Not at all	1	1.6
	Somewhat	9	14.3
	Fairly	24	38.1
	Very	28	44.4
Confidence in MedCom	Somewhat	8	12.7
	Fairly	21	33.3
	Very	34	54.0

Note. $N = 63$. Concern for Self = Concern about oneself contracting COVID-19. Concern for

Others = Concern about those known to one contracting COVID-19. Satisfaction Info =

Satisfaction w/ available COVID info. COVID Knowledge = Self-reported COVID-19 knowledge.

Confidence in MedCom = Confidence in the Medical Community's ability to diagnose COVID-19

Descriptive Statistics

See Table 2 for means and standard deviations for all variables. Pearson correlation coefficients were computed among all social connection and mental health variables to examine the strength and direction of the linear relationships between each of them. The bivariate correlations presented in Table 3 show three strong correlations, two moderate correlations and two weak correlations. Depression was strongly associated with anxiety and loneliness ($r = .841$, $p < .001$), moderately negatively associated with number of people in one's social network ($r = -.357$, $p < .001$), and number of embedded networks ($r = -.369$, $p < .001$) and weakly negatively associated with network diversity/high contact roles ($r = -.284$, $p < .05$). Anxiety was strongly associated with loneliness ($r = .697$, $p < .001$) and appeared to have a weak negative association with the number of people in one's network ($r = -.288$, $p < .05$).

Table 2

Descriptive Statistics for the Social Connections and Mental Health Variables

Category	Measure	Mean	SD	Range
Social Connection	Loneliness	33.44	11.09	14-66
	Network Diversity	5.70	1.60	2-10
	People In Network	14.44	6.90	2-32
	Embedded Networks	2.08	1.42	0-6
Mental Health	GAI	2.95	4.70	0-18
	GDS:SF	2.81	2.41	0-12

Note. $N = 63$. Network Diversity = number of people in high contact roles. Network Domains = the number of different network domains. GAI = Geriatric Anxiety Inventory. Geriatric Depression Scale: Short Form.

Table 3

Bivariate Correlations between the UCLA Loneliness Scale, SNI Subscales: Network Diversity, Embedded Network and Number of People in One's Network, GAI and GDS: SF

	Loneliness	Network Diversity	P in Network	Embedded Networks	Anxiety
N Diversity	-.195				
P in Network	-.340**	.721**			
Embedded N	-.300*	.572**	.747**		
Anxiety	.697**	-.143	-.288*	-.246	
Depression	.841**	-.284*	-.357**	-.369**	.719**

Note. SNI = Social Network Index. ND = Network Diversity. P in Network = Number of People in One's Network. EN = Embedded Networks.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Hypotheses Testing

Simple linear forced entry regression analyses and stepwise regression analyses were conducted. Details of the regression analyses are discussed.

Predicting Depression and Anxiety from Social Isolation and Loneliness

Depression. A simple linear forced entry regression analysis was conducted to see how social connection measures predict depression. The predictor variables included the three SNI Subscales: Embedded Networks, People in Network, Network Diversity, and the UCLA Loneliness Scale. The linear combination of all the social connection measures significantly predicted

depression, $R^2 = .73$, adjusted $R^2 = .71$, $F(1, 58) = p < .001$. The sample correlation coefficient was .86, indicating that the model can account for approximately 73% of the variance of depression. Upon examining the coefficients, loneliness was the only statistically significant variable in the model (Table 4).

A stepwise regression analysis was also conducted with all variables entered as predictors (SNI Subscales, UCLA Loneliness Scale, COVID-worry variables, satisfaction with COVID-19 related information, self-reported knowledge, and satisfaction and confidence in the medical community). Consistent with the findings in the forced entry regression, loneliness was the only predictor entered into the model, indicating that loneliness is the only variable that significantly contributed to the variance in depression, $R^2 = .71$, adjusted $R^2 = .70$, $F(1, 61) = p < .001$. The sample correlation coefficient was .84, indicating that approximately 71% of the variance of depression can be accounted for by loneliness. According to the findings, for every one standard deviation of change in loneliness, depression should increase by .84 standard deviations. Examination of the scatterplot indicates that linearity can be assumed (Table 5).

Anxiety. A simple linear forced entry regression analysis was conducted to see how social isolation measures predict anxiety. The predictor variables included the three SNI Subscales: Embedded Networks, People in Network, Network Diversity, and the UCLA Loneliness Scale. The overall regression equation was significant, $R^2 = .49$, adjusted $R^2 = .46$, $F(4, 58) = p < .001$. Upon examining the coefficients, loneliness was the only statistically significant variable in the model (Table 6).

A stepwise regression analysis was also conducted with all variables entered as predictors (SNI Subscales, UCLA Loneliness Scale, COVID-worry variables, satisfaction with COVID-19 related information, self-reported knowledge, and satisfaction and confidence in the medical community). Consistent with the findings of the forced entry regression, loneliness was

the only variable entered into the model, $R^2 = .49$, adjusted $R^2 = .48$, $F(1, 61) = p < .001$. The sample correlation coefficient was .68, indicating that approximately 48% of the variance in anxiety can be accounted for by loneliness. According to the findings, for every one standard deviation of change in loneliness, anxiety should increase by .7 standard deviations. Examination of the scatterplot indicates that linearity can be assumed (Table 7).

Table 4

Summary of Finding and Standardized Beta Coefficients for Forced Entry Regression Analyses of Social Connection Measures (SNI & UCLA Loneliness Scale) and Depression

	Beta	R²	Adjusted R²	Sig
Overall Model	.855**	.731	.712	<.001
<hr/>				
SNI Embedded Networks	Beta = -.021			
	$p = .186$			
SNI people in Network	Beta = -.068			
	$p = .344$			
SNI Network Diversity	Beta = .187			
	$p = .189$			
UCLA Loneliness Scale	Beta = .814**			
	$p < .001$			

**Note.* Predictors: Embedded Networks, People in Network, Network Diversity, Loneliness.

Dependant Variable: Depression.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 5

Summary of Finding for Stepwise Regression Analysis—The prediction of Depression from Social Connection Measures (SNI Subscales and UCLA Loneliness Scale), COVID-worry variables, Satisfaction with COVID-19 related information, Self-reported COVID-19 knowledge, and Satisfaction and Confidence in the Medical Community

Beta	R²	Adjusted R²	R² change	df1	dd2	B	Sig. F change
.841**	.707	.703	.707	1	61	.183	> .001

*Note. Predictor: Loneliness. Dependant Variable: Depression.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 6

Summary of Findings and Standardized Beta Coefficients for Forced Entry Regression Analyses of Social Connection Measures (SNI subscales and UCLA Loneliness Scale) and Anxiety

Category	Beta	R²	Adjusted R²	Sig
Overall Model	.701**	.491	.456	<.001
SNI Embedded Network	Beta = -.006			
	$p = .965$			
SNI People in Network	Beta = -.101			
	$p = .557$			
SNI Network Diversity	Beta = .065			
	$p = .633$			
UCLA Loneliness Scale	Beta = .647**			
	$p < .001$			

**Note.* Predictors: Embedded Networks, People in Network, Network Diversity, Loneliness.

Dependant Variable: Anxiety.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 7

Summary of Finding for Stepwise Regression Analysis—The prediction of Anxiety from Social Connection Measures (SNI Subscales and UCLA Loneliness Scale) COVID-worry variables, Satisfaction with COVID-19 related information, Self-reported COVID-19 knowledge, and Satisfaction and Confidence in the Medical Community

Beta	R ²	Adjusted R ²	R ² change	df1	df2	B	Sig. F change
.697	.486	.478	.486	1	61	.295	<.001

**Note.* Predictor: Loneliness. Dependent Variable: Anxiety.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Additional Analyses

Anxiety. Pearson correlation coefficients were computed among anxiety, COVID-worry variables (concern for self and concern for others), satisfaction with COVID-19 related information, self-reported knowledge, and satisfaction and confidence in the medical community to examine the strength and direction of the linear relationships between each of them. The bivariate correlations presented in Table 8 show a moderate negative association between anxiety and one's confidence in the medical community's ability to diagnose COVID-19 ($r = -.311, p < .05$). Anxiety was also moderately associated with participant's reported concern for others ($r = .324, p < .001$) and moderately negatively associated with one's self-reported knowledge of COVID-19 ($r = -.333, p < .001$). Interestingly, although both COVID-worry variables

were not associated with anxiety, they were strongly related ($r = .695, p < .001$). There was also a strong correlation between one's confidence in the medical community's ability to diagnose the disease and level of satisfaction with available COVID-19-related information ($r = .399, p < .001$).

Depression. Pearson correlation coefficients were also computed among depression, COVID-worry variables (concern for self and concern for others), satisfaction with COVID-19 related information, and confidence in the medical community to examine the strength and direction of the linear relationships between each of them. The results of the bivariate correlations presented in Table 8 show a weak negative association between depression and confidence in the medical community ($r = -.255, p < .05$) and a moderate association between depression and concern for others ($r = .307, p < .05$).

Table 8

Bivariate Correlations Between Anxiety, Depression, medical health, COVID-worry variables (concern for self and concern for others), satisfaction with COVID-19 related information, and confidence in the medical community

	Dep	Anx	Confidence	Satisfaction	Knowledge	ConSelf	ConOth	COV+
Dep	1							
Anxiety	.719**							
Confidence	-.255*	-.311*						
Satisfaction	-.203	-.210	.467**					
Knowledge	-.198	-.333**	.470**	.399**				
ConcenSelf	.155	.163	.004	.141	.160			
ConcenOth	.307*	.324**	-.171	.082	-.209	.695**		
COV +	-.010	.080	.074	-.114	-.038	-.100	-.175	
COV Contact	-.122	-.131	-.078	.144	-.022	.100	-.069	-.037
Medical	-.019	-.068	.085	-.005	.010	.213	.207	-.163

**Note. Dep = Depression. Anx = Anxiety. Confidence = Confidence in COV treatment. Satisfaction = Satisfaction with COV treatment. Knowledge = COVID knowledge. ConcernSelf = Concerned about contracting COVID. ConcernOth = Concern for others contracting COVID. COV + = Has tested positive for COVID. COV Contact = knows someone who has tested positive. Medical = medical condition.*

******. Correlation is significant at the 0.01 level (2-tailed).

*****. Correlation is significant at the 0.05 level (2-tailed).

CHAPTER IV

Discussion

The current thesis—conducted during an active wave of the SARS-CoV-2 pandemic (COVID-19)—examined the relationship between social connections (the presence and perception of relationships), and mental health (anxiety and depression), in an aging population. To speak to the findings, it is helpful to reflect again on the information outlined by the Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults (National Academies of Sciences, Engineering, and Medicine, 2020), as previously mentioned. Specifically, the determination that qualitative aspects of social connection influence the broader functional aspect of social relationship—loneliness. When we consider this and look at Schwarzbach et al.'s (2014) systematic review of 25 longitudinal studies on the subject—which found that the qualitative aspects of social relations (i.e., social support, relationship quality, presence of a confidant) were most consistently related to depression—the relationship between loneliness and depression is expected. A systematic review by Choi and colleagues (2015) also demonstrated associations between loneliness and depression in seven of eight cross-sectional studies. Still, depression and low social engagement were correlated in only one of these eight studies, indicating a stronger relationship between loneliness and depression than loneliness and social isolation. A study by Taylor and colleagues (2018) is in line with this, wherein qualitative aspects of social connections were more strongly related to depression than quantitative aspects when depression and social connections were measured simultaneously. That said, in Schwarzbach et al.'s (2014) systematic review, more associations between the lower quantity of social interactions and depression were demonstrated over time, and results of the bivariate correlational analysis in the current study also showed weak to moderate negative associations between both mental health measures and structural

connection subscales (SNI Subscales). In the present study, when all connection measures were considered together, social isolation was no longer a significant predictor of depression or anxiety. Because loneliness has been linked to increasing social isolation (possibly due to negative social biases and avoidance) over time (Cacioppo et al., 2010), a longitudinal examination of the sample may have demonstrated a more vital link between social isolation and poorer mental health as time went on. The current study was not longitudinal in design—participants were asked to reflect on recent social connections and mental health levels—so it is possible that there was not much opportunity to see the association between social isolation and depression take place. Looking at this longitudinally could support the idea that lonely individuals more often utilize emotion-focused coping. This likely introduces attentional, confirmatory, and memory biases, contributing to ongoing social expectations (i.e., hypervigilance to social threats, negativity) and motivations (i.e., avoidance, withdrawal, etc.) and facilitating a cyclical pattern of mental health symptomatology (Cacioppo et al., 2009; Gable, 2006).

Research by Chatters et al. (2018) and Cornwell and Waite (2009) can help speak to these findings. These authors noted that one's social network need not be extensive to be rewarding; instead, rewards are most significant when existing relationships are high quality. Similarly, social isolation is detrimental to health; however, the presence of others may not necessarily be positive or protective. While social connections can facilitate intimacy, companionship, and nurturance, some have negative attributes like conflict, insensitivity, jealousy, rejection, burden, and abuse (Rook & Charles, 2017). These things considered, it could be said that supportive relationships may minimize loneliness and depression, while difficult or unfulfilling relationships may do the opposite (Cohen-Mansfield et al., 2016). For instance,

relationship strain and poor-quality relationships more than doubled the risk of depression ten years later in Teo et al.'s (2013) study.

As mentioned several times, negative cognitions contribute to and moderate relationships between various variables and mental health (Van Moorlegem & Conniff, 2017). So, the sense of connection or lack thereof and subjective positive or negative appraisal of such connections would seemingly contribute more to depressive and anxious symptoms than the quantity of social connection (i.e., amount of people or frequency of contact). This is important as it can help guide intervention strategies for older adults during this challenging time—clearly, expanding social horizons may not be as efficacious as improving the quality of existing relationships or addressing maladaptive negative social cognitions that facilitate the cycle of loneliness and poorer mental health.

Various health-related questions were included in the study to examine whether health status—and resultant increased risk of contracting and experiencing more serious COVID-19 symptoms—related to or could account for some differences in anxiety and depression scores. Questions about the consumption of COVID-19-related information, confidence in the medical community, COVID-specific worry, and contact with those who have contracted the disease were also included to speak to differences in depression and anxiety scores. It was expected that higher depression and anxiety scores would be reported by individuals who were more at risk (i.e., those who reported poorer health status), those who reported more contact with COVID-19 positive individuals, and those who reported less satisfaction with available information. Individuals who reported having less confidence in the medical community and more worry about COVID-19 were also expected to have higher depression and anxiety scores. A noteworthy finding from this analysis was that those higher in anxiety self-reported to have less COVID-19 related knowledge, less confidence in the medical community's ability to diagnose the disease,

and more concern related to individuals known to them contracting the disease. The same negative cognitive processing appeared to be present here as suggested to be the link between mental health and loneliness. Although it could not be concluded that this occurred, this provides further support for the idea that a CBT model may be most effective in reducing loneliness in an aging population.

All variables were also entered into a regression equation to determine if the extraneous variables contributed to the variation in anxiety and depression scores. As with previous regression results, loneliness continued to be the only variable with a meaningful impact on mental health scores. Additionally, considering only one individual reported to have contracted COVID-19 and only 17 individuals said that they knew someone personally who had contracted the disease at the time of the study, COVID-19 contact seemingly did not play a role in the variation of scores in this sample. That said, it should also be noted that results from Blendon et al.'s (2003) study examining the SARS epidemic indicated that even in areas where there were low levels of spread (Canada & the United States), the outbreak had a significant psychological impact.

Limitations

The study had many advantages, including the survey being open during an active wave of a pandemic; the measurement of extraneous variables, controlling for confounds, providing further details on the sample, and helping to explain the link between depression, anxiety, and social connection; and the measurement of both loneliness and social isolation together to examine their impact on mental health as well as separately. A possible limitation in this study is a lack of diversity in the sample, with most individuals identifying as Caucasian. The small N should also be taken into consideration, as well as the variables being highly correlated. Also, the sample was relatively healthy, with over half the participants indicating they had no pre-

existing medical conditions, which lowers their risk of these concerns arising. Perhaps in a less healthy sample, isolation would have been more salient. The online format should be addressed as well. There is no way to control the participants' environment, and individuals may have been completing the questionnaires together, which could have influenced responses. Additionally, those who don't access the internet may not have been represented in the sample, suggesting this population may have been more able to adapt to the social isolation measures.

Furthermore, as this study did not measure the variables before the pandemic, it is possible that some in the sample had pre-existing struggles with depression and anxiety, and the social restrictions enforced because of the pandemic did not contribute to the results. To speak to this, only 11 individuals (17.5%) indicated that they had a pre-existing mental health disorder, eight of whom identified depression diagnoses (12.7%), which is consistent with prevalence estimates of 8% to 30% for clinically significant depression, among community-living people >65 in the DSM-5 (American Psychological Association, 2013). The current study showed 20 responses with anxiety and depression scores above clinical cut-offs. The additional nine individuals may have been unaware of their levels of anxiety and depression before completing the survey. That said, when considering studies like the one by Best et al. (2021)—which showed associations between increases in overall distress, panic, emotional disturbance, depression, and short-term social distancing measures—the government imposed social restrictions having an impact on the results is plausible.

Conclusion and Future Directions

While the associations demonstrated in the current study and previous research cannot establish causality, the findings suggest a link between social connections and mental health. Despite low levels of contact with COVID-19 positive individuals and low spread levels in the area, there appeared to be a bi-directional relationship between depression, anxiety, and

loneliness in an aging population during the third wave of the COVID-19 pandemic. Although required limit contact, structural aspects of social connection did not appear to influence mental health, indicating subjective evaluations and negative cognitions relate more to mental health symptomatology than the objective presence of others. This Provides direction for possible avenues of exploration that older individuals can take to improve depression and anxiety symptoms related to social connection. This is promising, as one cannot change the restrictions put in place by the government, and continuous cost-benefit debates are being had wherein physical safety appears to outweigh the importance of the mental health implications these extreme measures have had on the world. Whether it can be said that the social restrictions contributed to levels of anxiety and depression in the current sample or not, these mental health issues were still related to loneliness, which is a particularly relevant dynamic considering the ongoing safety protocols being implemented, and the severity of the lockdowns in Ontario. An examination of Table 2 shows that the mean value for loneliness (33.44) was a little higher than those reported in previous research, with estimates in previous studies ranging from 25-29% in American populations (>70), 20.1-34.04% in European populations (>60), and 23.9-29.6% in Asian populations (>60). This could indicate an increase in loneliness because of the pandemic; However, it should be kept in mind that various measurement approaches were used in these studies (Ong et al., 2016), and culturally the samples differed.

Future studies should investigate the variables longitudinally with a more extensive and more diverse sample to get more data on the interaction between them and demonstrate the effect on social isolation. The fact that only loneliness predicted depression and anxiety in the current study should also be noted. This indicates that quality and perception of relationships could be a more efficacious area of focus in intervention plans than structural social connection aspects (i.e., the number of people one interacts with often). Future studies should investigate

social connection interventions for aging individuals to see if focusing on making relationships more meaningful, positive, and supportive can reduce depression and anxiety symptoms; comparing this approach to one focusing on structural aspects may be interesting. Based on Schoenmakers and colleagues (2011) research, this active form of coping with loneliness should be adequate. That said, it would be essential to include a cognitive component to encourage intervention initiation and prevent negative cognitive processes from interfering with participants' efforts.

According to Cacioppo and colleagues (2003), and consistent with research by Schoenmakers and colleagues (2015), loneliness promotes hypervigilance and, in turn, avoidance and emotion-focused coping strategies (i.e., distracting or distancing). This is particularly alarming because this would only exacerbate loneliness and likely other associated health ailments (as outlined in the literature review). The seemingly complicated interrelationships between poorer health, more significant depression (Dell et al., 2019), anxiety, and loneliness should not be overlooked during this worldwide pandemic—a period wherein most populations are being required isolated and having comorbid disorders also puts one at an increased risk of mortality from COVID-19.

Ultimately, this research provides direction for possible avenues of exploration that older individuals can take to improve depression and anxiety symptoms. Additionally, because studies like those by Beam and Kim (2021) indicate that social restriction measures may have more of an impact on younger individuals than older individuals, the cognitive model with emphasis on improving functional aspects of connectedness may also be an area to focus future research on as it concerns these variables in all populations.

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APPENDIX A

Demographic Questionnaire

Gender: _____

Date of Birth: _____

Ethnicity: _____

1. Have you ever been diagnosed with a mental health disorder (i.e., depression, bipolar, Obsessive Compulsive Disorder, etc.)?

Yes No

2. If so, what was the diagnosis? (If more than one, list all that apply)

3. Are you currently prescribed a psychoactive drug?

Yes No

4. Do you have one of the below medical conditions? If so, check all those that apply.

- Respiratory disease
 Heart disease
 Diabetes
 Kidney disease
 Liver disease
 Weakened immune system
 Obese
 Pregnant

5. What is your religious affiliation?

- No religion
 Christian
 Catholic
 Muslim
 Hindu
 Buddhist
 Sikh
 Jewish
 Other: _____

APPENDIX B

COVID-19 Survey

Instructions: The following questions pertain to your COVID-19-related knowledge and concerns. Please circle the response that best reflects how you feel.

1. Where do you obtain your COVID-19 related information? (Check all that apply)

- National News Network
- News articles (online or print)
- Social Media (i.e., Facebook, Twitter)
- Word of mouth
- Peer reviewed academic articles
- Other: _____

2. Do you believe you understand how COVID-19 is transmitted?

- Yes
- No

3. What is your level of confidence in the medical community's ability to diagnose this disease?

- Not at all
- Somewhat
- Fairly
- Very

4. What is your level of satisfaction with the health information you have been able to access about COVID-19?

- Not at all
- Somewhat
- Fairly
- Very

5. What is your level of knowledge of potential treatments for COVID-19?

- Not at all knowledgeable
- Somewhat knowledgeable
- Fairly knowledgeable
- Very knowledgeable

6. Have you tested positive for COVID-19?

- Yes
- No

7. Have you been in contact with someone who has tested positive for COVID-19?

- Yes
- No

8. Has someone you know personally, tested positive for COVID-19?

Yes

No

9. On a scale from “not worried at all” to “very worried” how concerned are you about contracting COVID-19?

Not at all

Somewhat

Fairly

Very

10. On a scale from “not worried at all” to “very worried” how concerned are you about a loved one potentially contracting COVID-19?

Not at all

Somewhat

Fairly

Very

APPENDIX C

The UCLA Loneliness Scale

Instructions: The following statements describe how people sometimes feel. Please indicate how often you feel the way described by circling one of the responses below for each statement. Here is an example:

How often do you feel happy?

If you never felt happy, you would respond “never”; if you always feel happy, you would respond “always.”

1. How often do you feel that you are “in tune” with the people around you?

Never Rarely Sometimes Always

2. How often do you feel that you lack companionship?

Never Rarely Sometimes Always

3. How often do you feel that there is no one you can turn to?

Never Rarely Sometimes Always

4. How often do you feel alone?

Never Rarely Sometimes Always

5. How often do you feel part of a group of friends?

Never Rarely Sometimes Always

6. How often do you feel that you have a lot in common with the people around you?

Never Rarely Sometimes Always

7. How often do you feel that you are no longer close to anyone?

- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
8. How often do you feel that your interests and ideas are not shared by those around you?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
9. How often do you feel outgoing and friendly?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
10. How often do you feel close to people?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
11. How often do you feel left out?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
12. How often do you feel that your relationships with others are not meaningful?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
13. How often do you feel that no one really knows you well?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
14. How often do you feel isolated from others?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|
15. How often do you feel that you can find companionship when you want it?
- | Never | Rarely | Sometimes | Always |
|-------|--------|-----------|--------|
|-------|--------|-----------|--------|

16. How often do you feel that there are people who really understand you?

Never

Rarely

Sometimes

Always

17. How often do you feel shy?

Never

Rarely

Sometimes

Always

18. How often do you feel that people are around you but not with you?

Never

Rarely

Sometimes

Always

19. How often do you feel that there are people you can talk to?

Never

Rarely

Sometimes

Always

20. How often do you feel that there are people you can turn to?

Never

Rarely

Sometimes

Always

APPENDIX D

Social Network Index

Instructions: This questionnaire is concerned with how many people you see or talk to on a regular basis including family, friends, workmates, neighbors, etc. Please read and answer each question carefully. Answer follow-up questions where appropriate.

1. Which of the following best describes your marital status?

- (1) currently married & living together, or living with someone in marital-like relationship
 (2) never married & never lived with someone in a marital-like relationship
 (3) separated
 (4) divorced or formerly lived with someone in a marital-like relationship
 (5) widowed

2. How many children do you have? (If you don't have any children, check '0' and skip to question 3.)

___0___1___2___3___4___5___6___7 or more

2a. How many of your children do you see or talk to on the phone at least once every 2 weeks?

___0___1___2___3___4___5___6___7 or more

3. Are either of your parents living? (If neither is living, check '0' and skip to question 4.) ___ (0) neither ___ (1) mother only ___ (2) father only ___ (3) both

3a. Do you see or talk on the phone to either of your parents at least once every 2 weeks?

___ (0) neither ___ (1) mother only ___ (2) father only ___ (3) both

4. Are either of your in-laws (or partner's parents) living? (If you have none, check the appropriate space and skip to question 5.)

___ (0) neither ___ (1) mother ___ (2) father ___ (3) both ___ (4)

4a. Do you see or talk on the phone to either of your partner's parents at least once every 2 weeks?

___ (0) neither ___ (1) mother ___ (2) father ___ (3) both only only

5. How many other relatives (other than your spouse, parents & children) do you feel close to? (If '0', check that space and skip to question 6.)

___0___1___2___3___4___5___6___7 or more

5a. How many of these relatives do you see or talk to on the phone at least once every 2 weeks?

___0___1___2___3___4___5___6___7 or more

6. How many close friends do you have? (meaning people that you feel at ease with, can talk to about private matters, and can call on for help)

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

6a. How many of these friends do you see or talk to at least once every 2 weeks?

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

7. Do you belong to a church, temple, or other religious group? (If not, check 'no' and skip to question 8.)

___ no ___ yes

7a. How many members of your church or religious group do you talk to at least once every 2 weeks? (This includes at group meetings and services.)

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

8. Do you attend any classes (school, university, technical training, or adult education) on a regular basis? (If not, check 'no' and skip to question 9.)

___ no ___ yes

8a. How many fellow students or teachers do you talk to at least once every 2 weeks? (This includes at class meetings.)

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

9. Are you currently employed either full or part-time? (If not, check 'no' and skip to question 10.)

___ (0) no ___ (1) yes, self-employed ___ (2) yes, employed by others

9a. How many people do you supervise?

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

9b. How many people at work (other than those you supervise) do you talk to at least once every 2 weeks?

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

10. How many of your neighbors do you visit or talk to at least once every 2 weeks? ___0

___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

11. Are you currently involved in regular volunteer work? (If not, check 'no' and skip to question 12.)

___ no ___ yes

11a. How many people involved in this volunteer work do you talk to about volunteering-related issues at least once every 2 weeks?

___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7 or more

12. Do you belong to any groups in which you talk to one or more members of the group about group-related issues at least once every 2 weeks? *Examples include social clubs, recreational groups, trade unions, commercial groups, professional organizations, groups concerned with*

children like the PTA or Boy Scouts, groups concerned with community service, etc. (If you don't belong to any such groups, check 'no' and skip the section below.)

_____ no

_____ yes

APPENDIX E

Geriatric Anxiety Inventory

Instructions: Please circle the response that reflects how you generally feel.

1. I worry a lot of the time
Agree Disagree
2. I find it difficult to make a decision
Agree Disagree
3. I often feel jumpy
Agree Disagree
4. I find it hard to relax
Agree Disagree
5. I often cannot enjoy things because of my worries
Agree Disagree
6. Little things bother me a lot
Agree Disagree
7. I often feel like I have butterflies in my stomach
Agree Disagree
8. I think of myself as a worrier
Agree Disagree
9. I can't help worrying about even trivial things
Agree Disagree
10. I often feel nervous
Agree Disagree
11. My own thoughts after make me anxious
Agree Disagree
12. I get an upset stomach due to my worrying
Agree Disagree
13. I think of myself as a nervous person
Agree Disagree
14. I always anticipate the worst
Agree Disagree

15. I often feel shaky inside
Agree Disagree
16. I think that my worries interfere with my life
Agree Disagree
17. My worries often overwhelm me
Agree Disagree
18. I sometimes feel a great knot in my stomach
Agree Disagree
19. I miss out on things because I worry too much
Agree Disagree
20. I often feel upset
Agree Disagree

APPENDIX F

Geriatric Depression Scale: Short Form

Instructions: Choose the best answer for how you have felt over the **past week**:

1. Are you basically satisfied with your life? YES / NO
2. Have you dropped many of your activities and interests? YES / NO
3. Do you feel that your life is empty? YES / NO
4. Do you often get bored? YES / NO
5. Are you in good spirits most of the time? YES / NO
6. Are you afraid that something bad is going to happen to you? YES / NO
7. Do you feel happy most of the time? YES / NO
8. Do you often feel helpless? YES / NO
9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO
10. Do you feel you have more problems with memory than most? YES / NO
11. Do you think it is wonderful to be alive now? YES / NO
12. Do you feel pretty worthless the way you are now? YES / NO
13. Do you feel full of energy? YES / NO
14. Do you feel that your situation is hopeless? YES / NO
15. Do you think that most people are better off than you are? YES / NO