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THESIS APPROVAL FORM

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In the judgment of the following signatory this thesis meets the academic standards that have been established for the above degree.

Thesis Advisor: Wendy Allen

The Effects of Social Isolation on People with Dementia and the Use of Arts as Connection

Capstone Thesis

Lesley University

9 June 2024

Emily Olive

Expressive Arts Therapy

Wendy Allen, Ph.D., LPC, BC-DMT

Abstract

During the COVID-19 pandemic, many states issued quarantines and social isolation policies. While this impacted the well-being and mental health of everyone, it had an increased effect on the elderly population and, more specifically, those living with dementia. Social isolation has been shown to cause a quicker progression of dementia symptoms, increase anxiety and depressive symptoms, and worsen chronic health issues. Before the pandemic, research has agreed that a way to combat the progression of dementia and lower the symptoms is through socialization. A critical review of the literature found that the arts may be used to form connections between people with dementia and between the community and people with dementia. This thesis hopes to present this information and brainstorm a possible protocol for caregivers to use the arts to continue to help a person with dementia stay connected during times of isolation.

Keywords: *dementia, isolation, loneliness, Expressive Arts Therapy, Arts interventions, social connection*

Author Identity: *I acknowledge my bias as an able-bodied, passing, cognitively intact, white, queer, nonbinary person who grew up in a middle-class household.*

The Effects of Social Isolation on People with Dementia and the Use of Arts as Connection

Introduction

The pandemic was a difficult time for me and my family. We all struggled with isolation, but we struggled most with the guilt of not being able to visit my great-grandmother. When the pandemic started and the quarantines called, she was living in a nursing home because her dementia had progressed. As a white, middle-class family, we were able to place her in a nursing home that provided her with some stimulation and connection during the quarantine. However, during the months, her dementia continued to progress, causing more agitation, forgetfulness, and trouble walking. A year after the quarantines were lifted and visitors were allowed again, there was a clear difference between before and after the quarantines. The following year, she passed away. I decided to write this thesis to investigate how the isolation may have played into the quick progression of her dementia, the lack of research available on interventions for older adults experiencing isolation, and how the arts could be used as an intervention for isolation.

During the COVID-19 pandemic, many countries implemented quarantine orders to slow the spread of the sickness. Quarantining is the practice of separating and limiting the movements of people who may have been exposed to a contagious disease to see if they become sick (Centers for Disease Control, 2020). This was necessary for protecting physical health; however, many felt the negative mental impact of social isolation. While the well-being and mental health of everyone was negatively impacted, the population that has seen the most significant effect of the isolation caused by the quarantines is older adults, specifically those living with dementia (Hawg et al., 2020; Farhang et al., 2021).

Pandemic-induced isolation only served to exacerbate and bring into focus the already existing problems of social isolation affecting those with dementia as it cuts off their already severely limited access to social support. The University of Michigan released its findings from a five-year-long study on the trends in loneliness in older adults. They found that in 2023, 34 percent of older adults ages 50 to 80 “reported feeling isolated from others” (*Trends in loneliness among older adults from 2018-2023* 2023, para. 3). They further break down the data and found that older adults with fair or poor mental or physical health and those with a disability were more likely to report feeling isolated and lonely (*Trends in loneliness among older adults from 2018-2023*, 2023, 2023).

Social connection is the feeling of belonging and having the support and care needed, as well as “the number, quality, and diversity” of relationships (Centers for Disease Control, 2023, para. 1). The definition of social connection is broad because it encompasses many aspects of life, such as interpersonal relationships, social networks, and social activities. Aging can affect one or all these areas, leading to social isolation. However, social connection has been shown to slow the progression or lower the risk of dementia. Saito et al. (2017) wrote, “...studies have reported social networks, social activities, and social support... diverse social relationship engagement rather than dense participation in one specific social relationship can reduce the risk of... dementia” (p.7). It can also lower the risk of other health issues related to aging and allow the older adult to maintain their independence longer.

Definitions

Throughout this thesis, words such as quarantine, which is defined above, social isolation, loneliness, dementia, and social connectedness will be used. Since each word has multiple definitions, the following paragraphs explain how each term will be used.

Dementia is an umbrella term used to describe a “collection of symptoms caused by abnormal changes within the brain that lead to a decline in cognitive functioning, mood, or emotional regulation and interfere with daily living tasks” (Alzheimer’s Association, para. 1). Severity is then determined by significant or mild decline “from a previous level of performance in one or more cognitive domains” (First, 2022, pp. 680-681). Dementia symptoms may look like typical issues in aging; however, they tend to be more severe and can endanger the person living with dementia and those around them.

Social isolation can be defined as “the lack of social contacts and having few people to interact with regularly” (National Institute on Aging, 2021, para. 4). Social isolation increased for older adults during the pandemic; however, it has been described as a “behavioral epidemic” in multiple countries and referred to by the U.S Surgeon General (2023) as “an epidemic of loneliness” for some time before the pandemic (Hwang et al., 2020; *Trends in loneliness among older adults from 2018-2023*, 2023) due to the large percentage of older adults socially isolating themselves because of poor mental or physical health or being forced to be socially isolated due to a disability. Another reason it is such an important issue is because of the negative effects it has on older adults, especially those with dementia. Social isolation has been attributed to increasing the risk of physical and mental health issues, worsening chronic disease and its burden on the healthcare system, and contributing to functional and cognitive decline (Abedini et al., 2019; Hwang et al., 2020; National Institute on Aging, 2021; *Trends in loneliness among older adults from 2018-2023*, 2023).

More people than ever, especially older adults with dementia, are feeling isolated and lonely; therefore, the literature should then focus on interventions or ways of preventing social isolation in this population. However, while doing a deep dive into the literature, there is very

little information available on addressing social isolation and loneliness in older adults, let alone older adults with dementia. Unsurprisingly, many articles bring attention to the health and psychological risks associated with social isolation and the burden socially isolated older adults can put on the health system (Abedini et al., 2019; *Trends in loneliness among older adults from 2018-2023*, 2023; US Surgeon General Advisory, 2023). The imbalance in literature begs the question, if social isolation in older adults with dementia is so harmful, why is there so little research available addressing it?

In this thesis, there is a differentiation between social isolation and loneliness. Loneliness is feeling alone, isolated, or separated from others (Hwang et al., 2020; National Institute on Aging, 2021). While they sound similar, often occur together, and can lead to similar adverse health outcomes, the distinction is vital since loneliness focuses on a feeling, while social isolation focuses on the action of being isolated. The distinction is also important since a person may be socially isolated but not feel lonely, or a person can feel lonely but not be socially isolated. While loneliness is not the main topic of the thesis, it is mentioned throughout because there is so little research into interventions for isolation. Therefore, with the understanding that loneliness and social isolation can cause similar health and psychological problems, interventions for loneliness can be used as the basis for the intervention framework for isolation presented at the end of the thesis. The idea is to focus the framework on using arts to address isolation since the arts have been shown to impact this population positively.

Literature Review

Dementia Prevalence

As stated above, dementia is an umbrella term that encompasses a wide variety of progressive symptoms that affect memory and other brain functions and interfere with a person's

life. Each form of dementia has its own set of main symptoms or precursors that differentiate it from the others. Some forms are more common than others, with some even being labeled as rare forms of dementia. These rare forms often present differently and may have an earlier age of onset.

The typical age of onset of dementia is roughly 65. Some rare forms of dementia can appear before the age of 65, with some people being diagnosed as early as 30 years old. Currently, 55 million people worldwide are diagnosed with dementia, with Alzheimer's disease making up about 60 to 70 percent of these cases. Cases of dementia in middle- and lower-income countries make up the majority, 60 percent of cases. Women are more likely to be diagnosed with dementia or care for someone with dementia (World Health Organization, 2023).

The risk of being diagnosed with dementia is disproportionately higher for people of color than their white counterparts. The Alzheimer's Association (2020) reported, "African Americans are about two times more likely than white Americans to have Alzheimer's and other dementias, and Hispanics are about one and one-half times more likely than whites to have Alzheimer's and other dementias" (p. 1). However, even with the higher risk, people of color are often less likely to get diagnosed with dementia. Black Americans are 35% less likely, and Hispanics are 18% less likely. Lennon et al. (2022) confirm these numbers in their study. They found that black participants had more risk factors for developing dementia; however, the prevalence was lower than that of white participants.

Types of Dementia

Alzheimer's disease is the most common form of dementia worldwide. Early symptoms of the disease include "forgetfulness, losing track of time, and becoming lost in familiar places" (*What Are the Signs of Alzheimer's Disease?*, 2022). These early symptoms often go unnoticed or

are mistaken for typical age-related issues. As the disease progresses, the symptoms worsen, and other bodily and brain functions are affected. In the end stages of the disease, the person cannot communicate, is entirely dependent on caregivers, and may be immobile (*What Are the Signs of Alzheimer's Disease?*, 2022).

Research is still trying to understand the underlying cause of Alzheimer's disease, what risk factors may lead to Alzheimer's diagnosis, and treatment options that extend the life and independence of the person with Alzheimer's. Two possible underlying causes have been discovered to possibly be connected to developing Alzheimer's disease. Some theories suggest that "exposure to harmful toxins, infections, injury, immune response, or inflammatory reaction has been suspected to play a role. The possibility of a nutritional deficiency, too, has been explored" (Ellison, 2021, para. 6). However, the leading theory that treatments for Alzheimer's are based on is the build-up of amyloid plaque in the brain caused by the beta-amyloid protein and tangles caused by a problem in tau protein (Ellison, 2021).

Another common form of dementia is Lewy Bodies Dementia (LBD). It's unclear how many cases there are since it is often misdiagnosed and only corrected once an autopsy is performed. However, the Lewy Body Dementia Association estimates that 1.4 million Americans are affected by LBD and that recent estimates suggest that it represents 4 to 16 percent of cases of dementia seen in clinical settings. Still, the prevalence could be higher (Fernandes, 2021).

LBD is different from other forms of dementia because it includes problems with memory and cognitive functions and movement, behavior, and sleep (*What is lewy body dementia? causes, symptoms, and treatments* 2021). The primary cognitive symptom, which affects about 80 percent of people with LBD, that differentiates LBD from other dementias is the presence of visual or nonvisual hallucinations. The movement symptoms include but are not

limited to, stiffness, trouble walking or shuffling, loss of coordination, and a weak voice. Lastly, LBD may cause sleep disturbances, such as insomnia, restless leg syndrome, or excessive sleepiness during the day (*What is lewy body dementia? causes, symptoms, and treatments* 2021).

LBD is caused by the build-up of the Lewy body protein in selective parts of the brain. The cause of this build-up is still unknown. However, research is currently looking into genetic connection and the connection to sleep disorders. One known factor in developing LBD is old age. Most people diagnosed with LBD are over the age of 50 (Fernandes, 2021).

The following common type of dementia is vascular dementia. Vascular dementia is the most common nondegenerative form of dementia and accounts for about 17 to 30 percent of all dementia cases (*Adi-Vascular Dementia*, n.d; Sanders et al., 2023). It mainly affects people over the age of 65, those at higher risk for stroke, or those with cardiovascular issues (Sanders et al., 2023). Symptoms usually appear after mini-strokes called Transient Ischemic Attacks (TIA) (*Adi-Vascular Dementia*, n.d). However, other vascular events can cause vascular dementia as well. Due to the nature of how vascular dementia is acquired, symptoms begin suddenly. These include cognitive impairment, depression, mood swings, and confusion. Symptoms will plateau and then worsen after another TIA event. There are several risk factors associated with vascular dementia. Smoking, hypertension, diabetes, and atrial fibrillation, among other things.

The last type of dementia that is often diagnosed or seen in clinical settings is frontotemporal dementia (FTD). This form of dementia is considered a rare form since the age of onset is between 45 and 65, with some showing symptoms in their early 20s. frontotemporal dementia accounts for about 50 to 60 thousand cases of early-onset dementia, dementia that occurs before the age of 65. The two most common forms of frontotemporal dementia are the

behavioral variant Frontotemporal dementia (bvFTD) or Primary Progressive Aphasia (PPA).

BvFTD is most commonly seen in men, while PPA is most seen in women. (Khan & De Jesus, 2023) FTD is often misdiagnosed since the symptoms usually appear earlier than typical dementias and can seem like other mental health disorders or other dementias (*Frontotemporal dementia*, 2023).

BvFTD is characterized by significant changes in personality, conduct, and interpersonal relationships, with noticeable symptoms appearing between the ages of 50 and 60. These changes can look like poor judgment, impulsivity, and lack of empathy. The “loss of interpersonal skills may result in more socially inappropriate activities, such as making inappropriate comments or acting in demeaning, rude or immodest fashion” (*Frontotemporal dementia*, 2023, p. 2). These symptoms are caused by the degeneration of the brain cells in the frontal lobe that are responsible for behaviors and empathy. PPA is characterized by difficulty speaking, forming, or understanding spoken words. The areas of degenerating brain cells associated with PPA are commonly found in the left hemisphere, areas such as the temporal lobe or the parietal lobe. The two leading causes of deterioration in both forms of frontotemporal are diseases related to tau proteins or TDP43 proteins. So far, research has not found why these diseases attack the front and temporal lobes of the brain (*Frontotemporal dementia*, 2023).

Genetics are the leading risk factor for developing FTD, with about 40 percent of cases originating from shared genes in the family. Researchers have found over 20 gene mutations connected to developing frontotemporal demntia, some of which are considered a dominant inheritance. This means there is a near-guaranteed chance of the mutations being inheritable (Khan & De Jesus, 2023). Research has not been able to connect any other risk factors to the development of FTD (*Frontotemporal dementia*, 2023; Khan & De Jesus, 2023).

Future Outlook

The number of older adults is expected to increase in the following years due to the baby boomer generation, born between 1946 and 1964, reaching 65 or older. It is estimated that the number of older adults within the population may grow “from 58 million in 2022 to 82 million by 2050” (Mather & Scommegna, 2024, para 3). With this historic increase in older adults, there is an expected increase in age-related health issues, including dementia. It is estimated that the incidence of Alzheimer's disease could increase from 6.7 million older Americans to 13.8 million older Americans by 2060 (*2023 Alzheimer's disease facts and figures*, 2023).

At the current number of cases, there is a significant lack of caregivers for older adults with dementia, and the gap is only going to widen as cases increase (Matthews et al., 2019). More older adults with dementia are going to find themselves isolated and without caregivers in the upcoming years. This means the importance of understanding how isolation affects those with dementia and creating interventions to address it is more important than ever.

Social Isolation Effects on People with Dementia

As previously stated, social isolation is the lack of social contact and interaction with others. While it has always been a problem, it has significantly increased throughout the United States in recent years. In his report, the Surgeon General (2023) notes, “about one-in-two adults in America reported experiencing loneliness” before the pandemic (p. 4). The number of Americans experiencing social isolation only increased during the pandemic. While the trends in social isolation and loneliness are now beginning to drop, they are still significantly higher than they were before the pandemic (*Trends in loneliness among older adults from 2018-2023*, 2023). Social isolation can appear in many different ways: physically isolating oneself from others,

feeling a lack of companionship with others, and infrequent social contact. (*Trends in loneliness among older adults from 2018-2023*, 2023; US Surgeon General Advisory, 2023)

More research finds that older adults are more susceptible to social isolation than other populations and experience more severe adverse effects from social isolation, which span from physical effects to economic strain. Older adults with dementia face age-related health issues and health issues related to dementia. Social isolation only exacerbates both physical health issues due to aging and dementia in a person experiencing the isolation. As noted in the previous section, dementia affects not only memory and cognitive functions but also physical functions. Even with mild dementia symptoms, people can quickly become disabled. Some can still function in daily life; however, social isolation can increase the risk of developing more severe disabilities and health issues (*Trends in loneliness among older adults from 2018-2023*, 2023; US Surgeon General Advisory, 2023). This is due to possible sleep disturbance, lack of energy, and social stimulation (Farhang et al., 2021). Isolation cannot only increase the risk of disability in older adults but also increases the risk of death nearly as much as other risk factors, like smoking or obesity (Fakoya, 2020).

Interestingly, however, one study that interviewed Chilean older adults with dementia during the pandemic quarantines found that participants had lower sleep disturbances, no appetite changes, or physical pain. They also noted that the decrease in daily activities was not due to the adverse effects of social isolation but due to family members taking over the activities. The study did align with other studies in their findings regarding the psychological and emotional effects social isolation has on older adults with dementia (Farhang et al., 2021).

Social isolation can leave older adults, especially those with dementia, more vulnerable to different mental health illnesses, suicidality, and financial abuse (Farhang et al., 2021; Rine &

LaBarre, 2021; Rascoe, 2023). In a person with dementia who is experiencing behavioral symptoms, the added stress of social isolation often increases the symptoms, causing further isolation from others. Not only do behavioral symptoms worsen or the person with dementia is diagnosed with comorbid mental health disorder, but those who are aware of their dementia diagnosis and progression often are fearful of their symptoms progressing if they are socially isolated or feel lonely (Farhang, 2021).

While this fear could be associated with anxiety, it is, in fact, a very real fear to have. Social isolation increases the risk of developing dementia; it can also contribute to the progression of dementia. Curelaru et al. (2021) reviewed studies that looked at the effects of social isolation and loneliness on dementia and found:

Isolation and loneliness also speed dementia progression. Loneliness was associated with more rapid declines in memory and language fluency than nonlonely controls in the 10-year follow-up of the English Longitudinal Study of Ageing. Porcelli et al. concluded that social deprivation negatively affects cognitive performance in people with dementia. (p. 951)

Curelaru also noted that some studies they looked into did not find a correlation between a quickening progression of dementia and increased social isolation or loneliness, which may have had more to do with the execution of the study or the collection of data. Overall, studies very rarely look at the effects of social isolation on the progression of dementia. Instead, studies focus on the adverse physical and psychological health effects and increased mortality rate.

Interventions used for Dementia

Standard Medical Interventions

In Western medicine, the first line of action against dementia once diagnosed is medication. Many different medications are approved to treat dementia. Since research has not discovered a singular cause for the development of dementia, the medication used addresses different theories researchers believe cause dementia. One of the first theories, a still standard chemical treatment for dementia, specifically Alzheimer's, is cholinesterase inhibitors. These work by increasing the neurotransmitter acetylcholine, which scientists found to be a deficit in dementia brains (Ellison, 2021). Another medication approved for treating dementia is memantine, unlike cholinesterase inhibitors, which work to balance the function of the glutamate system. Both do not affect the progression of dementia; they work to mitigate symptoms. Other types of medication not necessarily approved to treat dementia are also used to minimize symptoms. Since mood disturbances are common in all forms of dementia, there are "a variety of psychotropic medications such as antipsychotics, benzodiazepines, anticonvulsants, and antidepressants are used off-label to treat these symptoms" (Gerlach & Kales, 2020, para. 1).

Most recently, the Food and Drug Association (FDA) granted full approval of a new Alzheimer's medication, "which has been shown to moderately slow cognitive and functional decline in early-stage cases of the disease" (MacMillan, 2023, para. 1). The medication clears amyloid plaque that builds up the brain. In the trial that ultimately led to the approval process, researchers "saw a clinical decline by 27% after 18 months of treatment compared with those who received a placebo" (MacMillan, 2023, para. 8). They also noted that in cognitive functioning testing and daily living testing participants who received treatment experienced a significant decline compared to the placebo group (MacMillan, 2023). The medication is still under investigation to see the results in people who are still cognitively functional but are at risk of developing Alzheimer's due to high levels of amyloid protein. The drug is a significant step in

the progress of treatment for Alzheimer's and other dementia since this is the first to have shown a decline in progression instead of mitigating symptoms.

Alternative Interventions

It can be extremely frustrating for people with dementia and their caregivers when navigating health care for dementia. Especially when needing to keep track of multiple medications, the possible interactions, and the known side effects. Many of the medicines used to treat dementia cannot address the underlying cause but only treat the symptoms arising from the disease, with a focus on behavioral and memory symptoms. Occupational therapy and Physical therapy are often used to address the motor symptoms of dementia. Still, many caregivers and those living with dementia are seeking other types of treatments to address and complement the medication treatment.

Similar to treating with medication, there are theories that many alternative and complementary treatments are based on. Behavioral interventions are based on two theories: competence-environmental press and needs-driven dementia (Scales et al., 2018). Competence-environmental press is the idea that "environmental forces influence ("press" on) an individual's psychological state and evoke a behavioral response" (Scales et al., 2018, p.89). Meanwhile, needs-driven dementia is the idea that behavior is a way to communicate an unmet need (Scales et al., 2018, p.89). These two theories have made it possible to create behavioral interventions that address the root cause of the behaviors or the environmental factors that exacerbate behavioral and psychotic symptoms of dementia. Some of these interventions include sensory interventions such as aromatherapy, massage, or multisensory stimulation. Other interventions included social activities, such as music therapy, validation therapy, and meaningful activities.

Meaningful activities are individualized activities that help enhance the quality of life and offer some independence to the person with dementia. These activities provide the person with a space for meaningful engagement, social interaction, and a place for self-expression (Scales et al., 2018, p. 96). Meaningful activities are reported as a constant and crucial unmet need both by people with dementia and their caregivers (Han et al., 2015; Lu et al., 2016; Scales et al., 2018), which can lead to an increase in negative behavioral and psychotic symptoms. Therefore, it can make getting those with dementia socially engaged in meaningful activities challenging due to depression, paranoia, or agitation. However, when finding the underlying cause of behavior and motivation for the person with dementia, it can be easier to find engaging activities (Han et al., 2015). Multiple studies have shown that social engagement through meaningful activities can increase the quality of life for a person with dementia and their caregivers (Han et al., 2015; Lu et al., 2016; Scales et al., 2018; Mondro et al., 2018). One meaningful activity gaining more notice that has been found to encourage connection with others and self-expression and reminiscing is artistic activities, such as music and visual art making (Ismail et al., 2020).

Art as an Intervention

Over the last ten to fifteen years, more research has been conducted on the arts as a complementary treatment for dementia. With a focus mostly on music therapy and art therapy, only in the last few years has drama therapy been researched as a possible complementary treatment for people with dementia. Even with this new research, music therapy is still the most popular art form and expressive arts intervention for treating people with dementia (Bleibel et al., 2023). For a good reason, many studies have shown that music “may reduce agitation and improve behavioral issues that are common in the middle stages of the disease. Even in the late-stages of Alzheimer's, a person may be able to tap a beat or sing lyrics...” (*Art and music*, n.d).

The therapeutic use of music can look different when working with people with dementia; it can be as simple as listening to familiar music or what is typically thought of as music therapy, which is to address the behavioral and psychotic symptoms of dementia. Many different techniques can be implemented when using music as a complementary treatment for people with dementia. Each has varying goals and results. One common one is simply listening to music. A few studies have shown that listening to classical music improved some cognitive abilities, like spatial-temporal tasks, and improvement was seen within the abstraction domain (Li et al., 2015). While the improvements were noticed, they were not significantly different from the control groups. However, one study where familiar songs were chosen found an improvement in self-consciousness in mild to moderate stages of Alzheimer's (Arroyo-Anlló et al., 2013). While listening to music has shown some improvement, more significant data was found in the use of singing familiar songs than just listening to them. This type of intervention is not only good for the early and middle stages of dementia but also for later stages since many people who have become nonverbal can still sing (*Art and music*, n.d). Fang et al. (2017), in their article where the authors review different types of musical interventions, found multiple studies that discussed the significant improvement in quality of life and memory recall from using karaoke and songs that are associated with different emotions.

As mentioned before, music is the most common complementary treatment for dementia. However, other art modalities have become popular as well. Visual art "has the unique potential to increase awareness of the self and the outside world" (Mondro et al., 2018, p. 1642). This allows for the focus of therapy to change. Other benefits that art therapy provides are similar to psychotropic medication used to treat behavioral/psychotic symptoms of dementia without the side effects associated with the medication (Chancellor et al., 2014).

Research on art therapy as a complementary treatment for dementia is scarce, focusing primarily on early and mild/moderate stages and inconsistent. Interventions focusing on a specific goal have seen improvement (Mondro et al., 2018), while those looking at the overall effect of art therapy found no difference, or the benefits only occurred in specific settings (Chancellor et al., 2014). Even with the conflicting research on using the arts, a common theme arises among all the articles: the use of arts as complementary treatment benefits not only the person with dementia but also their family and caregivers.

Using Arts to Maintain Connection with People with Dementia in Times of Isolation

As mentioned in the introduction, social connectedness is the feeling of belonging and having the support and care needed (Olive, 2024), as well as “the number, quality, and diversity” of relationships (Centers for Disease Control, 2023, para. 1). The definition is broader because it encompasses not just the number of close connections a person has but many other things as well. The Surgeon General presents three components of social connection: structure, function, and quality.

Structure refers to the number and variety of relationships and the frequency with which interactions occur with others. The Surgeon General gives examples of “household size, friend circle size, and marital status” (2023, p. 11). The next is *function*, which refers to the degree to which we can rely on people around us for various needs. In simpler terms, function is the social and emotional support we can access. Lastly, *quality* is the degree to which our relationships and interactions are satisfying, helpful, and positive (US Surgeon General Advisory, 2023). Quality is if relationships are strained and if we feel actively included or excluded from groups.

Aging interferes with the components above, leading to an increased risk of social isolation. However, the risk is even higher for older adults with dementia. Due to behavioral and

psychotic symptoms, the type of care needed, and the toll it can have on family members, dementia interferes with all three components described by the Surgeon General. However, as described above, art is a way to begin treating the symptoms contributing to social isolation.

While not much research is available to support the idea, visual art can be used as insight into the world of the person with dementia. Chancellor et al. (2014) cited different visual and non-visual artists diagnosed with Alzheimer's and other dementias and how their painting styles changed over the course of their disease. "Their art tends to be obsessive, realistic, surrealistic, and sometimes bizarre. By contrast, the art of AD patients becomes more abstract, less precise with fewer, more muted colors, less attention to spatial relationships, less realistic, and possibly more symbolic" (p. 2). Using visual art in this way allows those around the person with dementia a glimpse into their lived experience in a more concrete way. This creates ways to navigate language barriers that may arise in the later stages of dementia and allows a new understanding between the person with dementia and their caregivers, reforming and strengthening their connection (Nobel, 2024).

Another way to encourage older adults with dementia to form connections is through outreach programs that bring the arts to the isolated person. This allows the person to remain in the safe space of their home or room while still being able to encourage connection. "Having the in-home visits... offered an opportunity for intimacy and to be in a relationship in the person's context..." (MacLeod et al., 2016, p. 20). This study addresses isolation among older adults. However, the idea of in-home visits can extend to people with dementia because, as stated previously, familiar settings, things, or music can help reduce psychiatric symptoms and increase the quality of life. Adding the use of art allows for the connection and allows participants and volunteers to share stories and form stronger relationships (MacLeod et al., 2016).

While traditional visual art or home visits may not be feasible during times of social isolation, the use of digital art has emerged as a promising alternative. This was particularly evident during the pandemic when social restrictions were in place. For instance, one study used “digital photcollages and narrative format of dignity therapy with older adults. The findings were encouraging, with older adults reporting a stronger sense of connection to themselves and others through sharing memories or wonderings sparked by the chosen images (Keisari et al., 2022).

However, painting, drawing, or even media arts may not be accessible to caregivers and persons with dementia during a time of social isolation. While articles do not specifically address why it is inaccessible, one main reason is the lack of contact allowed during times of social isolation, as seen during the pandemic. Other reasons may be a lack of understanding or access to materials needed. Therefore, other forms, like music, dance movement, and drama therapy, are more ideal during times of isolation. This is because they do not need specific materials, can be modified for the person or setting, and there are benefits to just listening to music or watching a dance because of mirror neurons.

Mirror neurons are “a distinctive class of neurons that discharge both when an individual executes a motor act and when he observes another individual performing the same or a similar motor act” (Acharya & Shukla, 2012, para. 2). Studies show that witnessing someone perform a stretch or exercise has similar benefits to completing the exercise. Mirror neurons also play a role in empathy, attachment, and attunement, which are significant in creating and maintaining relationships. In dance movement therapy (D/MT), a technique called mirroring targets these neurons (Berrol, 2006).

As in D/MT, mirroring can be overtly manifested in one or a combination of forms—a single effort or a mix of efforts exerted by way of movement, facial expression and/or voice. Underlying these dynamical interactions, the neurons of the mirror matching networks within the CNS are actively discharging. Theoretically then, comparable sets of CNS neurons are potentiated in the therapist when moving in synchrony with the client or when a therapist simply witnesses a moving client. In this latter instance, the network of actively matching mirror neurons is, in effect, generating interneuronal connectivity between the two individuals. (Berrol, 2006, p. 209)

An example of the connective power of mirror neurons is shown through the use of creative movement during a global virtual webinar where Plevin and Zhou (2020) lead a movement experience. During this experience, they describe their deep connection even through a screen. “The *Ch’I* raised and felt within us integrated with the individual soul expression imbuing it to facilitate the creative process which seemed to nurture a virtual group” (Plevin & Zhou, 2020, p. 69). While this is not specific to older adults with dementia, this shows how art, specifically dance, can connect people during times of social isolation.

The few studies that addressed social isolation in older adults, with or without dementia, focused on collaborating and connecting with family and or caregivers (Mondro et al., 2018; Bennett et al., 2019; Van Orden & Heffner, 2022; Dassa, 2024). Mondro et al. (2018) and Van Orden and Heffner (2022) actually focus on the caregivers of a person with dementia's experience of loneliness and social isolation; however, they found that interventions that included the person they were caring for reduced their feelings of loneliness and more social connectedness. It can then be inferred that there was a reduction in loneliness and an increase in social connectedness for the person they are caring for.

Benett et al. (2019) and Dassa (2024) focus on interventions that focus on how the person with dementia responds to the connection rather than the caregiver. Benett used movie and art installation watching with both people with dementia and their caregivers, while Dassa used music therapy with a person with dementia and their spouse. Both found that the use of arts helped the person with dementia connect to their caregiver and lower the risk of social isolation. Dassa (2024) takes this further by doing music therapy with couples online during the pandemic, finding that even online, the couples were able to “rekindle their relationship as a couple while supporting the caregiver spouse” (p. 15).

More research is still needed on the interventions for people with dementia experiencing social isolation as well as the caregiver's experience. Multiple studies show not only the importance of a connection to the self but also a connection to caregivers and other familiar people and things.

Discussion

This thesis critically reviewed the literature on the effects of social isolation on those living with dementia and how the arts could be used to maintain connections during periods of isolation. The intention is to understand these effects and what interventions are available to those living with dementia and those caring for someone with dementia. During the investigation into the literature, the information focused on the cause of isolation and the negative effects on mental and physical health, the health care system, and the economics of the United States. At one point, being called an “epidemic” that needs immediate addressing. However, few of the studies discussed how the epidemic should be addressed. When searching for interventions, there were few studies specific to isolation in those living with dementia and, more broadly, on the elderly population. Therefore, this thesis also aims to fill the gap in the literature. In order to do

this, interventions for loneliness and social isolation in other populations were researched and later modified so they could be used with people with dementia.

There are many adverse effects of social isolation, not just on people with dementia but in general. However, older adults, especially those with dementia, experience more psychological effects than physical effects of social isolation. Many are fearful of the progression of their disease and an increase in anxiety, depression, and suicidality. Those who are in later stages of dementia or experiencing more psychotic and behavioral symptoms are more likely to be isolated. This is because it can be challenging to care for and be around someone experiencing these types of symptoms.

Art can be a way to address the behavioral and psychotic symptoms that lead to social isolation. It also can give caregivers insights into the person with dementia's world, moving past language barriers that arise during the progress of the disease. Art may be able to be used to rebuild relationships between people with dementia and their caregivers, which reduces feelings of loneliness and social isolation in both the person with dementia and the caregiver.

Meaningful activities and familiar people and places also play a role in reducing psychotic and behavioral symptoms seen in dementia. Music therapy and dance therapy can be used together with meaningful activities to stimulate memories, calm anxiety, lower depression, and increase quality of life. However, like many findings within this thesis, more research needs to be done to see the full benefits of meaningful activities, dance movement therapy, and music therapy.

Limitations

The thesis had few limitations, considering the amount of research available on dementia and the different treatments available, as well as the effects of social isolation and social connection on people with dementia. However, even with this research, little to no interventions were available within the research. This means that the ideas presented within the thesis are based on different populations that may also be affected by social isolation and interventions that address loneliness within the older adult population. More research is needed on using the arts as a way to form social connections for this population. However, there is research on the benefits of using certain art forms, such as music, poetry, or drama.

Another aspect that needs more research is adapting expressive arts interventions to be used during times of social isolation. Van Orden and Heffner (2019) mention, “Telehealth has shown promise in addressing loneliness, including with caregivers” (p. 1262). Focusing on the relationship between the person with dementia and their caregiver is a crucial step in addressing social isolation in this population. By adapting, creating, and encouraging caregivers to use the arts, relationships can be rebuilt and extended over time.

Conclusion

Over the next 50 years, the older adult population is expected to substantially increase, becoming the majority of the population. This also means a rise in age-related health issues, including Alzheimer's and other dementias. This will widen the caregiver gap already seen today, in turn increasing the risk of social isolation within the older adult, specifically those with dementia. Given that this is an already underserved population, more research needs to be done into how to serve the population better and increase and retain caregivers. Two studies discussed in the thesis have already begun this research, but much more is needed to address the caregiver gap.

Given these limitations, further research should continue to fill the gap within the literature by moving the focus away from the effects of social isolation on those with dementia and toward what can be done to prevent social isolation and encourage reconnection to those who are socially isolated. Research should also continue to investigate the effects the arts have on people with dementia and how they can be used as a form of connection.

References

- 2023 Alzheimer's disease facts and figures. (2023). *Alzheimer's & Dementia*, 19(4), 1598–1695. <https://doi.org/10.1002/alz.13016>
- Abedini, N., Solway, E., Piette, J., & Malani, P. (2019, June 19). *Cross-sector collaborations and partnerships: Essential Ingredients to help shape health and well-being* | *Health Affairs Journal*. Health Affairs. <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2016.0604>
- Acharya, S., & Shukla, S. (2012, July). *Mirror neurons: Enigma of the metaphysical modular brain*. *Journal of natural science, biology, and medicine*.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3510904/#:~:text=Mirror%20neurons%20represent%20a%20distinctive,first%20discovered%20in%20monkey's%20brain>.
- Alzheimer's Association. (2020, March). Race, Ethnicity, and Alzheimer's.
https://aaic.alz.org/downloads2020/2020_Race_and_Ethnicity_Fact_Sheet.pdf
- Alzheimer's Association. (n.d.). *What is dementia?*. Alzheimer's Disease and Dementia.
<https://www.alz.org/alzheimers-dementia/what-is-dementia>
- Alzheimer's Association. (2023, January). *Frontotemporal dementia*. Alzheimer's Disease and Dementia. <https://www.alz.org/alzheimers-dementia/what-is-dementia/types-of-dementia/frontotemporal-dementia>
- Alzheimer's Disease International. (n.d.). *Adi - Vascular Dementia*. Alzheimer's Disease International (ADI). <https://www.alzint.org/about/dementia-facts-figures/types-of-dementia/vascular-dementia/>
- American Music Therapy Association. (1998). Retrieved April 25, 2024, from <https://www.musictherapy.org/about/musictherapy/>

Arroyo-Anlló, E. M., Díaz, J. P., & Gil, R. (2013). Familiar music as an enhancer of self-consciousness in patients with alzheimer's disease. *BioMed Research International*, 1–10.
<https://doi.org/10.1155/2013/752965>

Art and music. Alzheimer's Disease and Dementia. (n.d.). <https://www.alz.org/help-support/caregiving/daily-care/art-music#:~:text=Music%20can%20be%20powerful.,to%20a%20song%20from%20childhood.>

Bennett, J; Froggett, L; Kenning, G; Manley, J & Muller, L (2019). Memory Loss and Scenic Experience: An Arts Based Investigation [66 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 20(1), Art. 13,

Berrol, C. F. (2006). Neuroscience meets dance/movement therapy: Mirror neurons, the therapeutic process and empathy. *The Arts in Psychotherapy*, 33(4), 302–315.
<https://doi.org/10.1016/j.aip.2006.04.001>

Bleibel, M., El Cheikh, A., Sadier, N. S., & Abou-Abbas, L. (2023). The effect of music therapy on cognitive functions in patients with alzheimer's disease: A systematic review of randomized controlled trials. *Alzheimer's Research & Therapy*, 15(1), 1–10.
<https://doi.org/10.1186/s13195-023-01214-9>

Centers for Disease Control and Prevention. (2020, January 27). *About quarantine and isolation*. Centers for Disease Control and Prevention.
<https://www.cdc.gov/quarantine/quarantineisolation.html>

Centers for Disease Control and Prevention. (2019, April 5). *What is dementia?*. Centers for Disease Control and Prevention. <https://www.cdc.gov/aging/dementia/index.html>

- Centers for Disease Control and Prevention. (2023, March 31). *Social connectedness*. Centers for Disease Control and Prevention. <https://www.cdc.gov/emotional-wellbeing/social-connectedness/index.htm#:~:text=What%20is%20social%20connectedness%3F,people%20live%20longer%2C%20healthier%20lives>
- Chancellor, B., Duncan, A., & Chatterjee, A. (2014). Art therapy for Alzheimer's disease and other dementias. *Journal of Alzheimer's Disease*, 39(1), 1–11. <https://doi.org/10.3233/jad-131295>
- Curelaru, Aurora, et al. "Social Isolation in Dementia: The Effects of COVID-19." *The Journal for Nurse Practitioners*, vol. 17, no. 8, May 2021, pp. 950–953, <https://doi.org/10.1016/j.nurpra.2021.05.002>.
- Dassa, A. (2024). Meeting through music. *GeroPsych*, 37(1), 15–24. <https://doi.org/10.1024/1662-9647/a000320>
- Ellison, J. M. (2021a, July 8). *The History of Alzheimer's Disease*. BrightFocus. <https://www.brightfocus.org/alzheimers/article/history-alzheimers-disease>
- Ellison, J. M. (2021, August 23). *Possible causes of Alzheimer's Disease*. BrightFocus. [https://www.brightfocus.org/alzheimers/article/possible-causes-alzheimers-disease#:~:text=Amyloid%3A%20Still%20an%20Important%20Piece%20of%20the%20Alzheimer's%20Puzzle&text=These%20plaques%2C%20along%20with%20neurofibrillary,and%20neurofibrillary%20tangles%20\(tangles\)](https://www.brightfocus.org/alzheimers/article/possible-causes-alzheimers-disease#:~:text=Amyloid%3A%20Still%20an%20Important%20Piece%20of%20the%20Alzheimer's%20Puzzle&text=These%20plaques%2C%20along%20with%20neurofibrillary,and%20neurofibrillary%20tangles%20(tangles)).
- Fakoya, O. A., McCorry, N. K., & Donnelly, M. (2020). Loneliness and social isolation interventions for older adults: A scoping review of reviews. *BMC Public Health*, 20(1), 1–14. <https://doi.org/10.1186/s12889-020-8251-6>

- Fang, R., Ye, S., Huangfu, J., & Calimag, D. P. (2017). Music therapy is a potential intervention for cognition of Alzheimer's disease: A mini-review. *Translational Neurodegeneration*, 6(1), 1–8. <https://doi.org/10.1186/s40035-017-0073-9>
- Farhang, M., Miranda-Castillo, C., Behrens, M. I., Castillo, E., Mosquera Amar, S., & Rojas, G. (2021). Impact of social isolation and coping strategies in older adults with mild cognitive impairment during the COVID-19 pandemic: A qualitative study. *Aging & Mental Health*, 26(7), 1395–1416. <https://doi.org/10.1080/13607863.2021.1958145>
- Federal Interagency Forum on Aging-Related Statistics. (2020). *Older Americans 2020: Key indicators of well-being*. Washington, DC: U.S. Government Printing Office.
- Fernandes, C. (2021, August 16). *Learn more about LBD from Lewy Body Dementia Association*. Lewy Body Dementia Association. <https://www.lbda.org/about-lbd/#:~:text=LBD%20affects%20an%20estimated%201.4,or%20another%20form%20of%20dementia.>
- First, M. B. (2022). *Diagnostic and statistical manual of mental disorders: DSM-5-TR*. American Psychiatric Association Publishing.
- Gerlach, L. B., & Kales, H. C. (2020, December). *Pharmacological management of neuropsychiatric symptoms of dementia*. Current treatment options in psychiatry. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7742723/>
- Han, A., Radel, J., McDowd, J. M., & Sabata, D. (2015). Perspectives of People with Dementia About Meaningful Activities. *American Journal of Alzheimer's Disease & Other Dementias*, 31(2), 115–123. <https://doi.org/10.1177/1533317515598857>

- Hwang, T.-J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020, October). *Loneliness and social isolation during the COVID-19 pandemic*. *International psychogeriatrics*.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7306546/#:~:text=Quarantine%20and%20social%20distancing%20are,and%20mental%2Dhealth%20related%20repercussions.>
- Ismail, Zahinoor, et al. "Recommendations of the 5th Canadian Consensus Conference on the Diagnosis and Treatment of Dementia." *Alzheimer's & Dementia*, vol. 16, no. 8, 29 July 2020, pp. 1182–1195, <https://doi.org/10.1002/alz.12105>.
- Khan, I., & De Jesus, O. (2023, August 23). *Frontotemporal Lobe Dementia*. National Institute on Aging.
<https://www.ncbi.nlm.nih.gov/books/NBK559286/#:~:text=Overall%20prevalence%20is%2015%2D22,survival%20time%20is%207.5%20years.>
- Keisari, S., Piol, S., Orkibi, H., Elkarif, T., Mola, G., & Testoni, I. (2022). Spirituality during the COVID-19 pandemic: An online creative arts intervention with photocollages for older adults in Italy and Israel. *Frontiers in Psychology*, *13*, 1–17.
<https://doi.org/10.3389/fpsyg.2022.897158>
- Lennon, J. C., Aita, S. L., Bene, V. A. D., Rhoads, T., Resch, Z. J., Eloi, J. M., & Walker, K. A. (2022). Black and White individuals differ in dementia prevalence, risk factors, and symptomatic presentation. *Alzheimer's & dementia : the journal of the Alzheimer's Association*, *18*(8), 1461–1471. <https://doi.org/10.1002/alz.12509>
- Li, C.-H., Liu, C.-K., Yang, Y.-H., Chou, M.-C., Chen, C.-H., & Lai, C.-L. (2015). Adjunct effect of music therapy on cognition in Alzheimer disease in Taiwan: A pilot study. *Neuropsychiatric Disease and Treatment*, *291*. <https://doi.org/10.2147/ndt.s73928>

- Lu, Y. Y.-F., R.N., P., Ellis, J., PT, D., M.S., G.C.S., Yang, Z., M.S., W., Michael T, PhD., F.A.A.N., Bakas, Tamilyn, RN, PhD., F.A.A.N., Austrom, M. G., PhD., & Haase, Joan E, RN, PhD., F.A.A.N. (2016). Satisfaction With a Family-Focused Intervention for Mild Cognitive Impairment Dyads. *Journal of Nursing Scholarship*, 48(4), 334-344.
<https://doi.org/10.1111/jnu.12214>
- MacLeod, A., Skinner, M. W., Wilkinson, F., & Reid, H. (2016). Connecting socially isolated older rural adults with older volunteers through expressive arts. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement*, 35(1), 14–27.
<https://doi.org/10.1017/s071498081500063x>
- MacMillan, C. (2023, July 24). *Lecanemab, the new alzheimer's treatment: 3 things to know*. Yale Medicine. <https://www.yalemedicine.org/news/lecanemab-leqembi-new-alzheimers-drug#:~:text=Updated%3A%20July%202024%2C%202023.,stage%20cases%20of%20the%20disease.>
- Mather, M., & Scommegna, P. (2024, January 9). *Fact sheet: Aging in the United States*. PRB. <https://www.prb.org/resources/fact-sheet-aging-in-the-united-states/#:~:text=The%20number%20of%20Americans%20ages,from%2017%25%20to%2023%25.&text=The%20U.S%20population%20is%20older%20today%20than%20it%20has%20ever%20been.>
- Matthews, K. A., Xu, W., Gaglioti, A. H., Holt, J. B., Croft, J. B., Mack, D., & McGuire, L. C. (2019). Racial and ethnic estimates of Alzheimer's disease and related dementias in the United States (2015–2060) in adults aged ≥ 65 years. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 15(1), 17.
<https://doi.org/10.1016/j.jalz.2018.06.3063>

Mondro, Anne, et al. "Retaining Identity: Creativity and Caregiving." *Dementia*, vol. 19, no. 5, 4 Oct. 2018, pp. 1641–1656, <https://doi.org/10.1177/1471301218803468>. Accessed 16 Sept. 2020.

National Institute on Aging. (2021, January 14). *Loneliness and social isolation - tips for staying connected*. <https://www.nia.nih.gov/health/loneliness-and-social-isolation/loneliness-and-social-isolation-tips-staying-connected#:~:text=Social%20isolation%20is%20the%20lack,while%20being%20with%20other%20people>.

Nobel, J. (2024). Alleviating Loneliness in Older Adults Through Creative Expression. *Generations Journal*, 48(1), 1–13.

Plevin, M., & Zhou, T. Y. (2020). Creative movement with Te and Ch'i – Global Virtual and embodied connection during the COVID-19 pandemic. *Creative Arts in Education and Therapy*, 6(1), 61–71. <https://doi.org/10.15212/caet/2020/6/17>

Rascoe, A. (2023, December 3) *Why elderly men have the highest rates of suicide* [Radio broadcast transcript]. NPR. <https://www.npr.org/2023/12/03/1216836513/why-elderly-men-have-the-highest-rates-of-suicides#:~:text=My%20colleagues%20and%20I%20like,people%20who%20die%20by%20suicide>

Rine, & LaBarre, C. (2021). Research, Practice, and Policy Strategies to Eradicate Social Isolation. *Health & Social Work*, 45(4), 221–224. <https://doi.org/10.1093/hsw/hlaa031>

Saito, T., Murata, C., Saito, M., Takeda, T., & Kondo, K. (2017). Influence of social relationship domains and their combinations on incident dementia: A prospective cohort study.

Journal of Epidemiology and Community Health, 72(1), 7–12.

<https://doi.org/10.1136/jech-2017-209811>

Sanders, A. E., Schoo, C., & Kalish, V. B. (2023, October 22). *Vascular dementia*. StatPearls [Internet]. <https://www.ncbi.nlm.nih.gov/books/NBK430817/>

Scales, K., Zimmerman, S., & Miller, S. J. (2018, January 18). *Evidence-based nonpharmacological practices to address behavioral and psychological symptoms of dementia*. OUP Academic.

https://academic.oup.com/gerontologist/article/58/suppl_1/S88/4816740

Trends in loneliness among older adults from 2018-2023. National Poll on Healthy Aging. (2023, March). <https://www.healthyagingpoll.org/reports-more/report/trends-loneliness-among-older-adults-2018-2023>

U.S. Department of Health and Human Services. (2021, July 29). *What is lewy body dementia? causes, symptoms, and treatments*. National Institute on Aging. <https://www.nia.nih.gov/health/lewy-body-dementia/what-lewy-body-dementia-causes-symptoms-and-treatments#signs>

U.S. Surgeon General Advisory. (2023). *Our Epidemic of Loneliness and Isolation*. U.S. Department of Health and Human Services. <https://www.hhs.gov/sites/default/files/surgeon-general-social-connection-advisory.pdf>

Van Orden, K. A., & Heffner, K. L. (2022). Promoting social connection in dementia caregivers: A call for empirical development of targeted interventions. *The Gerontologist*, 62(9), 1258–1265. <https://doi.org/10.1093/geront/gnac032>

What are the signs of alzheimer's disease? National Institute on Aging. (2022, October 18).

<https://www.nia.nih.gov/health/alzheimers-symptoms-and-diagnosis/what-are-signs-alzheimers-disease>

World Health Organization. (2023, March 15). *Dementia*. World Health Organization.

<https://www.who.int/news-room/fact-sheets/detail/dementia#:~:text=Alzheimer%20disease%20is%20the%20most%20common%20form%20and%20may%20contribute,frontal%20lobe%20of%20the%20brain>.