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THE EFFECTS OF STIGMA ON QUALITY OF LIFE AND PSYCHOLOGICAL
OUTCOMES IN PARTICIPANTS WITH VARYING REPORTS OF SUBJECTIVE
COGNITIVE DECLINE

By

Lauren Flaherty, MS., M.A.
University of Louisville
Louisville, KY. 40245

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Department of Psychological and Brain Sciences
University of Louisville
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By

Lauren Flaherty, MS.,
M.A. University of Louisville,
Louisville, KY. 40245

A Dissertation Approved on

December 2nd, 2022

By the following Dissertation Committee:

_____ Dissertation Director Name
Benjamin Mast, PhD.

_____ Second Committee Member Name
Suzanne Meeks, PhD.

_____ Third Committee Member Name
Paul Salmon, PhD.

_____ Fourth Committee Member Name
Barbara Stetson, PhD.

_____ Fifth Committee Member Name
Kathrin LaFaver, M.D.

ABSTRACT

THE EFFECTS OF STIGMA ON QUALITY OF LIFE AND PSYCHOLOGICAL OUTCOMES IN PARTICIPANTS WITH VARYING REPORTS OF SUBJECTIVE COGNITIVE DECLINE

Lauren Flaherty

December 2nd, 2022

Background: Diagnostic labels such as cognitive impairment, dementia or MCI often carry associated stigmatization. Stigma can lead to social isolation and rejection; increasing the likelihood of loneliness, depression, and anxiety. Depression and anxiety can be predictive of cognitive function; depression and anxiety are linked to stigma. Subjective cognitive decline (SCD) can be indicative of actual cognitive impairment. Subjective impairment and stigma can significantly predict quality of life. The aim of the proposed dissertation study was to explore whether higher SCD scores associate with more internalized stigma, and if this stigma mediates the relationship between SCD and depression, SCD and anxiety, and SCD and isolation scores.

Methods: This sample was open to individuals aged 35-80 and consisted of individuals aged 35-78 years old with stratified age groups. One group consisted of adults aged 35-50 ($n=43$), one group consisted of adults aged 51-65 ($n=118$), and another aged 66-80 ($n=58$). This was a cross-sectional study collecting data from validated and continuously scaled measures. Correlational analyses were used to evaluate associative

relationships. Originally, if significant relationships were found, mediation analyses would have been used to look at mechanistic relationships amongst stigma and quality of life.

Results: The results showed that SCD was negatively associated with subjective age; however, these results were not statistically significant. The results also showed that SCD was positively correlated with stigma, even when controlled for age, sex, and race. Stigma was significantly and positively correlated with depression and anxiety, even when controlled for age, sex, and race. Stigma was not significantly correlated with loneliness or isolation. Bivariate correlations between depression and the quality of life were insignificant as well as all correlations between anxiety. Stigma and quality of life showed insignificant relationships. Loneliness and isolation relationships with quality of life were highly significant.

Discussion: Higher SCD was associated with more stigma and stigma was associated with more depression, anxiety, but not loneliness and isolation. Despite these associations, there was no association with quality of life amongst the variables of interest, other than with loneliness and isolation and attitudes towards aging (AAS). Attitudes towards aging had significant relationships with stigma, quality of life, loneliness and isolation. More research into AAS would better assist in seeing how it affects other psychological variables. Given that stigma can impact health outcomes and can begin during early stages of cognitive change, further understanding into this stigma may aid in preventative measures. In the future, research into primarily older adults and more heavily weighted SCD reporting might offer more insight into how these key variables interact with one another and affect health outcomes.

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BACKGROUND

Cognitive impairment is an experience that has rightfully received a great deal of attention in research, patient care, and public spotlight (Petersen, 2001). As data emerges regarding demographics and symptomology associated with cognitive impairment, public awareness and concerns about the healthcare system and concern for the aging public may heighten. Research suggests that many Americans fear losing cognitive function as they age. One study found that Americans are twice as fearful of losing their mental capacity as losing physical capabilities (Research! America, 2002; Madjaroff & Mentis, 2017), another found that 60% of adults are very or somewhat worried about memory loss, and narratives of individuals with cognitive impairment clarify the fear of the effects on their life (Cutler, Whitelaw, & Beattie, 2002; Madjaroff & Mentis, 2017). Unclear understanding of the boundaries between normal aging effects on cognition and pathological cognitive impairment combined with high prevalence rates in older adults, may lead to public concerns about personal risk. The purpose of the proposed study was to measure relationships between perceived cognitive decline, stigmas associated with cognitive decline, and various health outcomes.

The early definition of dementia included senility and classified it as an accelerated, age-related cognitive decline characterized by impairments in memory, language, understanding and judgment (Rice et al. , 2001; Hillman, 2017). However, with the discovery of Alzheimer's disease (comprising 60-80% of all dementias), it became apparent that dementia can be an organic and progressive neurodegenerative disorder that

can also encompass a wide range of both psychiatric and behavioral disturbances including apathy, agitation, depression, anxiety, and hallucinations (Rice et al. , 2001).

Bridging the gap between the expected cognitive decline of normal aging and that of dementia is a milder form of impairment known as “mild neurocognitive disorder” or MNCD as this condition is termed in the DSM-V. Mild neurocognitive disorder, used interchangeably by the DSM-IV and DSM-V with the more widely accepted term mild cognitive impairment (MCI), has well-established criteria that exceed normal age-related changes (Petersen et al. , 2001). The DSM-V (APA, 2013) includes criteria for MNCD whereas the DSM-IV did not; therefore, much of the present criteria for MNCD is based on the criteria set forth for MCI by Petersen et al. (2001). Petersen et al. defined MCI as a condition involving : 1) memory complaint, 2) impaired memory function for age, 3) preserved general cognitive function, 4) intact activities of daily living, and 5) those not already meeting criteria for dementia. Likewise, the DSM-V has similar criteria for MCI, marked by a striking decline in cognitive functioning and significant impairment in cognitive performance. Symptoms of MCI include varying degrees of memory impairment, decline in the ability to perform everyday activities (though still able to perform without assistance), difficulties with language, and perceptual-motor and social skills (APA, 2013).

With more criteria-based and assessment-based classifications of impairment and greater dissemination of information about dementia, people are more aware of cognitive changes they are experiencing, whether normal or not, during the middle and later stages of life (National Institute on Aging, 2017). Therefore, before someone has a diagnosis of MCI or dementia, those with perceived changes in cognition are more likely

to be aware of these changes, especially if they fear them. This experience of noting losses in cognition is called subjective cognitive impairment (SCI) or subjective cognitive decline (SCD). Subjective cognitive decline (SCD) is the self-reported experience of worsening or more frequent confusion or memory loss (Alzheimer's Association, 2018). It *may* be one of the earliest noticeable symptoms of Alzheimer's disease and related dementias (Alzheimer's Association, 2018). SCD can have implications for living with and managing chronic disease, employment, or performing everyday activities like cooking or cleaning (Alzheimer's Association, 2018). One in nine people aged 45 years and older are experiencing subjective cognitive decline, and half (50.6%) of people experiencing SCD report experiencing SCD-related difficulties, such as interfering with social activities, work, or volunteering, according to recent statistics by the Alzheimer's Association and published by the CDC in 2018. Although SCD is not an official diagnosis, people are encouraged by clinicians and researchers to take note of any perceived cognitive impairment, and not to assume it is a normal byproduct of aging, as it could be indicative of non-age-related changes. This realization is often feared by subjects as being the first sign of dementia, and stigma often follows this experience (Lion et al., 2019).

Subjective cognitive decline is closely linked to the experience of subjective age (SA), which is an individual's self-perception in terms of reference age groups. Additionally, it establishes how a person feels about such reference age groups (Blau, 1973; Keyes & Westerhof, 2012) Subjective age does not always correspond with objective chronological age, because it is the individual and perceived experience of aging. This experience may or may not include any perceived changes in cognitive

ability, but it often carries with it other social and psychological variables. For example, those who “feel” younger than their chronological age are more likely to be innovative and also less likely to adhere to traditional values (Blau, 1973; Keyes & Westerhof, 2012). Subjective age, like subjective cognitive decline, is associated with well-being and quality of life (Peters, 1971; ; Keyes & Westerhof, 2012).

When clinicians or researchers indicate that underlying deterioration could be occurring whilst not being yet observed, adults may understandably find this extremely anxiety-provoking. For the public, the idea that cognitive faculties could be organically declining even if one is currently completely unaware of these changes in the brain could make adults fear a sudden shift from “normal” to demented. But one does not go from completely normal cognition directly into dementia, there are several stages during this process, such as SCD. Each stage of cognitive change can introduce new anxieties and illness-related stigmas.

Diagnostic labels such as cognitive impairment, dementia or MCI often carry associated stigmatization. The term stigma, used by the Greeks to denote branding (often of slaves) or separating one from others in pain or suffering, has been defined as an "attribute that is deeply discrediting" and that reduces the bearer "from a whole and usual person to a tainted, discounted one" (Goffman, 1963, page 12). It can be a sign of disgrace or discredit, setting the person apart from others in a way that deviates from the “normal” (Byrne, 2000). According to Stites et al. (2018), stigmatization as a broad term defined above can be further classified as either internalized (or self-stigma) or public stigma. Internalized stigma describes personal preoccupation with negative and often self-inflicted beliefs, attitudes, assumptions, and stereotypes related to one's diagnosis or

other labels. Self-stigma (or perceived stigma, internalized stigma) is associated with depression, avoidant coping, social avoidance, low self-esteem, hopelessness, relatively worse psychiatric symptoms, and decreased help-seeking (Stites, Milne, & Karlawish, 2018). The second sub-category of stigma, public stigma describes how “the general population may carry negative or pejorative beliefs that cause them to act in discriminatory, exclusionary, or patronizing ways toward persons who either have or are closely associated with persons with Alzheimer’s Disease” (Stites, Milne, & Karlawish, 2018, page 286).

Stigma, as it relates to neurocognitive disorders such as dementia and MCI has been shown to affect physical, cognitive, and emotional functioning. For example, stigma can disrupt one’s identity and impose anxious and depressive moods on an individual which thereby limits their ability to perform normal activities and can cause attention issues. (Lion, 2019). However, most models of cognitive impairment conceptualize MCI as the first prodromal stage of dementia (Golomb, Kluger, Garrard, & Ferris, , 2001). Although MCI has been conceptualized as the first manifestation of pathology, researchers and clinicians are beginning to incorporate SCD as a stage (Alzheimer’s Association, 2018) that precedes MCI. This is not currently a discrete diagnostic code but may be the very first stage of change from normal aging. However, its presence is unclear because subjects experience cognitive decline as a natural part of aging; therefore, it may be hard to tell what decline is “normal for their age” versus a decline that is more precipitous. Uncertainty about cognitive decline often enhances the perceptions of stigma.

In addition to stigmas associated with the label of cognitive impairment, there is often a confounding stigma related to age. *Ageism* and age stigma have been shown to have a harmful effect on the well-being of older people, limiting their options in society and facilitating social exclusion (Age Concern and Mental Health Foundation, 2006; Robbins, 2015).

These harmful effects manifest as feelings of worthlessness and despair, lower self-esteem, low expectations, and a decreased access to certain services (Age Concern & University of Kent, 2005). Research shows how older people with dementia, a doubly stigmatized identity, are many times considered to be “effectively dead” and “pitiful victims” who require burdensome services from the healthcare industry and family members (Milne & Peet, 2008).

Qualifying the existence of intersectionally stigmatized identities of older persons with cognitive impairment is relatively simple but quantifying the experience and its effects is more difficult. In fact, this kind of study is still in the earlier stages of research (Milne, 2010). In an Australian general population study (Phillipson et al., 2011), 616 participants between the ages of 40 and 65 years reported that they would feel shame (60.3%), anxiety (76.4%), depression (70.1%), and humiliation (46.7%) when asked how they would feel if they received a dementia diagnosis.

Longitudinal studies have quantified the health-outcome effects of stigma on people with cognitive impairment. This research has increased detection rates of cognitive impairment through education about stigma for those affected by cognitive impairment, but also the public and healthcare workers (Milne & Peet, 2008; Phillipson et al., 2011). The studies above suggest that education would be therapeutic in alleviating

stigma and help to pinpoint specific areas in which interventions could be focused. For example, stigma involving cognitive impairment can be shown to increase the incidence of depression (Link et al., 1989) and has been shown to explain 15% of the variance in depression scores in those with cognitive impairment (Link et al., 1993). Pre-emptive interventions aimed at education and prevention of depression may help reduce the harmful effects on outcomes. Demonstration that stigma increases the likelihood of depression and relatedly, that depression is associated with worse outcomes, might promote depression intervention treatment models within the scientific community. Moreover, if impairment is caught at the MCI stage, stigma-related interventions that attenuate depression and other stigma-related variables may be useful in reducing progression to dementia and increasing reversion to normal cognition. Reversion rates in those with MCI can be as high as 47%, showing that not only is it important to catch impairment at the MCI stage but there is much room to change outcomes in the MCI stage, in which reversion rates can be as high as 47% (Roberts & Knopman, 2013). For our purposes, addressing stigma and its effects on depression and anxiety can be useful in attenuating depression and improving quality of life.

In the present study, stigma was a primary independent variable of interest among people with SCD, as we evaluate its effects on various outcomes such as depression, anxiety, quality of life, and health. Stigma is an invisible phenomenon, yet its effects are measurable. There are several measures that have been used to quantify stigma, yet some are more clinically accepted due in part to their demonstrated validity and reliability, to be discussed in further detail ahead. Relevant to this dissertation study, The Stigma Scale (also called Stigma Impact Scale), is a useful clinical research tool for assessing stigma in

populations with mental or neurological illness. The model used to develop this scale was constructed by King et al. (2007). These authors utilized data from interviews with 193 mental health patients aged 19-76 with various psychiatric diagnoses from different health care settings to develop a 42-item scale. This scale was constructed from results from questionnaires completed at baseline and again two weeks later. Items were assessed for test-retest reliability, and those items with a *k* coefficient of .4 or lower were thrown out (7 items), and the remainder of items had a *k* coefficient that ranged up to .71. Common factor analyses yielded 28 final items with a three-factor structure: discrimination, disclosure, and positive aspects of mental illness. This scale may be modified for disorders outside of mental illness. Internal reliability analyses yielded Cronbach's *alpha* of 0.87 for the first sub-scale (discrimination), 0.85 for the second (disclosure), and 0.64 for the third (positive aspects) sub-scale. This scale is endorsed by the National Institute of Neurological Disorders and Stroke as a useful measure for clinical research (Table 1). The measure may be completed in 5-10 minutes and can be used with other measures to gather valuable data about the relationships between stigma and other outlined variables such as depression, anxiety, quality of life, and health-related outcomes. The development of this scale suggests, with others, that stigma is both tangible and quantifiable.

A second useful measure for internalized stigma, particularly with mental illness, but also used for other disorders, is called the Internalized Stigma of Mental Illness (ISMI) 29 scale. Although it is similar to the Stigma (Impact) Scale (SIS), this measure contains 29 items and five subscales: alienation, stereotype endorsement, perceived discrimination, social withdrawal and stigma resistance. This model was constructed

from a psychometric evaluation of 127 mental health outpatients with an average age of 49.5 years old being treated at the Department of Veterans Affairs. Boyd and colleagues (2003) demonstrated high internal reliability ($r = 0.91$). The measure correlated positively with depressive symptoms and negatively with self-esteem. These results are in line with findings of a recent review of 127 stigma articles and a meta-analysis including 15 studies using the ISMI-29 (Livingston & Boyd, 2010). Analytical conclusions are that the ISMI-29 is a psychometrically sound measure to quantify internalized stigma, although the shorter version (IMSI-10) may be more useful as one total score rather than dividing and presenting separate subscale scores from the ISMI-29. The ISMI-29 also predicts stigma-related outcomes such as isolation, lower self-esteem, and negative affect (Ritsher et al, 2004). Strong relationships consistent with the stigma construct research were present between elevated internalized stigma and higher depression, lower self-esteem, and lower empowerment (Livingston & Boyd, 2010).

STIGMA AND HEALTH OUTCOMES

While this proposal has established problematic relationships between cognitive impairment and stigma, and between stigma and psychological variables, the relationships among impairment, stigma, and health outcomes over time are not well known. Only one published longitudinal study to date has directly addressed how cognitive impairment stigma affects long-term health outcomes. This two-part study provides a helpful starting point for subsequent research. Burgener and colleagues (2013) examined perceived stigma in individuals with early-stage dementia and comorbid health-related conditions. In part 1 of this study, data were collected from 50 people

recruited from various diagnostic centers with dementia and 47 of their caregivers at baseline and 6, 12, and 18 months. This sample was 48% male and 52% female, primarily white (62%) with an average age of 78.3 years ($SD = 8.3$), with caregivers being typically younger, 64.4 years on average ($SD = 12.9$).

Burgener and colleagues sought to address two questions: (i.) what the stability is for perceived stigma using the SIS, and (ii.) what the relationship is between stigma and person-centered variables. Cognitive functioning was measured using the Mini-Mental State Exam (MMSE). The MMSE was significantly and positively related to social rejection and social isolation, suggesting that in the earlier stages of impairment, people are highly susceptible to the stigma effects of impending dementia and existing MCI. While only the persons with cognitive impairment were administered cognitive assessments to address part of this study's purpose, both the persons with impairment and the caregivers were assessed for stigma, depression/anxiety, and quality of life. The investigators concluded that stigma is consistent during the earlier stages, individual traits are related to the levels of internalized stigma, and cognitive function is related to shame, rejection, and isolation.

Part 2 of this study was aimed at discerning how perceived stigma impacts health outcomes and quality of life at baseline and 6, 12, and 18 months. Quality of life measures in this part of the study included depression, anxiety, behavioral symptoms, personal control, physical health, self-esteem, social support, and activity participation. These variables were assessed using several adapted quality of life measures, the SIS, the Geriatric Depression Scale, the Revised Memory and Behavior Problems Checklist, Medical Outcomes Trust, and Rosenberg's Self-Esteem Scale. Many separate constructs

all correlated with stigma as shown through linear mixed models looking at each outcome and its relationship to stigma. Quality of life relationships with stigma were calculated at baseline, 6 months, 12 and 18 months. Internalized shame was significantly and positively associated with anxiety, and negatively associated with personal control, health, self-esteem, social support understanding and assistance, and activity participation. Social isolation was positively associated with depression and anxiety, and negatively associated with personal control, health, self-esteem, social support understanding, and activity participation. This study offered a detailed look at the complexities of quality-of-life constructs and their relationships with stigma. Stigma associated with cognitive impairment was associated with and predicted worsening health outcomes. Although it was a first of its kind, the evaluation of existing relationships between stigma, health outcomes across time, and quality of life paved the way for more study across these variables. Further study, both cross-sectional and longitudinal, in this area is needed to uncover the mechanisms that link stigma with health outcomes and quality of life.

Although studies that evaluate cognitively impaired individuals and explore statistical mediating factors between stigma and outcomes (cognitive, emotional, physical, and social) are scarce, there is ample reason to hypothesize that mediations and moderations exist between stigma and outcomes in dementia populations. Power and colleagues (2019) analyzed data from 7,443 individuals above the age of 50 to evaluate predictors of loneliness and cognitive functioning at three different points in time. The primary predictors of cognitive functioning were depression and anxiety (Power et al., 2019). Depressive symptoms also mediated a relationship between loneliness and

cognitive function (Power et al., 2019). The theory was that loneliness and isolation can create or increase depressive symptoms, and these variables can lead to a decrease in cognitive functioning. As previously established in this introduction, stigma in ageism and being labeled as cognitive impaired leads to social isolation and rejection, increasing the likelihood of loneliness. In another study, 345 Korean older adults diagnosed with early-stage dementia were administered the Geriatric Depression Scale (GDS- Korean version), Constructional Praxis Test, Hand Grip Strength test, and the existence of wandering was assessed via interviews. This study found a significant mediating effect of depression between visuospatial function and muscle strength (Lim & Park, 2015) marking a link between depression as a psychological variable and an observable and physical variable. Taken together with the study by Power and colleagues (2019), these data suggest that depression can play a role in physical functioning as well as cognitive functioning. With an established relationship between stigma and depression, a link between depression and functioning may be important when studying populations with stigmatized labels (such as cognitive impairment) that may render individuals prone to depression

A memory clinic-based study reported that the prevalence of the APOE $\epsilon 4$ genotype was similar in SCD patients (33%) compared to MCI patients (32%) (Mandecka et al., 2016). In another meta-analysis of 28 studies with a total of 29,723 individuals with and without subjective cognitive complaints were followed for an average of 4.8 years. This analysis yielded an annual conversion rate of 2.33%, a relative risk (RR) of 2.07 compared with those without SCD ($n = 15\ 009$). From 11 studies the annual conversion rate from subjective complaints to MCI was 6.67% (95% CI = 4.70–

8.95%). For summary, 14.1% of people with subjective cognitive complaints progressed to dementia and 26.6% progressed to MCI (Mitchell et al., 2014).

In a prospective cohort study of subjective cognitive decline (SCD) patients, cross-sectional data from 151 participants (age 64 ± 8 , 44% female, Mini-Mental State Examination 29 ± 2) were gathered to look at cognitive and psychiatric outcomes in those who report SCD. This study showed that 28 (25%) had preclinical Alzheimer's disease (AD), 58 (38%) had subthreshold psychiatric issues, and 65 (43%) had neither. More severe subjective complaints were associated with worse objective performance (Slot et al., 2018).

While it is documented that stigma is related to worsened psychological and health outcomes in those with a diagnosis of cognitive impairment, SCD is not a diagnosis. Stigma accompanies labels, and currently, SCD is not a diagnostic label, but a subjective experience (that may offer clinical utility). This means that stigma may be felt differently in those with SCD. The crux of this study is to assess the ways that stigma affects outcomes in those with SCD in similar ways that stigma impacts those with MCI or dementia. Stigma outcome research in those with MCI is limited, and stigma outcome research related to perceived or subjective cognitive impairment is even more limited. However, a study by Shin and colleagues (2016) of 70 outpatients (33 males, 37 females) with a mean age of 35.8 years old and a mean duration of illness of 7.1 looked at internalized stigma. These outpatients had both perceived cognitive impairment and schizophrenia and were evaluated for internalized stigma and its effects on quality of life. Subjective impairment and stigma significantly predicted quality of life, even when controlling for schizophrenia severity. Mediation analyses indicated that internalized

stigma partially explained the relationship between self-perceived cognitive deficits and quality of life. Perceived cognitive impairment was significantly and strongly related to stigma, and stigma was also significantly correlated with anxiety and depression (Shin, Joo, & Kim, 2016), similar to studies concerning diagnosed cognitive impairment, stigma, and outcomes. This suggests the stigma in perceived and officially diagnosed cognitive decline may be similar and may produce similar outcomes.

Another reasonable consideration to examine is whether stigmatic effects (e.g., depression, isolation, anxiety) affect health outcomes (e.g., cognitive, physical, and quality of life). There are data in current literature to suggest these stigmatic effects (not necessarily in cognitive impairment) do affect cognitive and physical functioning. The existence of stigma within the mental illness population leads to treatment resistance and refusal to seek physical and mental health evaluations (Pearl, Forgeard, Rifkin, Beard, & Björgvinsson, 2017). Additionally, stigma found in healthcare settings amongst clinicians can lead to worse care for physical problems (Thornicroft, Rose, & Kassam, 2007). Health providers with stigmatized views about patients may be less likely to endorse certain complaints and less likely to treat with the standard of care, due to the stereotypes of being incredible and dangerous that often accompany those with mental or cognitive illness. Stigma has also been shown to affect cognitive outcomes: Dubreucq and Frank (2019) found that people with severe mental illness performed worse on cognitive tests when they were confronted with stigma. Stigma was associated with lower cognitive performance on cognitive tests and worse mental health. The statistical links between increased stigma, worse cognitive performance, and higher anxiety were the strongest, but this study also found links between higher stigma, lower cognitive performance, and

more depression.

HYPOTHESIS AND AIMS

In sum, research suggests cognitive impairment (subjective and objective) is often accompanied by stigma, and stigma among people with cognitive impairment is associated with more depression, isolation, and anxiety. Depression, isolation, and anxiety can negatively impact cognitive performance, physical health, and quality of life. There are also established associations between SCD and stigma, but little information about how stigma affects those with SCD as opposed to those with a diagnosis documenting impairment. This paper has already submitted that isolation, depression, and anxiety are associated with lower quality of life in several populations, including those experiencing stigma with an impairment diagnosis. The present study sought to fill the research gaps between a diagnosis of impairment and SCD, to see if SCD stigma is also associated with more loneliness, isolation, depression, and anxiety. Moreover, an aim was to evaluate whether there would be a mechanistic relationship between SCD stigma, depression, isolation and loneliness, and global quality of life. It was proposed that a measure of subjective aging and a general health questionnaire should offer a deeper look into more than demographics of the sample, but an overall objective and subjective account of the sample's health and age identity.

The aim of the proposed dissertation study was to explore whether higher SCD scores are associated with more internalized stigma, and if this stigma mediates the relationship between SCD and depression, SCD and anxiety, and SCD and isolation scores. Additionally, this study will evaluate whether depression, anxiety, and isolation mediate quality of life. This study aims to establish a statistical mediation chain

(Figure1). I hypothesize that:

- 1.) higher SCD will be associated with higher subjective age
- 2.) higher SCD will result in higher internalized stigma scores,
- 3.) Internalized stigma is positively correlated with depression, anxiety, and loneliness,
- 4.) Depression, anxiety, and loneliness will mediate a negative relationship between stigma and quality of life.

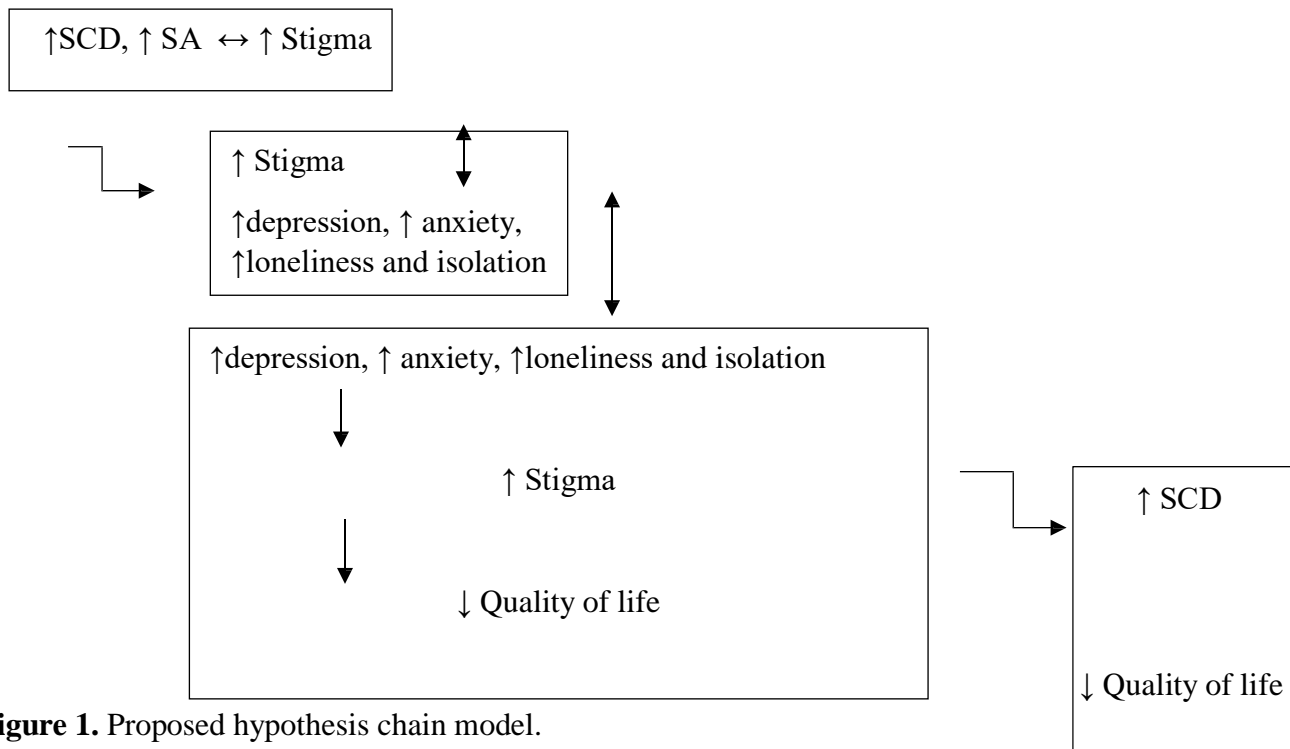


Figure 1. Proposed hypothesis chain model.

This study expected to establish processes of internalized stigma - a mediation chain, similar to those studies with established cognitive impairment. In sum, it was proposed that even the perception of cognitive decline would increase perceived stigma, and this stigma would be associated with more depression, anxiety, and isolation, and that these psychological factors negatively mediate stigma and quality of life.

METHODS

Sample

The CDC reports the prevalence of SCD among adults aged 65 years and older is 11.7%, compared to 10.8% among adults 45-64 years of age, similarly distributed amongst men and women (CDC, 2019). These significant percentages in each of these age groups suggested that it would be beneficial to include a sample containing both of these age groups as well additional, somewhat younger participants, in order to attain a diversified spread of differing levels of SCD.

The study sample was recruited using Amazon Mechanical Turk (mTurk), a crowdsourcing website platform by Amazon used to conduct research using large samples, in which individuals consent and perform discrete tasks for data collection. Recruitment was open to individuals aged 35-80 and the sample consisted of individuals aged 35-78 years old with stratified age groups. One group consisted of adults aged 35-50 ($n=43$), one group consisted of adults aged 51-65 ($n=118$), and another aged 66-80 ($n=58$). Each age group consisted of approximately 50 or more people, totaling to 219 participants. The majority of excluded cases, due mostly to the time taken to finish the questionnaire, were in the youngest age group, although the same exclusion criteria (time taken to complete the questionnaire being more than two standard deviations below the average amount of time taken to complete the survey) was applied to the entire sample. The number of subjects recruited for each age group was ensured by sending out three separate “hits” or ads specifying only one age range at a time, and once enough subjects participated or the ad expired, the ad closed. There was no way to ensure people will be honest about their age, but there is also no way to ensure this in most in-person

experiments as well. This stratification was to ensure that there were enough people in each age range.

The MTurk platform did not pose as a hurdle in recruiting older participants, as more than 50 of the participants were older than 65 years old. Additionally, effects observed using MTurk are well replicated in other nationally representative samples (Coppock & McClellan, 2019).

Inclusion criteria were a.) those between 35-80 years old, b.) those who did not have a previous or current diagnosis of cognitive impairment, c.) those who could accurately answer all of the questions within each of the measures outlined below. The minimum end of the age requirement was based off the CDC's figures for people over 45 (CDC, 2019), and since this study aimed to look at those with SCD as well as those without SCD, lowering the criteria to age 35 allowed more room for people most likely to be without SCD. The maximum age requirement was cut at 80 years old due to significantly higher prevalence of a cognitive impairment diagnosis in older ages, especially after age 75, and even more so after 85 years old (Freedman et al., 2011).

Exclusion criteria were a.) those not in the specified age ranges, b.) those already diagnosed with cognitive impairment (dementia, mild cognitive impairment, mild neurocognitive disorder, major neurocognitive disorder, c.) those with serious neurological or psychological diagnoses that prohibit proper assessment protocol. Those with current neurological or psychological diagnoses (such as schizophrenia, traumatic brain injury, etc.) were able participate in this study as long as their condition did not interfere with reading and comprehension of the protocol and questions, and as long as their physicians had not concluded that their condition severely impacted their memory.

The age criteria was able to be assessed via their MTurk profile, verified through Amazon. The criteria regarding impairment, neurological, or psychological diagnoses were explicitly outlined in the preamble form but was ultimately left up to the participant to adhere to the criteria.

Ideally, the recruitment approach aimed to collect data in which there were varying levels of SCD, including those who were and were not experiencing any SCD. Although there was no way to predict the likelihood of large variability, opening the study up to a large age range offered a higher chance of SCD variability.

Eligible individuals could only participate once and were compensated \$1 for their completed survey, when all directions outlined in the survey were followed and all items were answered.

Design

This was a cross-sectional study, collecting data from various scales (described below) validated to measure key variables; subjective age, subjective cognitive impairment, stigma, depression, isolation, and quality of life. Correlational analyses were used first to evaluate associative relationships, and if significant relationships were found, mediation analyses would have looked at the parts of system that aid a process to take place, examining stigma as a primary variable of interest in a mediation chain between stigma, psychological variables, and quality of life. The study approach was originally going to use simple Baron and Kenny mediation analyses (Baron & Kenny, 1986) looking at indirect effects between three variables at a time, with depression, anxiety, loneliness and isolation being mediators between stigma and quality of life.

Measures

Cognitive decline and aging are linked to physical health. For the purposes of this study, a health screener was used to conduct a comprehensive demographic conceptualization of the sample. Standard demographical questions were asked, such as age, race, education, with age and education being measured in number of years and race being assessed through coded racial categories; White, Black, Hispanic, Asian, American Indian or Alaskan Native, and Native Hawaiian or Pacific Islander. Participants were also asked to mark yes or no to a 38-item health screener. This screener consisted of physical illnesses or injuries that pertain to aging or cognitive functioning, such as conditions in the cardiac, neurological, endocrinological, and primary care domains. This demographic screener was adapted and combined from three separate health history screeners from different medical specialties.

Subjective cognitive decline

To measure the presence and severity of SCD, Gifford et al. (2015) constructed a 21 SCD item bank through a pilot study to extract the best items for an SCD measure. The participants were recruited from a research registry and consisted of 112 cognitively normal (NC; 76 ± 8 years; 63% female), 43 mild cognitive impairment (MCI; 77 ± 7 years; 51% female), and 33 diagnostically ambiguous participants (79 ± 9 years; 58% female).

Items were extracted through item response theory analyses from an original bank of 57 items. The aim was to measure unhealthy cognitive changes and the perception of cognitive decline. The 21-item bank is a series of yes or no answers, with answers of “yes” counting as one and “no” as zero. This measure showed good clinical utility and

discrimination in this pilot study, representing the participants' diagnostic statuses. This is a scaled measure where higher scores represent more SCD.

Because SCD and actual impairment may be different (as these two constructs are different but will be used to look at mediation processes), the Cognitive Change Questionnaire (CCQ) (Damin, Nitrini, & Brucki, 2015) was administered. This measure aimed to look specifically at current function, and also at the *perception* of cognitive decline, which is the crux of SCD. The CCQ was originally a 22-item measure developed in Brazil, to assess suspected cognitive changes. It was then adapted to an 8-item measure (CCQ-8). Statistical models selected the eight questions with the greatest discriminatory power (Damin, Nitrini, & Brucki, 2015). Each participant had been previously diagnosed with either normal cognition, MCI, or dementia and this study pulled the questions that best identified which group the participant belonged to based on their questionnaire answers. This bridged the gap between SCD as a perception and probable diagnostic groups. The area under the curve (AUC) receiver operating characteristic (ROC) analyses corresponding to the final version of the 8-item CCQ (CCQ-8), demonstrated good accuracy in differentiating between cognitive groups, good correlation with the final diagnosis ($r=0.861$) and adequate internal consistency (Cronbach's $\alpha=0.876$). This is also a scaled measure, in which the points were derived from how many answers are marked "yes"; the higher the score, the more cognitive change was present, and the more likely an impairment was present.

Subjective age

Subjective age was measured using an ordinal scale using 4 items from 4 domains; felt age ("How old do you feel?"), age appearance ("How old do you think you

look?”), interest age (“My areas of interest are as from someone who is aged ...”), and behavior age (“My daily activities are as from someone who is aged ...”). Participants were asked to rate their SA on a scale ranging from 30-100 ascending decade-wise. Although this sample did not consist of people that are actually 30 years old, this scale presented both lower and higher numbers than the sample ages because this scale was asking about how old they “feel”. “This scale was adapted from the Barak & Schiffman conceptualization (1981).

Depression

To assess levels of depressive symptoms, the Beck Depression Inventory (BDI-II) (Beck et al., 1961) was administered to each participant. Wang et al. (2013) showed the BDI to have internal consistency around 0.9? and the retest reliability ranged from 0. 73 to 0. 96 using studies of the BDI-II that were retrieved through electronic database searches, hand searches, of which 118 studies were used. The 188 studies were divided into three groups, non-clinical, psychiatric/institutionalized, and medical samples.

This measure showed good validity and clinical utility for detecting depression. The cutoff score to screen for depression varies according to the type of sample, but usually the cutoff for mild depression is a score of 10 (Want et al., 2013). Factor analysis showed a robust dimension of general depression composed of two constructs: cognitive-affective and somatic-vegetative.

In addition to the BDI, the Geriatric Depression Scale [(GDS; Yesavage et al., 1983)] was administered as a supplemental measure (for convergent validity) of depression, given the fact that depression is 1.) a complicated construct but importantly, 2.) widely mentioned in the research concerning stigma. The GDS is a 15-item scale that

is designed to discriminate between no depression, mild depression, moderate depression, and more severe depression states. This scale is traditionally used for older populations due to their inherent age-related difficulties (somatic), however the clinical utility of the 15-item GDS has also been established in both young (18 years old or older) and older adults (Guerin, Copersino, & Schretlen, 2018). Classification accuracy of the GDS, based on receiver operating characteristic (ROC) analysis, was strong in younger (area under the curve; AUC = 0.92) and older adults (AUC = 0.94). Sensitivity and specificity of the GDS-15 for identifying depression were 72% and 97% for younger adults and 86% and 91% for older adults, respectively. This well-known measure is scaled on a continuous scale in which higher scores represent more depression.

Anxiety

To assess anxiety, the Geriatric Anxiety Inventory (Pachana et al., 2007) was administered. The Geriatric Anxiety Scale (GAS) is a 20-item geriatric-specific measure of anxiety severity. A psychometric study (Johnco et al., 2015) showed the GAS has good internal consistency and convergent validity with other measures of anxiety in 197 clinical geriatric participants with a comorbid anxiety and unipolar mood disorder, and a non-clinical control sample ($N = 59$). Divergent validity from depressive symptoms was good but weak in the total and non-clinical samples. Divergent validity from cognitive functioning was good in all samples. This measure is much like the BDI in that it is continuous and higher scores are indicative of more anxiety.

Isolation and Loneliness

To determine the level of social isolation, two measures were used to identify isolation and loneliness, as these two constructs are related but different. To measure

social isolation, the Lubben Social Network Scale (LSNS) is one of the widely used instruments to assess perceived social support, a key factor in social isolation. This 12-item scale (LSNS-R) was condensed to a 6-item screener, which has a reliability of .70 and a reliability of .83 among community-dwelling older adult populations in three European countries.

Lubben Social Network Scale correlates with mortality, all case hospitalization, health behaviors, depressive symptoms, and overall physical health (Lubben et al., 2006). This measure is a continuous scaled measure in which participants are asked about social isolation and are asked for a Likert-like score from 1-3, in which 3 represents feeling lonely more often. A higher score indicated a higher level of isolation.

To measure loneliness, the 6-item De Jong Gierveld Loneliness Scale was administered. The 6-item scale has proved to be a valid and reliable measurement instrument for overall, emotional, and social loneliness in subjects participating in the United Nations “Generations and Gender Surveys”: France, Germany, the Netherlands, Russia, Bulgaria, Georgia, and Japan ($N= 8,158-12,828$). This study conducted confirmatory factor analyses yielding specific factors of social and emotional loneliness. This scale also shows congruent validity and reliability across 7 different countries (De Jong Gierveld & Van Tilburg, 2010). This measure is also scaled, and a higher score represented more severity in perceptions of loneliness.

Stigma

One of the key variables in this study was stigma. To measure stigma, the Stigma Impact Scale (King et al., 2007) is a 28-item scale used to measure internalized experienced stigma in populations with mental or neurological illness was administered.

It has adequate test-retest reliability, and good internal reliability (King et al., 2007). It measures three factors; discrimination, disclosure, and aspects of a psychological illness. This scale is endorsed by the National Institute of Neurological Disorders and takes 5-10 minutes at most to complete. Another measure of stigma was the Internalized Stigma of Mental Illness Scale (Ritsher & Phelan, 2004), containing 29 items and five subscales: alienation, stereotype endorsement, perceived discrimination, social withdrawal, and stigma resistance. This measure has excellent internal reliability and validation to related constructs; depressive symptoms, self-esteem, and lowered empowerment. This suggested that this measure contained a good constructual basis for looking at stigma and depression, anxiety, and isolation. This is a Likert-type scaled measure in which higher scores indicate a higher agreement with stigmatic statements. These scales are widely used in clinical populations with good validity and a construct that ties into psychological health.

Attitudes towards Aging

In order to identify a possible factor of ageism, either as a confounding variable or a mechanistic variable, the Attitudes towards Aging Scale (AAS) is a 13- item scale that includes subscales measuring ambivalent attitudes towards aging and hostile attitudes towards aging was administered. This scale shows good test-retest reliability ($r = .80$) and good internal consistency ($\alpha = .91$). Additionally, this scale does an optimal job at predicting attitudes toward older adults (Carry et al., 2017). This scale provides a series of statements endorsing ageism in which the participants rate on a scale of 1-7, which 7 being strongly agree. Higher scores indicated a higher level of ageism present.

Quality of Life

A primary outcome variable in the proposed study was quality of life (QOL). The World Health Organization Quality of Life measure is a 26-item version of the WHOQOL-100 assessment. This measure holds high internal consistency, item-total correlations, discriminant validity and construct validity. Factor analysis yields excellent reliability cross-culturally, and reflects four major domains; physical, psychological, social, and environmental quality of life. This is a scaled measure in which participants read the questions pertaining to QOL and rate their answer on a scale of 1-5, with higher scores indicating better QOL.

Another quality-of-life measure was administered since quality of life is one of the major components mentioned in the literature concerning stigma, along with depression. The Flanagan Quality of Life Scale (FQOLS) (Dantas & Ciol, 2014) is a 15-item instrument to evaluate global quality of life. It covers 5 domains: physical and material well-being; relations with other people; social, community, and civic activities; personal development and fulfillment; and recreation. The Quality of Life Scale demonstrated good content validity. Cronbach's alpha coefficients for the QOLS were .87 in a psychometric study, also showing good convergent and discriminant validity across all adult age groups (Burckhardt et al., 1989). This scale is also a Likert-like measure in which higher scores indicate higher satisfaction or higher needs met, indicating higher QOL.

Since each scale used in this study was numeric and continuous, this indicated a level of presence and severity on a continuum, and each variable was measured in comparison to one another numerically.

Procedure

Participants were recruited via Amazon Mechanical Turk and reimbursed \$1 for their participation if they followed protocol descriptions. For each age group (3; 35-50 [$n=43$], 51-65 [$n=118$], and 66-80 [$n=58$]), there was a separate “hit” put out to recruit participants in specific age groups with large enough sizes in order to ensure that a.) this study had varying age ranges, and b.) to ensure that people did not fill out surveys more than once. Once they were consented, they were administered the aforementioned measures using Qualtrics Data. The measures appeared as one long survey to the participants, but there were differences in sequencing of questions within surveys. Qualtrics administered the same measure questions in different order (within each survey, not between surveys) for participants in both the total sample and different age group samples to control for sequence bias. After the surveys were completed, the data were combed through in order to make sure all questions were appropriately answered, looking for missing items, appropriate age ranges for each group, and time taken to finish the surveys.

Some researchers have voiced concerns about using MTurk, but a review of existing MTurk research (Thomas & Clifford, 2017) showed insufficient attention does not present more of a problem among MTurk samples than among other high-quality commercial samples. Additionally, this review showed that MTurk participants trust researchers as much as participants in laboratory studies. This helps to address lingering concerns about validity. Being aware of these concerns, MTurk instituted healthy rules about how participants and researchers participate ethically, such as giving participants and researchers ratings. This review (Thomas & Clifford, 2017) concludes that these

rules strengthen validity in MTurk experiments. Aside from validity, this study noted that using MTurk as an experimental medium forges a practical pathway to get information from those “hard-to reach” samples. Lastly, MTurk research demonstrates good replicability.

When further contemplating the validity and reliability of using MTurk, research about this medium was encouraging. The anonymity offered by the Amazon Mechanical Turk medium helped to alleviate the tendency for participants to answer in a manner that pleased the researcher (Casler, Bickel, & Hackett, 2013). Comparisons of online responses of participants recruited via MTurk, as well as social media postings, a standard sample of college students on campus tested in person were analyzed MTurk participants were significantly more socio-economically and ethnically diverse, but the test results across the three samples did not significantly differ. These authors noted that using MTurk can actually offer superior data collection (Casler, Bickel, & Hackett, 2013).

In order to ensure validity of sampling, researchers using this medium have historically used random questions that assess attention scattered throughout the surveys to make sure participants are actively paying attention and giving valid data. However, recent research suggests that deleting data according to answers to the attention questions introduces a new and unnecessary bias, a perception that the participants are “being tricked” or “are now past the trick part of the survey.” Instead, a better way to assess that people are adequately thinking about the questions, Qualtrics released the completion times for each subject, and if participants answered the questions more than 2 standard deviations faster than the mean completion time, their answers were excluded (Anduiza

& Galais, 2016).

Power analysis

Fritz & Mackinnon (2007) published a meta-analysis to report the sample sizes needed across 166 mediation studies to ensure at least an 80% power rate. For indirect effect analyses, the range of sizes was 115-285 with a median of 142 participants. The most frequently used sample size range was 101-150 participants. To ensure adequate power for mediation analyses looking for indirect effects, the way one variable effects the relationship between two other variables, this study required 150 participants and overachieved this requirement with a sample size of 219. While mediation effect sizes are arbitrary, and the mediation research in this area does not submit solid effect sizes, in indirect effect analyses, a moderate effect size can be about .09 and a large effect size of about .25 (Hoyle & Kenny, 1999).

Statistical Analysis

After all surveys were completed, the Qualtrics data were transferred to SPSS 28. The scores from each survey were totaled. Each measure used in this study presented a continuous variable to be analyzed based on the relationships found between each of the scales. The health screener and subjective aging measures were used as a detailed supplement for demographic representation over participants' overall health and internal experience data from these measures were used descriptively for these purposes. Pearson's correlations were used to examine relationships between subjective aging and subjective cognitive decline (using the CCQ-8 and SCD item bank), as well as between subjective aging and stigma. It was hypothesized that SCD measures (the CCQ-8 and SCD item bank) and the subjective aging ratings were positively correlated. Specifically,

it was hypothesized that the younger a person feels, the lower the perceived change and impairment (lower score) will be. These analyses intended to aid in understanding the experience of the sample better, but also established a relationship between subjective aging and subject cognitive decline, and further; establishing an account of how much the subjective variables accounted for the correlation with stigma.

Next, in order to measure relationships between SCD and stigma, Pearson's correlations were computed between the CCQ-8 and SCD total scores in comparison to the stigma scales (SIS and ISMI). It was hypothesized that these relationships would also be strongly and positively correlated, with higher SCD scores related to higher stigma scores. If significant correlational relationships were found between stigma and quality of life, then mediation analyses would be used to look at mechanistic relationships between stigma (SIS and ISMI) and depression (BDI-II and GDS) and quality of life (WHOQOL and FQOLS). This study examined whether or not depression mediated a relationship between stigma and QOL. It was hypothesized that higher stigma would be associated with higher depression and lower QOL, and that depression would mediate the relationship between stigma and QOL. If relationships were found between these variables, causal mediation analyses would be administered to look at the indirect effects of depression on the relationship between stigma and QOL.

Similar to depression, if significant correlations between stigma, anxiety, and QOL were observed, then mediation analyses would be conducted between stigma, anxiety (GAS), and the quality-of-life measures, to assess whether or not anxiety mediated the relationship between stigma and QOL as an indirect effect in a statistically significant manner. It was hypothesized that higher stigma scores would be positively

correlated with higher GAS scores, that higher stigma scores would also be negatively correlated with QOL scores, and that GIA scores would also significantly mediate the relationship between stigma and QOL whereby more anxiety posed as a significant causal mediator between higher stigma and lower QOL.

An additional correlational analysis also examined stigma, isolation/loneliness, and QOL. Positive correlations between stigma and loneliness and isolation scores and QOL were anticipated and it was expected that loneliness and isolation would negatively mediate a relationship between stigma and QOL. Loneliness and isolation variables were examined independently.

All analyses used a significance level of $p \leq .05$, with any analyses yielding a higher p value than .05 were considered not significant.

RESULTS

Before excluding any data, 317 individuals started the questionnaire, but only 278 individuals finished the questionnaire; however, the final sample size was 219 after omitting individuals who fit any exclusion criteria for age or time taken to complete the questionnaire (an indicator for attention paid to each question). Fifty-nine subjects were excluded, with most (96.6%) of the exclusions being attributed to time taken to complete the questionnaire (survey completion time more than two standard deviations below the mean (see Figure 2). In the youngest age group, 37 subjects were excluded with 35 of them being excluded for completion time two standard deviations below the mean completion time ($M=32.15$ minutes, $SD=10.2$ minutes) and two were excluded due to being younger than 35 years old. In the middle age group, 15 participants were excluded, and in the older age group, 7 were excluded. The mean age was 58.72 years with a standard deviation of 9.2 years, [adults aged 35-50 ($n=43$), adults aged 51-65 ($n=118$), and another aged 66-80 ($n=58$)] with a mean education of 15.67 years. The mean age in the youngest age group was 45.21 ($SD=5.5$), the mean age in the middle age group was 58.4 ($SD=4.3$), and the mean age in the oldest age group was 69.41 ($SD=3.1$). In the youngest age group, there were 23 males and 20 females; in the middle age group, there were 53 males and 65 females; in the oldest age group, there were 27 males and 31 females. This sample consisted primarily of White participants (82.5%), followed by Black (7.2%), Asian (6.3%), American Indian or Alaskan native (1.3%), and Hispanic (.9%) participants. The sex of participants was fairly even between males (46.2) and females (52%; see Table 2).

A majority of the sample (51.2%) earned between \$20,000 and \$59,000 annually, with comparable income frequencies on both tails of the income range. The majority also reported being currently married (69.5%), while 30.5% reported being divorced (13.5%), never married (9.4%), widowed (4.5%), and separated (1.3%). Additionally, the majority of the sample reported full-time employment (56.1%) while the remainder reported being employed part-time (18.8%), retired (16.6%), unemployed (4%), or disabled (2.7%). Of the sample, 45.3% reported having one of the listed medical conditions listed on the health questionnaire, 19.7% reported having two, 12.6% reported having three, and 8.1% reported having four of the listed conditions. The remaining percentage of the sample reported having 5 or more of the listed conditions. ANOVA analyses showed that people who were not married had higher mean ages than those who were married, $F(4, 214) = 2.93, p = .022$, although 151 of the participants were married. Additionally, those who were employed full-time had lower ages than those who were not, $F(4,214)=14.97, p<.001$. Age means did not significantly differ across education groups, $F(4,214)= 1.59, p=.162$. No other demographic factors were significantly associated with age. All relevant bivariate correlations with other experimental variables can be found in Table 3.

Associations between demographic variables (age, race, sex, income, education) and key study variables (subjective cognitive decline, stigma, depression, anxiety, loneliness and isolation, and quality of life) were examined, with age and race demonstrating significant relationships with key study variables. Age was significantly and negatively associated with cognitive change (CCQ-8), $r = -.191, p = .005$. Age was also significantly and negatively associated with depression (only on the GDS), $r = -.173, p = .011$ and anxiety scores (using the GAS), $r = -.151, p = .025$. Age was negatively associated with one measure of stigma (ISMI), $r = -.183, p = .007$, and with loneliness (DJGLS), $r = -.158, p$

=.019, but not isolation. See Table 4 for bivariate correlations between key variables and age and see Table 5 for the means and standard deviations for each key variable across age groups. The CCQ [$F(2, 216)=3.6, p=.029$] differed across age groups with higher means with lower ages. The GDS [$F(2, 216)=3.22, p=.042$] also differed across age groups with lower means in the higher ages. Lastly, the ISMI [$F(2, 216)=4.32, p=.014$] differed across the age groups with higher means in the younger ages. Age did not differ on any other key variables.

Loneliness (LNSN) and isolation (DJGLS) mean scores were different across racial groups, $F(4, 214)=3.33, p=.011$ and $F(2, 214)=2.59, p=.037$, respectively. Asians reported the highest levels of loneliness, followed by; White, Black, Hispanic and Native-American/Alaska Native participant groups. For isolation, again Asians also reported the highest levels of isolation, followed by; White, Hispanic, Black, and Native-American/Alaska Native groups. Relationships between age and key study variables can be found in Table 4. The only other demographic variable demonstrating a significant correlation with any of the key variables was income, which was negatively associated with SCD, $r = -.170, p = .012$.

Hypothesis 1: Higher SCD will be associated with higher subjective age. The results showed that SCD (using both the CCQ and the SCD bank) were negatively associated with subjective age; however, these results were not statistically significant; $r = -.100, p = .140, r = -.087, p = .201$. Therefore, Hypothesis 1 was not supported.

Hypothesis 2: Higher SCD will be associated with higher internalized stigma scores. The results showed that SCD (using the SCD item bank and CCQ respectively) was positively correlated with the SIS (stigma), even when controlled for age, sex, and race, [$r = .22, p = .001; r = .34, p < .001$ (SCD and CCQ with SIS) using the partial

correlations option to control for any variables necessary in SPSS]. SCD was also positively and significantly associated with the ISMI (stigma) with higher stigma scores associated with higher SCD, even when controlled for age, sex, and race [$r=262, p<.001$; $r=439, p<.001$ (using SCD item bank and CCQ with ISMI)]. Therefore, Hypothesis 2 was supported. Additionally, another interesting and surprising result centered around stigma and age. Higher age was negatively and significantly correlated with stigma using the ISMI ($r=-.18, p=.01$), meaning the higher the age, the lower the stigma. Age was also positively and significantly correlated with subjective age ($r=.17, p=.01$); however, subjective age was not significantly correlated with stigma. This contradicts the assumption that those who are older are experiencing more stigma, even though they are still experiencing a higher subjective age.

Hypothesis 3: Internalized stigma will be positively correlated with depression, anxiety, and loneliness. Stigma, using both the ISMI and the SIS, was significantly and positively correlated with depression, even when controlled for age, sex, and race (the BDI [$r=.626, p<.001$; $r=.416, p<.001$] and the GDS [$r=.683, p<.001, r=.508, p<.001$]). Stigma (ISMI and SIS) was also positively and significantly correlated with anxiety, even when controlled for age, sex, and race (the GAS; $r=.683, p<.001$; $r=.576, p<.001$). Stigma (using the SIS and the ISMI) was not significantly correlated with loneliness or isolation using both the LSNS and the DJGLS. Additionally, higher SCD (using the SCD item bank and the CCQ, respectively) was also associated with higher depression using the GDS, even when controlled for age, sex, and race [$r=.243, p<.001$; $r=.489, p<.001$] and higher SCD was also associated with higher anxiety using the GAS, even when controlled for age, sex, and race [$r=.246, p<.001$; $r=.475, p<.001$] again using the partial correlations option to control for any variables in SPSS. Hypothesis 3 was mostly

supported. See Table 3 for all uncontrolled Pearson's correlations and p values.

Hypothesis 4: Depression, anxiety, and loneliness will mediate a negative relationship between stigma and quality of life. Bivariate correlations between depression (using the BDI and GD) and quality of life (using FQOL and WHOQOL) were nonsignificant ($p = .707$, $p = .696$; $p = .343$, $p = .422$), as well as all correlations between anxiety (using the GAS) and quality of life (using FQOL and WHOQOL; $p = .761$, $p = .227$). Similarly, stigma and quality of life showed nonsignificant relationships (using the ISMI with FQOL and WHOQOL; $p = .402$, $p = .560$; and using SIS with FQOL and WHOQOL; $p = .437$, $p = .587$). However, correlations between loneliness and quality of life were significant (using LNSN and FQOL and WHOQOL, $p < .001$, $p < .001$) as well as correlations between isolation and quality of life (using the DJGLS with FQOL and WHOQOL; $p < .001$, $p = .003$). In keeping with the analytic plan, mediation analyses were not initiated as the necessary significant bivariate correlation between stigma and QOL was not significant. Given the findings, hypothesis 4 was not supported.

While stigma was significantly correlated with higher SCD ($p < .001$ using the SIS and the ISMI), essentially stigma was significantly correlated with SCD, but depression, anxiety, and loneliness could not mediate a relationship outlined in hypothesis 4 (between stigma and quality of life) because there was no significant relationship between stigma and quality of life to mediate. Notably, other non-hypothesized variables were associated with quality of life (using both the FQOL and WHOQOL), including attitudes towards aging ($r = .140$, $p = .038$; $r = .151$, $p = .026$, respectively), meaning that higher quality of life was associated with negative attitudes towards aging; and, higher loneliness ($r = .240$, $p < .001$; $r = .202$, $p = .003$) and isolation ($r = .538$, $p < .001$; $r = .404$, $p < .001$).

In sum, the aim of this study was to determine if higher SCD was associated with higher subjective age and with more stigma, as well as evaluating if stigma was associated with psychological variables (depression, anxiety, loneliness and isolation). Additionally, this study postulated that these psychological variables mediated a relationship between stigma and quality of life. Hypothesis 1 suggesting that higher SCD would be associated with higher subjective age was not supported; however, hypothesis 2 suggesting that higher SCD was associated with more stigma was supported. Hypothesis 3 stating that stigma would be associated with depression, anxiety, and loneliness and isolation was partially supported. The data indicated that stigma was associated with more depression and anxiety, but not loneliness and isolation. Lastly, hypothesis 4 suggested that the aforementioned psychological variable would mediate a relationship between stigma and quality of life; however, this hypothesis was not supported due to insignificant relationships between stigma and quality of life.

Hypothesis 4 was important in the study goal of constructing a mechanistic model explaining indirect effects between stigma, psychological variables, and quality of life. Although some variables of interest had some association with one another, there was no association with quality of life amongst the variables of interest, other than with loneliness and isolation (DJGLS and LSNS). So, while this hypothesis was issued in hopes to establish this chain as the overall purpose of this study, the remaining hypotheses can still offer a great deal of important information for clinical practice and clinical research, to be further elaborated in the discussion.

While stigma and subjective cognitive decline had significant relationships with each other as well as with depression and anxiety, it seems that attitudes towards aging was the one variable that had significant relationships with stigma, quality of life,

loneliness and isolation. In particular, in considering the relationships between attitudes about aging and subjective age, these two variables had a significant and negative relationship, suggesting that higher subjective age was associated with lower scores on the AAS, indicated lower rates of ageism. In short, higher subjective age was associated with better attitudes towards aging.

DISCUSSION

Although prior research shows that people with cognitive impairment and dementia report more stigma, little research has examined whether subjective cognitive decline is also associated with stigma. This study postulated that the established relationships of dementia (or any established impairment) with stigma and health outcomes (Lion, 2019; Milne & Peet, 2008; Phillipson et al., 2011; Link et al., 1989; Link et al., 1993) would be similar for subjective cognitive decline. Although there are some similarities in relationships, in terms of medication or causal factors, SCD may diverge from the other models in its relationship with stigma and health outcomes.

SCD is different from dementia and MCI in that it is not an official label or diagnosis, it is not something that can be tested using large population norms, such as other standard neuropsychological testing, or diagnosed by a clinician. SCD is something that is experienced individually. The lack of well-established criteria for and lack of social acknowledgement of SCD may contribute to nonsignificant findings in this study. Nonetheless, in this study SCD was associated with higher stigma, depression, and anxiety.

To begin, the findings for hypothesis 1 showed that higher SCD was not significantly associated with higher subjective age. This contradicts previous findings that indicated that older individuals who reported lower subjective age showed younger brain age (Kwak, Kim, Chey, & Youm, 2018). It also contradicts the suggestions of Qiao et al (2021) in which older subjective age is associated with poor cognitive function (possible SCD or impairment) and a risk factor for dementia. Additionally, other research

over a ten-year span indicates that even after controlling for risk factors, such as disease or lifestyle, younger subjective age at baseline was prospectively associated with better episodic memory and executive function (Stephan, Caudroit, Jaconelli, & Terracciano, 2014). While the reason for a lack of relationship here is unclear, it appears that whatever drives people's perception of their cognition is not related to their subjective age, or it may be possible that these findings differ because this sample did not consist of an exclusively older sample. It also may be possible that those with certain personality types varied in the way they reported their SCD symptoms or may have varied in personal focus given to symptoms of SCD, giving less or more attention to the natural changes that come with aging.

The negative but nonsignificant relationship between SCD and subjective age warrants consideration. Perhaps examination of other sample characteristics would provide some explanations. One factor not accounted for in this study was cultural differences. According to Hess et al., 2017, collectivist cultures are less youth-oriented than individualistic cultures. This suggests that subjective age may be more strongly associated with well-being, depression, and importantly, cognition in individualist cultures (Hess et al., 2017). This theory about emphasis placed on youth could be represented in the original hypothesis, assuming all participants also adhere to the individualistic mindset regarding subjective aging, perhaps influencing a desire of this sample to under report their experiences of "aging." However, culture was not measured in this study therefore this is conjecture. Additionally, when assessing subjective age, using questions like "how old do you feel" could possibly evoke stigma whereas wording the question "what age do you feel" could have perhaps been less stigmatic. Attitudes towards Aging Scale (AAS) scores may have played a larger role in this study than

previously modeled, possibly interacting with other key variables, more so than the hypothesized relationships. This may highlight interesting possible exploratory correlational and possible mediation analyses using AAS as a contributor or mediator instead. Further research in this area is necessary, although the findings from the second hypothesis might offer some insight into why higher SCD scores resulted in lower subjective aging scores, indicating stigmatization as a possible reason to under report symptoms of aging. For instance, another study introduces the suggestion (also related to hypothesis 2) that higher stigma, and higher stigma-stress, interfere with symptom awareness and lead to underestimating one's cognitive performance (Hahm et al., 2020). Although this study primarily examines stigma within mental illness, it is possible that stigma may have been partially responsible as it is significantly associated with higher SCD (hypothesis 2), thereby interfering with symptom awareness or underestimated cognition with higher subjective age.

SCD and stigma

Higher SCD was significantly associated with higher internalized stigma scores, using both measures of subjective decline and both measures of stigma. These relationships between SCD and stigma would be essential in constructing an eventual model of SCD, stigma, and health outcomes. It is particularly helpful to know that the relationships between stigma and SCD are similar to those between a cognitive impairment diagnosis and stigma (Lion, 2019; Milne & Peet, 2008; Phillipson et al., 2011; Link et al., 1989; Link et al., 1993). This finding offers an excellent starting point for burgeoning research in SCD.

These findings are also corroborated by research stating that stigma severity is associated with sensitivity to symptomology when it comes to cognitive impairment, not

specific to subjective cognitive impairment (Hahm, 2020). However, sometimes these effects are negated when controlled for sampling factors (Hahm, 2020), such as whether or not a person has previous experience with someone with mental illness, previous treatment experience, or even just demographic differences.

In addition to these important relationships between SCD and stigma, stigma itself has several risk factors that raise public health concern. Studies show that internalized stigma is linked to both suicide (Carpiniello & Pinna, 2017) and substance use (Kulesza, 2017).

With established links between mental difficulties and stigma in previous research, the significant associations between SCD and stigma found in this study, and established possible consequences of stigma, there is also research connecting SCD itself to psychological variables. Kliegel and colleagues (2005) found that subjective decline was also associated with neuroticism, a tendency toward anxiety, depression, self-doubt, and other negative feelings. This further solidifies the ties between subjective cognitive decline and psychological health.

Stigma and mental health

To further demonstrate the importance of understanding stigma, for hypothesis 3, this study looked at the relationships between stigma and psychological variables. Stigma was significantly associated with depression and anxiety but not with loneliness or isolation. These findings are especially important after establishing a connection between SCD and stigma. These findings solidify that there is a relationship between SCD and stigma, depression, and anxiety as well as a relationship between stigma and depression and anxiety. These results suggest that there is, in fact, some sort of model

that can be eventually identified using all of these variables. It also signifies that SCD is similar to dementia and MCI with regards to the relationships with stigma, depression, and anxiety. This also suggests there is possible a relationship with SCD and health outcomes, since stigma, depression, and anxiety are related to health outcomes (Burgener et al., 2013). This leaves room for a potential early intervention method for health outcomes before any diagnosis is rendered.

While there is not a plethora of research directly connecting subjective cognitive decline to internalized stigma (other than this study), there is a wide variety of research about the profound effects of stigma on mental health and recovery. In a study by Drapalski et al (2013), the relationships between mental illness, internalized stigma, demographic variables, and psychiatric symptoms were explored. Drapalski et al. (2013) studied 100 participants from either a community mental health center or a Veterans Affairs clinic, most of whom were African American. Thirty-five percent of participants in their sample reported moderate to severe levels of internalized stigma. This relationship was not significantly associated with any demographic variable or diagnosis, similar to the findings of the present study. They found that greater internalized stigma was associated with lower self-esteem, self-efficacy, and recovery orientation, as well as with more severe psychiatric symptoms (Drapalski et al., 2013).

The findings for hypothesis 3 both reflect previous research but also contradict other previous research. Previous research has connected anxiety and depression with stigma in both directions, stigma about depression and anxiety, or anxiety and depression due to stigma (Busby, Bruce, & Batterham, 2016). However, the insignificant findings concerning stigma and isolation and loneliness in this study do not reflect a bulk of

research about the relationships between these variables (Kerr & Stanley, 2021). Another study by Kliegel, Zimprich, and Eschen found that stigma was significantly associated with loneliness in a sample of 200 patients with schizophrenia (Kliegel, Zimprich, & Eschen, 2005). In order to address the results that contradict the bulk of research concerning the relationships between stigma and loneliness and isolation, perhaps yet another look at the other variables in this study is warranted. Once again, stigma (using the ISMI) was significantly associated with attitudes towards aging, with higher stigma resulting in higher ageist attitudes. Likewise, while loneliness and isolation were not significantly associated with stigma, those two variables were significantly associated with attitudes towards aging, with higher ageist attitudes being associated with higher loneliness and isolation. Alici & Kalanlar (2021) used a mixed methods study measuring loneliness and attitudes towards aging for subjects in a nursing home to better advocate for nursing home staff to purposefully become more aware, using measurement, about the patients' attitudes towards aging to better inform potential interventions and addressing care due to the relationship between attitude about aging and loneliness. Additionally, in light of the Covid-19 lockdown restrictions, Losada-Baltar et al. (2021) explored attitudes towards aging, particularly negative attitudes, loneliness, and psychological distress. They posited that more negative perceptions about aging (particularly amongst those with lower chronological ages, were associated with loneliness and psychological distress. Quite possibly, again, attitudes towards aging may have accounted for the unexpected results for this hypothesis as well.

Now, observing that this study thus far corroborates previous research regarding the connections between stigma and psychological variables, as well as establishing a

relationship between stigma and SCD, it is noted the crux of this study was to identify a mediation chain that impacted quality of life, hypothesis 4.

Stigma and quality of life

The hypothesized significant correlation between stigma and QOL were not significant, and therefore mediation analyses between stigma, psychological variables, and quality of life was not conducted. While these particular measures were promising and reliable, measurement issues may have led to non-significant results. One assumption that could be made was that order bias was a factor, as in the case in which the quality of life measures were at the end of the entire questionnaire, a questionnaire that was exceptionally long. As stated in the procedures section, the order of questions administered to each participant were presented randomly within each questionnaire, not between questionnaires. In a publication called “This Questionnaire is Too Long!” (Gogol et al., 2014), the authors demonstrate that when administering an exceptionally long questionnaire (this survey consisted of approximately 300 questions), an interview may be best, or the use of shorter questionnaires might be more appropriate when dealing with complicated concepts such as self-concept or multifaceted psychological variables. Also, another study suggests that satisfactory response rates and data quality can be achieved in a relatively short time, requiring a short survey (Hunter, 2012). Survey fatigue can often complicate findings, whether it is done in person or on the internet, often affecting mostly the latter questions (the quality of life) in a substantive and statistical manner (Backor, Golde, & Nie, 2007). Additionally, using a sample in which the bulk of subjects were between 50-80 years old, perhaps other instruments would have been more reliable. A systematic review of 342 papers determined that Quality of Life Scale (CASP-

19), Older People's Quality of Life questionnaire (OPQOL-BRIEF) and the World Health Organization Quality of Life-AGE scale (WHOQOL-AGE) are the best specific measures to be used in older or aging populations (Nikkhah et al., 2017). This research posits that while certain quality of health measures offer reliability and consistency, there are measures that are better suited, both in length and content, for those who are aging and those with cognitive decline.

Surprisingly, the older the participants, the less stigma was reported, even though a higher subjective age was reported. One possible explanation for this could be that those who are younger have yet to experience the reality of older age and therefore may hold more fear or stigma regarding what it may be like in the future. A study by Klemmack & Roff (1984) suggested that it is the *fear of aging* that was associated with poorer well-being, rather than aging itself. Another study suggested that greater quality contact with others is related to less ageing anxiety, but poor health and ageism are related to greater ageing anxiety (Brunton & Scott, 2015). Therefore, research and findings in this study may point to the importance of attitudes about aging rather than the natural act of aging alone. In fact, research has corroborated this theory regarding younger people's negative attitudes towards aging, with poor knowledge of aging (Lucacel & Baban, 2014). In fact, being young leaves room for anxiety about aging and anxiety about aging and lack of knowledge about aging have been shown to be antecedents for stereotypes, and with other variables, influence ageist stigma (Donizzetti, 2019).

When people think about professions, beauty standards, and productivity, older adults are often grouped into a category that is less flattering than their younger

counterparts. For example, there was a two-phase experiment (Hummert, 1994) in which college students were presented with photographs of older men and women of different age groups; (55-64), (65-74), and (75 years and over). These younger adults were asked to observe facial features and group the photographs into which age group they thought the person belonged. Additionally, phase two required them to state ten different perceptions or traits that they would ascribe to the photographs and age groups. Results revealed that physiognomic cues to advanced age (e.g., eye droop, wrinkled vs. smooth skin, grey hair) affected the way that people were perceived and described. Consistent with predictions and theories of stigmatization, participants tended to pair photographs of seemingly younger people with positive stereotypes, and older individuals with negative stereotypes. This only reinforces the studies stated in the introduction of this paper that suggest people are “afraid” to grow old. However, with this data, perhaps since an individual is already at the age they once stigmatized, there is not as much uncertainty.

While younger people may be less informed about aging and likely to stigmatize it, those who have already reached both higher subjective and objective age have already experienced it, with lessening fear of the unknown, and realize perhaps stigma no longer serves a purpose. As a matter of fact, compared with younger people, older people tend to feel more positive towards people aged over 70 years, think that they make a larger contribution to the economy and are both friendlier and more competent (Nelson, 2002).

Limitations

The limits of this study can primarily be attributed to study design limitations. This was a cross-sectional questionnaire study with 219 participants at one point in time. The best information may be gleaned by further research utilizing longitudinal methods

to follow up with people at several different points in time to observe potentially meaningful changes. This particular sample's distribution of SCD reports were not normally distributed (as the study aimed for high variability in SCD reporting) which could have affected findings with subjective age. While data collected via MTurk has been shown to be just as valid as in-person administration, the concept of subjective cognitive decline is complex and does not yet have solid criteria. Perhaps pre-study psychoeducation about the symptomology and experience of cognitive impairment and subjective impairment (whether in-person or MTurk) would help to produce more informed answers. The number of questions on this survey totaled to almost 300, which may have produced test fatigue in some participants. While it is hard to know if and how that may have affected data, it is still an important point to note for future research. As mentioned in the discussion, this study could not account for cultural differences, and given the topic of aging as highly nuanced and heavily reliant upon cultural and social conceptualizations, some of the findings may be attributed to cultural and social factors unaccounted for in this study. Additionally, in the sampling exclusion of all complete questionnaires, 59 subjects were excluded due to completion time two standard deviations faster than the mean, and the majority of these participants were in the youngest age group. These exclusions may have penalized the younger age group for having faster processing speed, possibly introducing a skewness in age in the sample; thereby, affecting relationships between variables.

With the broad ages and reports of SCD and stigma presented in this study, it is likely generalizable to other broad aging populations. However, there may be some limits to its generalizability due to the recruitment method (online crowd sourcing), with some

aging populations potentially unable or unfamiliar with online surveying. Additionally, the mean education in this study was 15.67 years of education, which is not representative of American education statistics. The mean years of education is approximately 13 years, and 35% of people over the age 25 attained a four-year college degree in 2019 per the United States Census Bureau. The difference in medium used and education may limit some generalizability but with the wide range of ages, SCD, health conditions, and reported psychological variables, these data are likely adequately generalizable to an aging population.

Future Directions

The numerous unexpected findings, in which some contraindicated previous relevant research, obviously necessitate further study about how all of these variables relate to one another. Replication would be a helpful start to see if the same relationships arise, but even so, more detailed information about how attitudes towards aging affect all areas of life seem to be more relevant after this study. This study looked at attitudes towards aging as somewhat of an afterthought, a variable that would only add more context. However, with attitudes towards aging taking center stage, more research to produce solid construct validity of AAS would better assist in seeing how it affects other psychological variables, and perhaps even more physical variables. It could be true that attitudes are predictive of more than just quality of life, but our physical wellness as well. Likewise, if stigma can impact health outcomes and can also begin during early stages of cognitive change, it is imperative for healthcare workers and researchers to explore as it may aid in preventative measures. Research into the attitudes about aging and the number of health issues acquired over a period of time would be an incredible addition to the

literature. The SCD reports were not normally distributed, as to be expected since SCD only affects a smaller portion of society as mentioned in the introduction. Therefore, a sample with more variability in SCD may be able to more clearly identify robust links to other variables.

The findings in this study identify relevant and important relationships between SCD and stigma as well as stigma and psychological variables. The findings in this study also suggest that AAS and quality of life are closely linked; however, more research would be necessary. Given the current psychological climate post COVID-19, understanding relationships between stigma and psychological variables amongst an aging population are crucial in determining effective preventative measures to help offer support for those experiencing symptoms of aging and the stigmas that can be associated with older age and changing cognition. Given that stigma can impact health outcomes and can also begin during early stages of cognitive change, further understanding into this stigma may aid in preventative measures. In the future, research into primarily older adults and more heavily weighted SCD reporting might offer more insight into how these key variables interact with one another and affect health outcomes.

Table 1. Stigma Impact Scale (King et al., 2007).

Statement	Response				
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. I have been discriminated against in education because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
2. Sometimes I feel that I am being talked down to because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
3. Having had mental health problems has made me a more understanding person (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
4. I do not feel bad about having had mental health problems (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
5. I worry about telling people I receive psychological treatment (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
6. Some people with mental health problems are dangerous (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
7. People have been understanding of my mental health problems (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
8. I have been discriminated against by police because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
9. I have been discriminated against by employers because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
10. My mental health problems have made me more accepting of other people (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
11. Very often I feel alone because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
12. I worry how other people will react if they find out about my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
13. I would have had better chances in life if I had not had mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
14. I do not mind people in my neighborhood knowing I have had mental health problems (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
15. I would say I have had mental health problems if I was applying for a job (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
16. I worry about telling people that I take medicines/tablets for mental health problems (A)	Strongly agree	Agree	Neither agree nor	Disagree	Strongly disagree

			disagree		
17. People's reactions to my mental health problems make me keep myself to myself (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
18. I am angry with the way people have reacted to my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
19. I have not had any trouble from people because of my mental health problems (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
20. I have been discriminated against by health professionals because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
21. People have avoided me because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
22. People have insulted me because of my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
23. Having had mental health problems has made me a stronger person (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
24. I do not feel embarrassed because of my mental health problems (D)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
25. I avoid telling people about my mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
26. Having had mental health problems makes me feel that life is unfair (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
27. I feel the need to hide my mental health problems from my friends (A)	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
28. I find it hard telling people I have mental health problems (A)	Strongly agree	Agree	Neither agree nor disagree		

Table 2. Sample Demographics

	N	Mean	Std. Deviation	Variance
Age	219	58.72	9.198	84.606
Education	219	15.67	1.024	1.049
Income	219	50k-59.9k		
Health Conditions (number reported)	219	2.42	1.990	3.961
Full-time	125	56.1%		
Part-time	42	18.8%		
Unemployed	9	4%		
Retired	37	16.6%		
Disabled	6	2.7%		
White	184	82.5%		
Black	16	7.2%		
American Indian or Alaska Native	3	1.3%		
Asian	14	6.3%		
Hispanic/Other	2	.9%		
Male	103	46.2%		
Female	116	52.0%		

Figure 2. *Flow Chart Demonstration of Sample Recruitment, Completion, and Exclusions*

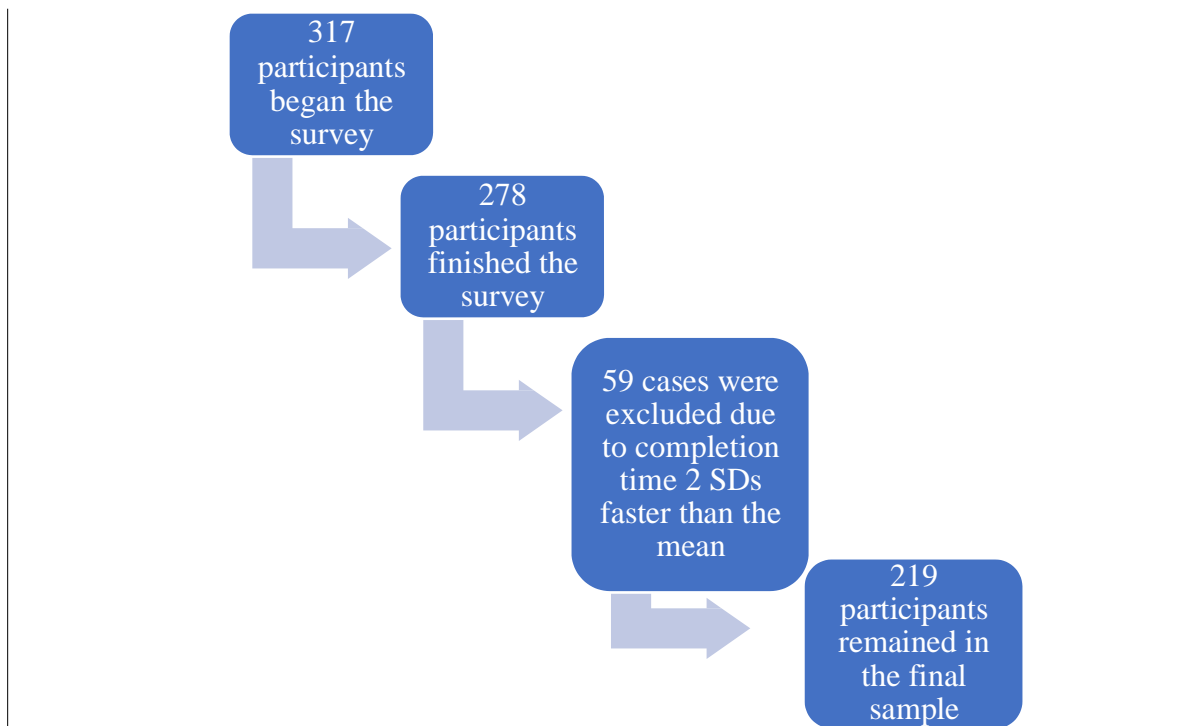


Table 3. All Variable Correlations Between Key Variables

	SIS	ISMI	LSNS	DJGLS	WHO		SCD	CCQ	Sub- jective Age	BDI	GDS	GAI
ISMI	.760**											
LSNS	.119	.052	--									
DJGLS	.096	.082	.533**	--								
WHOQOL	.037	-.040	.404**	.202**	--							
FQOL	.053	-.057	.538**	.240**	.774**	--						
SCD	.233**	.281**	.055	-.002	.072	.044	--					
CCQ	.350**	.463**	.062	.027	-.042	-.043	.626**	--				
SubjectiveAge	-.107	-.103	-.032	-.037	-.029	-.055	-.087	-.100	--			
BDI	.473**	.630**	.044	.066	-.064	-.026	.258**	.432**	.076	--		
GDS	.514**	.629**	.062	.009	-.055	-.027	.270**	.513**	-.009	.654**	--	
GAI	.581**	.693**	.107	.061	-.082	-.021	.268**	.496**	-.008	.821**	.675**	--
AAS	.048	.136*	.157*	.227**	.151*	.140*	.115	.103	-.180**	.078	.124	.086

* $p < 0.05$. ** $p < 0.01$.

Note. SIS=Stigma Impact Scale, ISMI=Internalized Stigma of Mental Illness, LSNS= Lubben Social Network Scale, DJGLS= De Jong Gierveld Loneliness Scale, WHOQOL=World Health Organization Quality of Life Scale, FQOL=Flannigan Quality of Life Scale, SCD=Subjective Cognitive Decline, CCQ=Cognitive Change Questionnaire, BDI=Beck Depression Inventory, GDS=Geriatric Depression Scale, GAS=Geriatric Anxiety Scale, AAS=Attitudes Towards Aging.

Table 4. Correlations Between Key Variables and Age

Measure	Coefficient	P Value
WHOQOL	-.010	.880
FQOL	-.068	.881
SIS	-.077	.254
ISMI	-.183*	.007
BDI	-.101	.137
GDS	-.173*	.011
GAS	-.151*	.025
SCD	-.085	.212
CCQ	-.191**	.005
LSNS	-.014	.536
DJGLS	-.158*	.019

* $p < .05$, ** $p < .01$

Note* SIS=Stigma Impact Scale, ISMI=Internalized Stigma of Mental Illness, FQOL=Flannigan Quality of Life Scale, WHOQOL=World Health Organization Quality of Life Scale, BDI=Beck Depression Inventory, GDS=Geriatric Depression Scale, GAS=Geriatric Anxiety Scale, LSNS=Lubben Social Network Scale, DJGLS=De Jong Gierveld Loneliness Scale, SCD=Subjective Cognitive Decline, CCQ=Cognitive Change Questionnaire.

Table 5. Means and Standard Deviations for Each Key Variable Across Age Groups

Key Variables	Ages 35-50	Ages 51-65	Ages 66-80
SCD	<i>M</i> =9.28, <i>SD</i> =5.93	<i>M</i> =8.12, <i>SD</i> =6.12	<i>M</i> =8.28, <i>SD</i> =5.75
CCQ	<i>M</i> =1.95, <i>SD</i> =2.37	<i>M</i> =1.57, <i>SD</i> =2.23	<i>M</i> =0.84, <i>SD</i> =1.79
Subjective Age	<i>M</i> =9.28, <i>SD</i> =3.40	<i>M</i> =11.32, <i>SD</i> =3.86	<i>M</i> =11.14, <i>SD</i> =4.02
BDI	<i>M</i> =16.4, <i>SD</i> =12.9	<i>M</i> =14.47, <i>SD</i> =13.26	<i>M</i> =11.52, <i>SD</i> =11.83
GDS	<i>M</i> =7.67, <i>SD</i> =2.88	<i>M</i> =7.53, <i>SD</i> =3.14	<i>M</i> =6.43, <i>SD</i> =2.57
GAS	<i>M</i> =37.84, <i>SD</i> =15.56	<i>M</i> =34.06, <i>SD</i> =14.63	<i>M</i> =30.74, <i>SD</i> =14.08
LSNS	<i>M</i> =14.65, <i>SD</i> =5.12	<i>M</i> =13.17, <i>SD</i> =5.43	<i>M</i> =14.21, <i>SD</i> =5.99
DJGLS	<i>M</i> =23.2, <i>SD</i> =4.95	<i>M</i> =21.58, <i>SD</i> =5.88	<i>M</i> =21.6, <i>SD</i> =5.59
SIS	<i>M</i> =57.53, <i>SD</i> =22.78	<i>M</i> =55.16, <i>SD</i> =18.11	<i>M</i> =52.67, <i>SD</i> =18.23
ISMI	<i>M</i> =67.37, <i>SD</i> =24.67	<i>M</i> =59.26, <i>SD</i> =23.44	<i>M</i> =53.28, <i>SD</i> =23.98
AAG	<i>M</i> =53.97, <i>SD</i> =17.43	<i>M</i> =47.74, <i>SD</i> =18.47	<i>M</i> =46.29, <i>SD</i> =18.08
WHOQOL	<i>M</i> =99.72, <i>SD</i> =15.35	<i>M</i> =99.55, <i>SD</i> =15.13	<i>M</i> =98.52, <i>SD</i> =12.49
FQOL	<i>M</i> =80.58, <i>SD</i> =14.83	<i>M</i> =77.23, <i>SD</i> =14.19	<i>M</i> =79.05, <i>SD</i> =13.68

*Note** SIS=Stigma Impact Scale, ISMI=Internalized Stigma of Mental Illness, FQOL=Flannigan Quality of Life Scale, WHOQOL=World Health Organization Quality of Life Scale, BDI=Beck Depression Inventory, GDS=Geriatric Depression Scale, GAS=Geriatric Anxiety Scale, LSNS=Lubben Social Network Scale, DJGLS=De Jong Gierveld Loneliness Scale, SCD=Subjective Cognitive Decline, CCQ=Cognitive Change Questionnaire.

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CURRICULUM VITAE

Lauren Brooke Flaherty

University of Louisville Department
of Psychological and Brain Sciences
Life Sciences Building 317
Mobile: 502-640-4697
E-mail: Lbangg01@louisville.edu

EDUCATION AND GOALS

- 2021-2022 **Psychology Doctoral Intern**, *Robley Rex Veteran Affairs*
- 2020 **Dissertation Proposal**: The Effects of Stigma on Quality of Life and Psychological Outcomes in those with Subjective Cognitive Decline
- 2016-2021 **PhD Student**, *University of Louisville Department of Psychological and Brain Sciences*. Neuropsychology and Aging Lab. Psychological Services Center Clinic.
Advisors: Benjamin Mast, PhD. and Bernadette Walter, PhD.
- 2018 **Masters of Science**, *University of Louisville Department of Psychological and Brain Sciences*. Clinical Psychology.
Advisor: Benjamin Mast, PhD.
- 2014-2016 **Masters of Arts**, *University of Louisville Interdisciplinary Studies in Philosophy*. Bioethics and Medical Humanities.
Advisor: Nancy Potter, PhD.
- 2010 **Bachelors of Arts**, *University of Louisville College of Arts and Sciences*. Psychology.
Advisor: Allison Sommers
- GOALS **Post Doctoral Fellowship**

HONORS, APPOINTMENTS, AND TEACHING

- 2020 **Teaching Assistant**, Research Methods in Psychology.
Responsible for teaching two lab sections which includes class instruction, grading assignments, and providing weekly office hours for students to ask questions or receive private instruction.

- 2020 **Teaching Assistant**, Life Span Development.
Attending classes in vivo (before COVID-19), opportunity to lecture, grading.
Providing weekly office hours for all students.
- 2019 **Lab Instructor/Teaching Assistant**, Research Methods in Psychology.
This course required lecturing at least one of the main courses, and teaching two independent lab sections. Providing at least one hour of office hour time for each of the 75 students. This class also required all grading to be done by teaching assistants.
- 2018-present **National Honours Society for Academic Professionals**
- 2015-present **Golden Key International Honours Society, Graduate Scholars**
- 2016 **Student Spotlight**, *Geropsychology Newsletter*
- 2016-2018 **Doctoral Cohort Liason**, *Clinical Psychology cohort*.
Communicates with the cohort about any difficulties or compliments and relays those messages to the counsel to facilitate change.
- 2015-2017 **Grawemeyer Scholars Program, Graduate Assistant**
Responsible for recruiting potential scholars, assisting with office management, setting up events in appreciation of the fine arts and politics for the Scholars to participate in, engaging with the community and emulating an example of what a Scholar is supposed to represent.
- 2016-2018 **Research Assistant**, *Neuropsychology and Aging Lab*
- 2017-2018 **Teaching Assistant**, *Undergraduate Psychology 201*
Meeting with undergraduate students enrolled in class to go over exams, answer any questions regarding class content and expectations, as well as advise any students who wish to excel in the field of psychology.
- 2018 **Teaching Assistant**, *Undergraduate Psychology 404*
Assisting the professor in grading duties.
- 2014-2017 **University Note-taker**, *Disability Resources Center*
Taking clear and thorough notes for a given class for an anonymous student with a learning disability in the course. After taking notes, it was imperative to make copies of the notes and send them via email.
- 2016-2018 **Doctoral Clinician**, *University of Louisville Psychological Services Center*
Responsible for conducting intake interviews, assigning diagnoses, performing intellectual, personality, psychopathological, and cognitive assessments, and administering therapy sessions.

PROFESSIONAL ASSOCIATIONS

- 2016-2021 **Louisville Chapter of the Society for Neuroscience**
- 2015-2021 **American Psychological Association**
- 2015-2021 **Member of the American Society for Bioethics and Humanities**
- 2016-2020 **Mindfulness Based Clinical Practice Organization**
- 2017-2021 **Political Action for Psychology**

CLINICAL EXPERIENCE

- 2021-2022 **Pre-doctoral Intern, Robley Rex Veteran's Association.**
Directors: Dr. Shay Kirkpatrick & Dr. Norma Sofia Marsano-Jozefowicz
Rotations: Neuropsychology, Primary Care Mental Health Integration, General Mental Health, Geriatric Extended Care.
- 2020-2021 **Practicum Student Clinician, Comprehensive Neuropsychology practice.**
Advisor: Dr. Brenda Parker
Conducting a variety of neuropsychological assessments and psychological assessments on children and adults. Neuropsychological scoring, interpretation.
- 2019-2021 **Practicum Student Clinician, Behavioral Wellness Clinic, OCD.**
Advisor: Dr. Russell Street
Administering psychodiagnostic assessments specific to obsessive compulsive disorder and panic disorders. Delivering therapy weekly to clients with obsessive compulsive disorder, perfectionism, and occasionally eating disorders. Additionally, I was a co-leader of a weekly group training clients in DBT for eating disorders.
- 2019 **Practicum Student Clinician, Residential Practicum position**
Advisor: Dr. Suzanne Meeks
Assessing depression, anxiety, and cognitive impairment in geriatric residential populations. Delivering weekly therapy to those with depression and anxiety.
- 2018-2019 **Neurosurgery Observation, University of Louisville Hospital, Functional Neurosurgery.**
Advisor: Dr. Joseph Neimat, Chairman of Neurosurgery.
Observing deep brain stimulation operations on patients suffering from Parkinson's Disease, epilepsy, and movement disorders. Learning the anatomy and neurophysiology behind these procedures.

- 2018-2019 **Neuropsychology Doctoral Extern**, *University of Louisville Hospital Outpatient Center*.
 Conducting cognitive assessments of senior populations as well as those with cognitive difficulties due to TBI, stroke, medical complications, etc. Conducting one 2-3 hour cognitive assessment a week. Expected hours per year: 120
 Advisor: Whitney Rebholz, PhD. & Elizabeth Cash, PhD.
- 2018 Integrated Reports (October 2020): 17
- 2016-2018 **Doctoral Student Clinician**, *University of Louisville Psychological Services Center*.
 Conducting structured assessments for cognitive, personality, and clinical diagnoses. Administering interventions to a variety of clients.
 Advisor: Bernadette Walter, PhD.
- 2017 **Interviewer**, *Altenheim Highlands Community Ministries*.
 Conducted interviews with dementia patients in a care center to formulate a case conceptualization.
 Advisor: Benjamin Mast, PhD.
- 2008-2013 **Unit Administrator**, *Jewish Hospital, Rudd Heart and Lung Critical Care Nursing Unit*: Administration and Patient Care duties. Transcribed medical labs and orders. Assigned patients. Responsible for all communication between physicians, nurses, patients, and families. Patient's Diets. Enact unit policies. Create patients' charts. Transfer patients to outside facilities. Contact physicians and offices. Arrange for engineering to fix electronic or structural issues. Call the emergency codes and cooperate with met team emergency services. Help nursing assistants when possible. Keep supplies on the floor for unit function.
 Advisor: Angie Freeman, R.N.

PUBLICATIONS

- Flaherty, L. (2016). Empathetic Reasoning as an Evolution of Humankind. *Dialogue Journal of Phi Sigma Tau International Honor Society for Philosophy*, 58(2-3), 113-121.
- Flaherty L.B., Wood T, Cheng A, Khan A.R., (2017). Preexisting psychological depression confers increased risk of adverse cardiovascular outcomes following cardiac surgery: a systematic review and meta-analysis. *Journal of Thoracic Cardiovascular Surgery*, 154, 1578-86.
- Mast, B., Flaherty, L.B., (2017). Should Dad Be Driving? Ethical Challenges in Professional Geropsychology: Review of Ethical Practice in Geropsychology. *PsycCRITIQUES: American Psychological Association*, 62(32), 1-3.

Flaherty, L.B., Midden, A., Mast, B., (2019). Psychometric Evaluation of the Symptoms of Dementia Screener in a Geriatric Primary Care Setting. *Clinical Gerontologist*, 42(5): 504-511.

Flaherty, L.B., Mast, B., (2020). Clinician Word use in Dementia Evaluation Reports as a Function of Cognitive Impairment. *Gerontology and Geriatric Medicine Journal*.

Flaherty, L., Girgis, C., Digasbarro, D., Mohanty, D., LaFaver, K.(2020). *Perceived Stigma in Patients with Functional Movement Disorder: A Qualitative Study*[Unpublished manuscript]. University of Louisville.

2020-2021 Gerontology and Geriatric Medicine Journal Reviewer

PRESENTATIONS

2021 3rd Edition International Aging Speaker

2021 2nd Edition International Aging and Rejuvenation Speaker.

2020 Flaherty, L., Girgis, C., Digasbarro, D., Mohanty, D., LaFaver, K.(2020). *Perceived Stigma in Patients with Functional Movement Disorder: A Qualitative Study* [Abstract and Poster presentation]. Movement Disorders Society 2020 Congress.

2016 Flaherty, L.B., Mast, B., (2016). *Clinician Word use in Dementia Evaluation Reports as a Function of Cognitive Impairment* [Abstract and Poster presentation]. American Psychological Association.

2017 Flaherty, L.B., Midden, A., Mast, B., (2017). *Psychometric Evaluation of the Symptoms of Dementia Screener in a Geriatric Primary Care Setting* [Abstract and Poster presentation]. American Psychological Association.

2015 Flaherty, L.B., Carlson, A., Urevick, A. (2015). *An Engaged patient: Value Systems and a Defense of Agency for Patients with Alzheimer's* [Abstract and Poster Presentation]. CBHD 2015 Summer Conference on Science, Research, and The Limits of Bioethics.

OTHER TRAINING

2021	Primary Care Mental Health Integration Certification, <i>Veteran's Association</i>
2021	Motivational Interviewing Training, <i>Veteran's Association</i>
2021	Basic Life Support Advanced Healthcare Certified
2016	LGBTQ Interviewing, <i>Interviewing Course</i>
2016	Psychiatry Preceptorship, <i>University of Louisville Hospital Psych Unit</i> Rounding and observing.
2016	Pharmacology Preceptorship, <i>University of Louisville Hospital</i> Rounding and observing.
2016	Neurology Preceptorship, <i>University of Louisville Hospital</i> Rounding and observing.
2016-2017	SAT scorer, <i>Educational Testing Services.</i> Reading SAT essays and assigning scores. Paid position.
2015-2018	ALISON Certification, <i>courses in Physiology, Cellular Biology, Anatomy, Psychopharmacology, Neuropsychology</i>
2014	CITI and HIPPA certified and trained

COMMUNITY OUTREACH & VOLUNTEER TEACHING

2022	Social Psychology Brain Health App
2022	Private book release
2021	Parish Councilwoman, Assumption Greek Orthodox Church
2021	Developing Brain Health App
2020	DBT Group Leader for Eating Disorders, Be Well Providers Clinic

- 2019 **Chairwoman of Capitol Campaign Committee**, Assumption Greek Orthodox Church
- 2018 **UofL Radio Segment**, discussing dementia screening in primary care settings with Mark Hebert
- 2017-2018 **Philoptochos Member**, *Assumption Greek Orthodox Church*.
Participating and donating in public causes.
- 2017 **Psychology Grawemeyer Awards**
- 2017 **Music Grawemeyer Awards**
- 2016-2017 **Grawemeyer Award Banquet**
- 2016-2017 **World Order Grawemeyer Award Talk**
- 2016 **Kentucky Psychology Association Convention Participant**
- 2014-2016 **Attender and Supporter**, *Alzheimer's Support Group at Southeast Christian Church*
- 2015 **Muhammad Ali Grawemyer Spirit Awards**, *program assistant for the award giver*.
- 2016 **Online Instructor**, *University of Louisville*.
Created a teaching module for medical students and nursing students about ethical and medical issues concerning those with Alzheimer's Disease.
- 2015 **Class Lecturer**, *Cultural Neuroscience* regarding the physiology and biopsychosocial model of addiction in various cultures.
- 2015 **Interviewer and Collaborator**, *Restorative Justice Movement Louisville*
Resolving legal conflict by leading discussion between the victim and transgressor.
- 2014 **Compassion Games Participant**, *Compassion Louisville*.
Participating in monthly compassion exercises.
- 2012-2018 **Occasional Volunteer for Center For Women And Children**
Washing dishes for the kitchen.
- 2014 **Hunger Walk 5k Participant**

ADMINISTERING & SCORING ASSESSMENT INSTRUMENTS

McCarthy Semantic Fluency

Judgement of Line Orientation (JOLO)
 Grooved Pegboard Test
 Repeatable Battery for the Assessment of Neuropsychological Status (**RBANS**)
 Neuropsychological Assessment Battery
 Delis-Kaplan Executive Function System (D-KEFS)
 Wisconsin Card Sorting Test (WCST)
 ACS Test of Premorbid Functioning
 Dot Counting Test
 RDS Embedded Effort Tests
 B Test
 Global Scale Tic Severity
 Wechsler Adult Intelligence Scale IV (WAIS-IV)
 Yale-Brown Obsessive Compulsive Scale II (Y-BOCS II)
 Mini International Neuropsychiatric Interview (MINI)
 Galvestone Orientation and Amnesia Test (GOAT)
 Wechsler Intelligence Scale for Children V (WISC-V)
 Wechsler Individual Achievement Test (WIAT)
 Cognitive Continual Performance Test (CPT-3)
 Minnesota Multiphasic Personality Inventory
 Wide Range Achievement Test-3 Reading (WRAT-3)
 Western Aphasia Battery-Auditory Comprehension
 Dementia Rating Scale -2 (DRS-2)
 California Verbal Learning Test (CVLT)
 Clock Drawing (CLOX)
 WAIS-III Digit Symbol-Coding
 Visual Form Discrimination Test
 Trail Making Test - Part A and B
 Category Fluency - Animal Naming
 Controlled Oral Word Association Test (COWA-FAS)
 Boston Naming Test (BNT)
 Geriatric Depression Scale (GDS)
 Symptoms of Dementia Screener (SDS)
 Outcome Questionnaire (OQ-45)
 Beck Depression Inventory (BDI)
 Beck Anxiety Inventory (BAI)
 Beck Scale for Suicidal Ideation (BSS)
 Brief Symptom Inventory (BSI)
 Children's Depression Inventory-2 (CDI-2: Self Report)

 Multidimensional Anxiety Scale for Children2- (MASC-2: Self Report)
 Conners-Wells Adolescent Self-Report Scale- Short (CASS: Self-Report: Short Version)

 CAARS-Self-Report: Long Version (CAARS-S:L)
 Millon Clinical Multiaxial Inventory—Third Edition (MCMI-III)
 Clinical Interview
 Intake Assessment

HOBBIES

Assumption Greek Orthodox Church Choir
Book writing
Piano
Tennis
Cooking
Reading
Gardening
Philosophy Book Club

REFERENCES

Dr. Benjamin Mast (doctoral mentor, co-author)

Full Professor
A&S Psychology
Life Science Bldg Rm 322-B
502-852-3280 (office)
b.mast@louisville.edu

Dr. Nancy Potter (Masters mentor)

Full Professor
A&S Philosophy
Bingham Humanities Room 313
502-852-0449 (office)
nancy.potter@louisville.edu

Dr. Paul Salmon (Clinical Supervisor)

Associate Professor
Psychological and Brain Sciences
Life Sciences 314
502-852-8268
Paul.salmon@louisville.edu

Dr. Meeks (clinical supervisor and dissertation committee member)

Professor and Editor of The Gerontologist
Psychological and Brain Sciences
Life Sciences 107/111

502-852-5950

Suzanne.meeks@louisville.edu

Dr. Barbara Stetson (Director of clinical training)

Associate Professor

Psychological and Brain Sciences

Lutz Hall 443

502-852-8904

Barbara.stetson@louisville.edu

Dr. Broderick Sawyer

Private practice clinician

Behavioral Wellness Center

Broderick.sawyer@bewellproviders.com