Successful Aging in Older Adults with Mild Cognitive Impairment: Effects of Social Support

by

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ABSTRACT

Introduction: Successful aging (SA) is defined as low rates of disease and disability, high cognitive and physical functioning, and active engagement with life. Mild cognitive impairment (MCI) is an intermediate state between normal cognition and dementia. Those with MCI by definition are not successfully aging in the domain of cognitive and physical functioning; however, it is possible for those with MCI to age successfully in the other two domains. Perceived social support (PSS) may be one way to influence the effect of cognitive impairment on SA outcomes.

Purpose: The purpose of this study is to evaluate the association between cognitive status and three domains of SA, and whether these associations depend on PSS.

Methods: The sample of participants are from the Monongahela-Youghiogheny Healthy Aging Team (MYHAT) study and are 65+ years old. The dependent variables are measures of the three domains of successful aging, the independent variable is cognitive status defined by the Clinical Dementia Rating score (0 = normal; 0.5 = MCI), and three measures of PSS. Covariates included age, sex, and education level. Normal vs. MCI older adults were compared on measures of SA. Cross-sectional associations between cognitive status, and SA domains were examined using binary logistic or simple linear regressions, and whether these associations depended on PSS was explored.

Results: Those with MCI did not age as successfully as normal individuals. Social support did not moderate the negative effects of MCI on SA.

Conclusions: This study provides a better understanding of how those with MCI age compared to their normal counterparts. Future research should examine coping mechanisms those with MCI use to compensate for their inability to successfully age.

Keywords: mild cognitive impairment, successful aging, perceived social support
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Successful Aging in Older Adults with Mild Cognitive Impairment: Effects of Social Support

In the United States, the population of adults 65 and older will rise approximately 20% by 2050 (McLaughlin, Connell, Heeringa, Li, & Roberts, 2010); therefore, challenges and issues regarding older adults will be of great importance (McLaughlin et al., 2010).

Successful Aging (SA) should be a major goal for older adults to reach and maintain in our society and is based on three overlapping domains: (1) low rates of disease and disability, (2) high cognitive and physical functioning, and (3) active engagement with life (Rowe & Kahn, 1997). Since this definition was explained, several critiques mention that SA needs to be operationally defined and include many other factors, like subjective well-being (Phelan & Larson, 2002), and social connection (Christakis & Fowler, 2009). In most studies, the SA model is examined in cognitively normal older adults; however, little research assesses if those with cognitive impairment (one domain of SA) are successful in the other domains (i.e. low rates of disease and disability, and active engagement in life).

Epidemiological research suggests that the prevalence of mild cognitive impairment (MCI) ranges from 3-19% in individuals 65 and older (Gauthier et al., 2006). MCI is briefly defined as an intermediate state of cognitive decline that does not interfere remarkably with the completion of instrumental activities of daily living (IADLs) (Gauthier et al., 2006).

Findings suggest that social relationships, or various forms of social support, can influence the onset of cognitive and physical disabilities (Avlund, Lund, Holstein, & Due,
2004; Power, Lawlor, and Kee, 2017). Those with MCI are not aging successfully in one domain (cognitive and physical functioning). Therefore, it is crucial to understand if (1) these individuals with MCI are successfully aging in any other domains of SA (rates of disease and disability or engagement with life), and (2) if their ability to successfully age is moderated by perceived social support (PSS).

**Critiques of the Rowe & Kahn Successful Aging Theory**

Rowe & Kahn (1997) first proposed the theory of successful aging (SA) as three domains: 1) low rates of disease and disability, 2) high cognitive and physical functioning, and 3) active engagement in life (Rowe et al., 1997). When all three domains overlap in one individual, that individual is said to experience successful aging. Though successful aging has provided over 20 years of framework towards the idea that the three domains of SA will result in an ideal outcome for older adults (Stowe & Cooney, 2015), there are criticisms of this theory. For instance, the definition is not inclusive of subjective, cultural, historical, or socially constructed aspects of aging (Brandt, Deindl, & Hank, 2012; Dillaway & Byrnes, 2009; Hank, 201; Hung, Kempen, & Devries, 2010; Phelan et al., 2002; Whitley et al., 2016), does not include influence of religion/spirituality (Crowther, Parker, Achenbaum, Larimore, & Koenig, 2002), and it does not examine the influence of social connections or relationships (Christakis & Fowler, 2009). It is important to recognize that not one definition of successful aging has been established for better assessment (Whitley et al., 2016). However, it is important to understand that there is growing interest in what relates to and aides successful aging due to the increasing number of older individuals around the world (Whitley et al., 2016). In the proposed study, I will examine the influence of cognitive impairment on the domains
of successful aging, and whether or not PSS might reduce the potential negative impact that cognitive impairment has on successful aging outcomes.

**Mild Cognitive Impairment (MCI)**

Mild cognitive impairment (MCI) is recognized as the intermediate state between normal cognition and dementia (Petersen et al., 2009). According to Cooper and colleagues (2015), MCI affects approximately 19% of adults who are 65 and older (Cooper, Sommerlad, Lyketsos, & Livingston, 2015; Lopez, Kuller, Becker, Dulberg, Sweet, Gach, & DeKosky, 2007), and there are differences in progression rates from MCI to dementia in community and clinical settings (Ganguli et al., 2011).

This state of mild cognitive impairment has had many definitions/criteria but, the most widely recognized definition of MCI was created by the Mayo Clinic (Petersen, Smith, Waring, Ivnik, Tangalos, & Kokmen, 1999). This definition of MCI includes: (1) subjective memory complaints, (2) objective memory loss, (3) cognitive function, (4) independence in completion of IADLs, and (5) no dementia diagnosis (Petersen et al., 2014). After 2003, the Mayo Clinic definition of MCI expanded, because it recognized that other cognitive domains outside of memory are affected, to include (6) subjective cognitive complaints, and (7) objective cognitive loss (Petersen et al., 1999).

Another assessment tool for MCI is the Clinical Dementia Rating (CDR) scale (Morris, 1993). This rating is composed of questions and observations regarding daily functioning in memory, orientation, judgement, home and hobbies, community affairs, and personal care (Morris, 1993). All of the areas are rated from 0 – 0.5, 1, 2, and 3. Then, a summary CDR score is used to describe the state of the individual (0 = no dementia, 0.5 = MCI, 1 = mild dementia, 2 = moderate dementia, and 3 = severe dementia).
dementia (see Appendix A) (Ganguli et al., 2010). The CDR scale is used in the MYHAT to classify older adults with MCI based on everyday functioning and independent of neuropsychological function.

According to Petersen and colleagues (2014), there is no current pharmacological treatment for MCI. However, there is still a need for further investigation and intervention development to assess protective factors and to better understand not just if those with MCI can successfully age in other domains besides the cognitive/physical functioning domain, but what factors influence their ability to successfully age in those domains. More specifically, it is important to examine SA with regard to MCI and perceived social support, and if those with MCI and higher perceived social support have better SA outcomes when compared to MCI individuals with lower PSS. The current study will examine if and how older individuals with MCI successfully age, especially with the help of perceived social support.

**MCI and Successful Aging**

By virtue of meeting the definition of MCI, those with MCI are not successfully aging. However, given the multi-dimensionality of successful aging, it is of interest to examine how these individuals are doing in other aspects of successful aging. A study done by Negash and colleagues (2011) looked to examine models of defining successful aging within community-dwelling, normal cognitively aging, adults 65 and older. The authors created three models where different percentages of older adults were defined as “successful agers,” based on participants’ scores on the Neuropsychological Screening Battery (NSB). Besides MCI, the researchers measured mortality and conversion to MCI for participants. Model 1 states at participants’ scores on the NSB in the top 10% would
be identified as “successful agers,” whereas the other 90% would be “typical agers.” In Model 2, those with NSB scores in the 50th percentile or higher were identified as “successful agers,” and the lower 50th percentile were “typical agers.” Finally, in Model 3, the researchers used “reverse-age-associated memory impairment” (AAMI) and scores were identified as the cut-off for the four cognitive domains to define the “successful agers.” Out of 560 older adults, only 56 were identified as successful agers in Model 1, but 14 participants were identified as successful agers in all three models. In models 1 and 3, those classified as successful agers had lower mortality (Negash et al., 2011). This study explains the flexibility of the successful aging definition, in that some individuals, even those with lower scores on the neuropsychological battery, can still be classified as “successful agers.”

**MCI & Disease/Disability.** Mild cognitive impairment (MCI) influences the first domain of the successful aging theory: low rates of disease and disability (Artero, Touchon, & Ritchie, 2001; Barnes, Alexopoulos, Lopez, Williamson, & Yaffe, 2006; Boyle, Buchman, Wilson, Leguras, & Bennett, 2010; Lopez et al., 2007). More specifically, those with MCI are more likely to develop physical disabilities compared to their non-MCI counterparts (Artero et al., 2001; Boyle et al., 2010). Artero and colleagues (2001) performed a longitudinal study to examine associations between MCI and disability. In the first year, the researchers found that participants with MCI that did not develop dementia had a harder time using the restroom, bathing, using telephones, and with their overall mobility than their non-MCI counterparts. Additionally, participants with MCI who developed dementia over the 3-year study had higher rates of disability at baseline whereas those with MCI who did not develop dementia had higher
rates of disability compared to the non-MCI group (Artero et al., 2001). Therefore, evidence suggests that those with MCI are unable to successfully age based on the first domain because of their increased risk and rates of disease and disability.

**MCI & Cognitive and Physical Functioning.** Those with MCI are less likely to successfully age because of the second domain: high cognitive and physical functioning (McGough et al., 2011; Buracchio, Dodge, Howieson, Wasserman, & Kaye, 2010). McGough and colleagues (2011) assessed gait speed and executive function in subjects with amnestic mild cognitive impairment. These researchers used the “timed-up and go” (TUG) and neuropsychological tests (i.e. executive function and stroop interference tests) to examine these relationships. Analyses showed that longer TUG times were related to lower neuropsychological test scores (i.e. lower executive function, and higher stroop scores) (McGough et al., 2011). This study shows that those with MCI have lower cognitive and physical functioning thus inhibiting their ability to successfully age based on Rowe & Kahn’s second domain (1997).

Additionally, Buracchio and colleagues (2010) performed a study to compare gait speed and finger tapping in those with and without MCI. Clinical assessments included health backgrounds, gait speed, finger-tapping speed in both the dominant and non-dominant hand, and Clinical Dementia Rating (CDR) scores to confirm MCI. Overall, the researchers found that gait speed and finger-tapping times in both hands were significantly lower, indicating better performance, in those without MCI compared to with MCI over time (Buracchio et al., 2010). This study shows that physical function is significantly worse in those with MCI than those without, providing more evidence that those with MCI are less likely to successfully age based on the second domain.
**MCI & Social Engagement.** Finally, MCI influences the third domain of successful aging: active/social engagement with life (Bassuk et al., 1999). For instance, Bassuk & colleagues (1999) assessed social disengagement and cognitive decline in adults 65 and older. When compared with older adults who had 5-6 social connections (i.e. spouse, visual contact with friends/relatives, religious service attendance, social activities, etc.) those with zero social connections had significantly higher risk of cognitive decline at 3, 6, and 12-year follow up (Bassuk et al., 1999).

**Role of Social Support in Successful Aging**

Perception of social support in the elderly population is said to positively influence health outcomes important for successful aging, including overall mortality and morbidity (Buchman, Boyle, Wilson, James, Leurgans, Arnold, & Bennett, 2010; Forster, & Stoller, 1992; Holmen, Ericsson, & Winblad, 1999; Rasulo, Christensen, & Tomassini, 2005; Tomaka, Thompson, & Palacios, 2006).

**Social Support and Disease/Disability.** Evidence suggests that, in different ways, social relationships may influence the *onset of disability in old age* (Avlund et al., 2004). Avlund and colleagues (2004) performed a longitudinal study to determine if various aspects of social relations influenced the onset of physical disabilities in old age. The results of the study indicate that having many social relationships reduces the risk of onset of a physical disability. More specifically, in men and women, it was found that more diversity and increased participation in social relationships were important in reducing the risk for onset of physical disabilities (Avlund et al., 2004). Therefore, aspects of social relationships can aid in the achievement of successful aging by reducing the risk of onset of physical disability. A study by Tomaka and colleagues (2006)
examined levels of social support and disease outcomes in the elderly. Their measure of social support included subjective interactions with friends and family, and participants were asked if they had various diseases (yes vs. no) like diabetes, hypertension, arthritis, kidney disease, etc. Results explained that belonging social support negatively predicted diabetes, hypertension, arthritis and emphysema. Family social support negatively predicted stroke. This study showed the relationship between social support and various diseases that affect the elderly population.

**Social Support and Cognitive/Physical Function.** Social support and relationships can also influence *cognitive function* (Power et al., 2017; Seeman et al., 2001). Seeman and colleagues (2001) performed a longitudinal study to examine the association between social support and cognitive function. Using data from the MacArthur Studies of Successful Aging, the authors assessed cognitive function (language, abstraction, spatial ability, delayed spatial recognition, recall after 10 minutes, and delayed recall of story) and social support (perception of social network and instrumental or emotional support types). Longitudinal analyses revealed that initial emotional support was a significant predictor of cognitive function after a 7.5-year follow-up when controlling for other risk factors (Seeman et al., 2001). Further, Power and colleagues (2017) realized that personality traits also relate to some of the modifiable risk factors of cognitive function. The authors studied social support as a mediator between cognitive function and personality traits (i.e. extraversion & neuroticism). They found support for both hypotheses explaining that social support mediates the positive relationship between extraversion and cognitive function and the negative relationship between neuroticism and cognitive function (Power et al., 2017). Further, social support
may influence *physical function* in older populations, too (Choi & Wodarski, 1996). Choi and colleagues (1996) examined the relationship between social support and physical deterioration in older adults. By comparing two waves of longitudinal data, the authors were able to compare physical and functional deterioration as well as social support between the two waves. Results indicated that more social support increased more positive health outcomes (i.e. number of medications, doctor visits, hospitalizations, ability to walk 0.25 of a mile, and ADLs/IADLs). Further, those with more social support to help (unpaid) with ADLs and IADLs at wave 1, had lower levels of functional deterioration at wave 2 (Choi et al., 1996). Increased social support will not stop physical or cognitive deterioration/decline, but it may prolong the process.

**Social Support and Engagement.** Berkman and colleagues (2000) discussed the multi-dimensional concept of social integration. One pathway the authors define is social engagement and how some social relationships and support may encourage social engagement. More specifically, when an individual has an opportunity to engage with others, they reinforce social ties and sociability and give the individual a purpose in life (Berkman, Glass, Brissette, & Seeman, 2000). Another paper by Colclough & Sitaraman (2005) explain that the opposite can also happen; in essence, social engagement can also elicit social support from others and define it as “community leads to social capital.” When individuals join groups based on common interests/identities and then the sense of community is reinforced by social gatherings. These gatherings offer opportunities to offer and ask for help/information/advice and individuals become comfortable around those in this community even if they have not met face-to-face (Colclough et al., 2005). Social support can increase engagement and engagement can increase social support in
others. As social support influences positive outcomes in individuals of all ages, it is important to understand that this is an important part of the aging process.

**Purpose/Hypothesis**

The purpose of this study is to evaluate the association between cognitive status (normal vs. MCI) and three domains of successful aging (SA), and whether these associations depend on perceived social support (PSS).

A main effect of cognitive status among all domains/outcomes of SA is predicted. Additionally, it is hypothesized that associations between cognitive status and SA will depend on PSS.

**Methods**

**Participants**

**MYHAT Study.** The sample is from a population of older adults south of the city of Pittsburgh, PA, who surround the merging of the Monongahela and Youghiogheny rivers. Voter registration and a commercial mailing lists were merged to identify possible study participants. Letters were mailed to randomly chosen individuals telling them to contact the study team if they wanted to opt out of the study (Ganguli et al., 2009). If, after two weeks, the individual did not contact the study team, the individual was contacted by telephone. After contact, the study team made appointments with the individual to complete an interview that contained a study description and if the individual volunteered, the study team obtained written informed consent (Ganguli et al., 2009). The baseline sample consisted of 2,036 older adults, 1,982 were followed annually by the MYHAT study team based on a Mungus and colleagues (1996) (Mungas, Marshall, Weldon, Haan, & Reed, 1996) adjusted Mini Mental State Examination score.
of 21 that would allow study of progression to dementia. All Institutional Review Board (IRB) requests from the MYHAT study were approved by the University of Pittsburgh IRB (Ganguli et al., 2009). The sample of participants are drawn from the Monongahela-Youghiogheny Healthy Aging Team (MYHAT) study. Older adults who are (a) 65+, (b) living in the selected area, (c) not in a long-term care facility, and (d) who can make their own decisions about participating in research, were eligible to participate in the study (Ganguli et al., 2009).

Measures

Dependent Variables

Successful Aging Domains. The three domains of successful aging (SA) will be defined based on multiple measures from the MYHAT study (Ganguli et al., 2009). Rates of Disease and Disability is based on 3 measures in the MYHAT assessment: self-rated health, current number of prescription medications, and performance on instrumental activities of daily living. Self-reported health is based on response to the question, “Compared to other people your age, how would you rate your overall state of health?” Response choices were excellent, very good, good, fair, and poor. The responses were re-categorized as very good/excellent vs. good/fair/poor based on conceptual and statistical distribution. Number of prescription medications (0-3 vs. 4+) is based on the MYHAT study baseline median score (Hughes, Chung-Chou, Vander Bilt, Snitz, & Ganguli, 2012). IADL tasks include medication management, money management, shopping, walking, meal preparation, travel and using a telephone (Fillenbaum, 1988). Participants reported if they could perform each activity independently, with some help, or completely unable. The “some help” and “unable” categories were combined, and then a sum score
across all 7 items was created with scores ranging from 0-7 where 0 is completely independent, and 7 is unable to complete any task independently (Hughes et al., 2013).

*Cognitive and physical functioning* is based on neuropsychological test performance and gait speed, respectively Cognitive domain composite scores for attention, language, executive functioning, memory, and visuospatial ability (Ganguli et al., 2009). Gait speed (measured in seconds) based on a 4-meter timed up and go (TUG) test (continuous variable) (Podsiadlo & Richardson, 1991). *Engagement with Life* is defined on 3 constructs of social, cognitive, and physical activity. Social activity based on participation in any of the following four activities: attending church, attending family occasions, attending other social activities, or working (0 = no, 1 = yes). Cognitive activity based on participation in either hobbies or computer use (0 = no, 1 = yes). Physical activity based on participation in either exercise or every day physical activity of moderate intensity or more (0 = no, 1 = yes).

**Independent Variables**

*Cognitive Status* is based on the Clinical dementia rating score (CDR score) is defined as normal = 0 and MCI = 0.5. The present study excluded participants with a CDR score 1-3 (dementia, N = 23) leaving 1,959 MYHAT participants who were both normal (CDR = 0; N = 1,413) and MCI (CDR = 0.5; N = 546) at baseline (see Appendix A for an explanation of CDR Scores).

*Perceived social support (PSS)* based on responses to the following questions: (a) “how satisfied are you with the support and encouragement you receive from the persons you mentioned (from other SS question)” (very dissatisfied, dissatisfied, satisfied, very and satisfied), (b) “do you meet or talk with family and friends as often as you would
like?” (definitely not, probably not, probably, and definitely), and (c) “overall, do you get as much help and support as you need with any difficulties (concerns, problems, needs) that you may have?” (much less help and support than I need, slightly less help and support than I need, about enough help and support I need, and more help and support than I need). Each of these variables began as categorical variables but we changed them to be dichotomous. In more detail, the responses for the PSS – Satisfied variable were dichotomized to satisfied and dissatisfied, for the PSS – Often variable the responses became often and not often and for the PSS – Enough variable, the responses changed to much/slightly less help and support than I need and about enough/more help and support than I need. This was decided because very limited participants stated the most negative response in these questions, so we grouped the two most negative and two most positive responses together to create dichotomous levels for each PSS variable/question (refer to Table 1). There are different N values for each PSS question. PSS – Satisfied (N = 1901) had 58 missing data points, PSS – Often (N = 1952) had 7 missing data points, and PSS – Enough (N = 1953) had 6 missing data points. The missing data in the PSS – Often and PSS – Enough variables either meant the interviewer did not ask the question or the question was not asked because the participant was too impaired (mentally or physically) to answer the question. Of the 58 missing data points in the PSS – Satisfied response, 35 are female (60.3%), most have a HS diploma/GED equivalent (44.8%), the mean age is approximately 78, and most have a normal CDR score (58.6%). This is different from the study sample in that most do not have a HS diploma/GED equivalent (58.7%).

Covariates
In this study, the following measures were considered covariates: age (continuous), sex (male vs. female), and education level (<High School vs. >= High School).

**Analyses**

The basic demographic characteristics of the sample were first described in terms of chi-square and independent samples t-tests (i.e. age, sex, education level). The normal and MCI participants were then compared on the three successful aging domains. When comparing categorical variables, two independent proportions tests were used, and when comparing continuous variables, two independent means tests were used.

Next, cross-sectional associations between cognitive status and SA domains were examined overall and separately based on PSS. Binomial logistic regressions were calculated for all dichotomous categorical variables (i.e. sex, education, PSS (satisfied, often, enough), cognitive activity, physical activity, and cognitive activity). Simple linear regressions were estimated for all continuous variables (i.e. age, IADL score, Neuropsychological Battery composite scores (memory, attention, executive function, language, and visuospatial, and the timed up and go (TUG)). Separate models were run for each successful aging outcome, adjusting for age, sex, and education, and for each of the three PSS questions (satisfied, often, and enough) as moderators.

**Results**

The study sample has a mean age of 77.57, is primarily female ($N = 1201$), and most participants have less than a high school (HS) diploma ($N = 1149$) compared to those with greater than or equal to a HS diploma ($N = 810$) see Table 1 for more characteristics of the sample at study baseline.
Chi-square tests for independence were calculated to examine differences between categorical variables and cognitive status for the entire sample and as a function of cognitive status. As shown in Table 1, the MCI group was significantly more likely to be female, report often and enough social support, report their health as poor/fair/good, take more than 4+ medications, and report engagement in social, cognitive, and physical activities compared to the normal group.

Independent samples t-tests were performed to examine the differences between continuous variables and cognitive status. Those with MCI were significantly older, had significantly higher IADL impairment, significantly lower Neuropsychological Battery composite scores (all), and significantly slower gait speed compared to the normal group (Table 1).

**Cognitive Status and Disease and Disability (SA – Domain 1).** Associations between cognitive status (CDR normal vs. CDR MCI) and SA domain 1 (rates of disease and disability) were calculated after adjusting for covariates (Table 2). Overall, cognitive status was associated with poorer self-reported health, taking 4+ prescription medications, and significantly positively predicted IADL score.

Other analyses were examined to measure the effect of cognitive status on each of the measures of SA – Domain 1 as a function of PSS response. There was a significant association between cognitive status and self-reported health for those who reported being satisfied with their social support, however an effect modification by PSS – Satisfied was not found. Additionally, there was a significant association between cognitive status and self-reported health for those who reported often and not often having social support, but no effect modification was found. Finally, there was a
significant association between cognitive status and self-reported health for those who reported having enough social support. Again, no effect modification was found.

For number of prescription medications, there was a significant association between cognitive status and number of medications for those who reported being satisfied and dissatisfied with their social support but, no effect modification was found. There was a significant association between cognitive status and number of prescription medications for those who reported often having social support. However, there was not an effect modification. Finally, there was a significant association between cognitive status and number of medications for those who reported having enough social support. But, there was not an effect modification.

Third, IADL score was predicted based on cognitive status (CDR score) as a function of the PSS responses. Linear regression was calculated to predict IADL score based on cognitive status (normal vs. MCI) and responses to PSS – Satisfied and a significant equation was found, but there was not an effect modification. A linear regression was calculated to predict IADL score based on cognitive status and responses to PSS – Often. A significant equation was found, but an effect modification was not. A linear regression was calculated to predict IADL score based on cognitive status (normal vs. MCI) and responses to PSS – Enough where a significant equation was found but an effect modification was not.

Cognitive Status and Cognitive and Physical Function and (SA – Domain 2). Associations between cognitive status and SA domain 2 (cognitive and physical function) were calculated after adjusting for covariates (Table 3). Cognitive status significantly negatively predicted all measures within this domain.
Memory was predicted based on cognitive status as a function of the PSS responses. Although significant equations were found for all PSS responses, except “dissatisfied,” no effect modifications were found for any of the PSS variables. Second, executive function was predicted based on cognitive status as a function of the PSS responses. Significant equations were found for all PSS responses except “dissatisfied,” and no effect modifications were found. Third, visuospatial ability was predicted based on cognitive status as a function of the PSS responses. Significant equations were found for all PSS responses except “dissatisfied,” “not often,” and “not enough,” and no effect modification was found. Fourth, attention was predicted based on cognitive status as a function of the PSS responses. Significant equations were found for all PSS responses except “dissatisfied.” But, no effect modification was found. Finally, language was predicted based on cognitive status as a function of the PSS responses. Significant equations were found for all PSS responses except “dissatisfied,” and no effect modification was found.

Second, gait speed (TUG score) was predicted based on cognitive status as a function of the PSS responses. Significant equations were found for all PSS responses except “dissatisfied” and no effect modifications were found.

**Cognitive Status and Engagement with Life (SA – Domain 3).** Associations between cognitive status and SA domain 3 (engagement with life) were calculated after adjusting for covariates (Table 4). Cognitive status was negatively associated with engagement in cognitive, physical, and social activity.

There was a significant association between cognitive status and cognitive activity for those who reported being satisfied with their social support, but no effect modification
was found. Further, there was a significant association between cognitive status and cognitive activity for those who reported often having social support; however, there was no effect modification. Also, there was a significant association between cognitive status and cognitive activity for those who reported having enough and not enough social support, but no effect modification was found.

Physical activity and cognitive status were significantly associated for those who reported being satisfied with their social support but there was no effect moderation. Cognitive status and physical activity were significantly associated for those who reported often having social support, but no effect modification was found. Also, cognitive status and physical activity were significantly associated for those who reported having enough social support. Again, no effect modification was found.

There was a significant association between cognitive status and social activity for those who reported being satisfied with their social support; although, no effect modification was found. Social activity and cognitive status were significantly associated for those who reported often having social support, but no effect modification was found. Finally, there was a significant association between cognitive status and social activity for those who reported having enough social support; however, there was no effect modification.

**Discussion**

Overall, the main results suggest that older adults with cognitive impairment are not aging as successfully as their normal counterparts. The results also suggest that perceived social support does not influence the effect that cognitive impairment has on successful aging. This finding is not similar to the majority of previous literature
findings. For instance, most studies have shown social support to be a protective factor, to prevent the onset of disease (Avlund et al., 2004), disability (Tomaka et al., 2006), cognitive and physical functioning (Power et al., 2017; Seeman et al., 2001; Choi et al., 1996), and to promote engagement (Conclough et al., 2005; Berkman et al., 2000).

However, there is some literature that states that increased instrumental social support predicted functional declines in the elderly (Hayes, Saunders, Flint, Kaplan, & Blazer, 1997). Hayes and colleagues (1997) performed a longitudinal study examining the relationship between social support, depression and physical/functional decline in older adults. First, they found that social support buffered the negative effects of functional decline in older adults with depressive symptoms, similar to other literature findings. But, they also found that instrumental social support, or when individuals receive help from friends and family, increased functional decline in older adults (Hayes et al., 1997). Therefore, there may be certain types of social support that influence functional decline, but it might not be in the same way. A theory that could explain this finding is Maier and Seligman’s “learned helplessness” concept (1976). More specifically, learned helplessness refers to an organism’s ability to recognize when outcomes, no matter how influenced, are uncontrollable (Meier et al., 1976). Individuals with MCI may receive adequate social support from their friends or family but, that social support may perform tasks in a way where the individual with MCI no longer performs those tasks or engages that skill set. This could influence an individual’s IADL/gait score, or their neuropsychological battery score, even after MCI diagnosis because those measures could become poorer. In the current study, it may be that individuals with MCI report enough social support, but those in the social support group
are compensating for the MCI individual by performing tasks and increasing their risk for functional decline, therefore, reducing their ability to successfully age.

Further, it is possible that there is reverse causality in this scenario where individuals who report lower social support may have an increased risk of MCI. A study by Dickinson & colleagues (2011) found that when individuals decrease their social interaction and have lower instrumental social support, they are at a higher risk for cognitive decline (Dickinson et al., 2011). Therefore, if lower social support negatively predicts cognitive decline, those with MCI may already have lower perceptions of social support compared to their normal counterparts. Additionally, Hughes & colleagues (2013) found that specifically within the MYHAT study, more engagement in social activities reduced the progression from mild to severe cognitive impairment. Although not all individuals with MCI will progress to dementia/severe cognitive impairment, it is important to recognize that lower levels of engagement do increase the risk of cognitive impairment and may explain some of the reverse causality.

Strengths. The sample is very large and is from an epidemiological study. Instead of assuming those with MCI in this sample would not successfully age, I assessed domains of successful aging within the MCI sample to see if there were significant differences. Since the definition of the SA theory is vague in how it is defined within each domain, I utilized various measures within each domain as to increase the understanding and definition of successful aging.

Limitations. The critiques of Rowe & Kahn’s Successful Aging theory are a limitation due to the missing pieces to develop the SA concept. However, because there is no established SA measure, I utilized various measures within each of the three domains
of SA in order to further define each domain. Another limitation would be that the underlying causes of MCI may cause that individual to not successfully age in certain domains. Although this is a limitation, it is important to understand that if these conditions are related in any way, they should be examined in order to further understand MCI and its relation to overall health in older individuals. There is a limitation of selective observation in this study because I did not assess individuals who reported having no social support (PSS – Satisfied). This created missing data within the analyses resulting in lower variability. In more detail, comparisons between the 58 missing data points were calculated based on cognitive status (CDR normal vs. CDR MCI) and the PSS – Satisfied variable. PSS – Satisfied responses were significantly different between cognitive status $X^2 (11) = 28.820, p = .004$, where those in the missing data group for the PSS – Satisfied response were more likely to be from the CDR normal group than the CDR MCI group. Although this means that cognitively normal individuals were more likely to report having no social support/no one to confide in, it would be interesting to know why these individuals did not report having social support. Further, it is not clear if the questions used to define the PSS variables (satisfied, often, enough) created a variable that correctly identified perceived social support. It is also possible that this study identifies reverse causality. More specifically, decreased PSS might influence or cause MCI whereas this study examines if MCI influences decreased PSS and if decreased PSS negatively influences measures of successful aging compared to increased PSS. Finally, very few participants reported negative perceptions of PSS and this could have impacted our analyses.
Conclusion

Individuals with MCI are not successfully aging as well as their normal counterparts. The amount of perceived social support an individual perceives does not moderate the negative effects of MCI on the three domains of successful aging. Future research should examine various coping mechanisms those with MCI may use, to enhance their aging ability or to compensate for their inability to successfully age. Additionally, future research should include longitudinal studies, preferably beginning with normal (CDR = 0) individuals who then have MCI (CDR = 0.5) and compare measures of successful aging along with changes in perceived, and instrumental, social support.
References


Buchman, A. S., Boyle, P. A., Wilson, R. S., James, B. D., Leurgans, S. E., Arnold, S. E.,


Negash, S., Smith, G. E., Pankratz, S., Aakre, J., Geda, Y. E., Roberts, R. O., …Petersen,


<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Sample (n = 1959)</th>
<th>Normal (CDR = 0) (N = 1413)</th>
<th>MCI (CDR = 0.5) (N = 546)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>77.57 (7.4)</td>
<td>76.76 (7.27)</td>
<td>79.67 (7.33)</td>
<td>.000</td>
</tr>
<tr>
<td>Sex, n (%) Female</td>
<td>1201 (61.3)</td>
<td>898 (63.6)</td>
<td>303 (55.5)</td>
<td>.001</td>
</tr>
<tr>
<td>Education, n (%) &lt;HS</td>
<td>1149 (58.7)</td>
<td>811 (57.4)</td>
<td>338 (61.9)</td>
<td>.069</td>
</tr>
<tr>
<td>Perceived Social Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfied n (%) Dissatisfied</td>
<td>52 (2.7)</td>
<td>37 (2.6)</td>
<td>15 (2.7)</td>
<td>.876</td>
</tr>
<tr>
<td>Often n (%) Not Often</td>
<td>215 (11.0)</td>
<td>115 (8.2)</td>
<td>100 (18.4)</td>
<td>.000</td>
</tr>
<tr>
<td>Enough n (%) Not Enough</td>
<td>166 (8.5)</td>
<td>99 (7.0)</td>
<td>67 (12.3)</td>
<td>.000</td>
</tr>
<tr>
<td>Successful Aging – Disease and Disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reported health, n (%) Very Good/Excellent</td>
<td>727 (37.1)</td>
<td>583 (41.3)</td>
<td>144 (26.4)</td>
<td>.000</td>
</tr>
<tr>
<td>Rx Medications, n (%) 4+</td>
<td>1079 (55.1)</td>
<td>726 (57.1)</td>
<td>353 (69.2)</td>
<td>.000</td>
</tr>
<tr>
<td>IADL, mean (SD)</td>
<td>.35 (.982)</td>
<td>.20 (.689)</td>
<td>.73 (1.425)</td>
<td>.000</td>
</tr>
<tr>
<td>Successful Aging – Cognitive and Physical Function</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory Composite, mean (SD)</td>
<td>.00752 (.77782)</td>
<td>.18086 (.69494)</td>
<td>-.44789 (.80019)</td>
<td>.000</td>
</tr>
<tr>
<td>Attention Composite, mean (SD)</td>
<td>.00915 (.77907)</td>
<td>.11306 (.74741)</td>
<td>-.26213 (.76617)</td>
<td>.000</td>
</tr>
<tr>
<td>Executive Function Composite, mean (SD)</td>
<td>-.00664 (.75537)</td>
<td>.13209 (.67121)</td>
<td>-.36751 (.38386)</td>
<td>.000</td>
</tr>
<tr>
<td>Language Composite, mean (SD)</td>
<td>.01253 (.77996)</td>
<td>.16534 (.67055)</td>
<td>-.38670 (.89655)</td>
<td>.000</td>
</tr>
<tr>
<td>Visuospatial Composite, mean (SD)</td>
<td>.01263 (.99046)</td>
<td>.14019 (.97334)</td>
<td>-.33873 (.95248)</td>
<td>.000</td>
</tr>
<tr>
<td>Get up and Go Time, mean (SD) seconds</td>
<td>13.17 (4.824)</td>
<td>12.83 (4.448)</td>
<td>14.09 (5.626)</td>
<td>.000</td>
</tr>
<tr>
<td>Successful Aging Engagement with Life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Activity, n (%) Yes</td>
<td>1603 (81.8)</td>
<td>1185 (84.0)</td>
<td>418 (77.0)</td>
<td>.000</td>
</tr>
<tr>
<td>Cognitive Activity, n (%) Yes</td>
<td>1853 (94.6)</td>
<td>1367 (96.8)</td>
<td>486 (89.5)</td>
<td>.000</td>
</tr>
<tr>
<td>Physical Activity, n (%) Yes</td>
<td>1656 (84.5)</td>
<td>1219 (86.3)</td>
<td>437 (80.5)</td>
<td>.001</td>
</tr>
</tbody>
</table>

*Comparison of normal vs. MCI. Chi-Square tests for categorical variables, independent sample t-tests for continuous variables.
Table 2

Association between Cognitive Status and Successful Aging Domain 1 – Disease and Disability

<table>
<thead>
<tr>
<th></th>
<th>Self-Reported Health</th>
<th></th>
<th>Rx Prescription Medications</th>
<th></th>
<th>IADLs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>p-value</td>
<td>OR (95% CI)</td>
<td>p-value</td>
<td>Beta (SE)</td>
</tr>
<tr>
<td>Cognitive Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfied SS</td>
<td>3.53 (1.425 - 8.662)</td>
<td>.000</td>
<td>1.551 (1.322 - 2.062)</td>
<td>.000</td>
<td>.216 (.969)</td>
</tr>
<tr>
<td>Dissatisfied SS</td>
<td>5.21 (1.416 - 6.553)</td>
<td>.000</td>
<td>1.584 (1.266 - 1.983)</td>
<td>.000</td>
<td>.230 (.998)</td>
</tr>
<tr>
<td>Often SS</td>
<td>1.57 (1.29 - 2.557)</td>
<td>.463</td>
<td>14.289 (1.395 - 146.342)</td>
<td>.025</td>
<td>.072 (.631)</td>
</tr>
<tr>
<td>Not Often SS</td>
<td>1.55 (1.440 - 7.11)</td>
<td>.000</td>
<td>1.607 (1.261 - 2.047)</td>
<td>.000</td>
<td>.207 (.101)</td>
</tr>
<tr>
<td>Enough SS</td>
<td>1.47 (2.252 - 8.92)</td>
<td>.021</td>
<td>1.801 (1.988 - 3.285)</td>
<td>.055</td>
<td>.245 (.322)</td>
</tr>
<tr>
<td>Not Enough SS</td>
<td>1.55 (1.439 - 6.98)</td>
<td>.000</td>
<td>1.581 (1.281 - 1.998)</td>
<td>.000</td>
<td>.217 (.100)</td>
</tr>
<tr>
<td>Age</td>
<td>2.51 (1.18 - 2.67)</td>
<td>.134</td>
<td>2.036 (1.390 - 3.315)</td>
<td>.064</td>
<td>.244 (.370)</td>
</tr>
<tr>
<td>Sex</td>
<td>2.01 (3.23 - 1.28)</td>
<td>.899</td>
<td>1.011 (1.328 - 1.234)</td>
<td>.915</td>
<td>.100 (.044)</td>
</tr>
<tr>
<td>Education</td>
<td>2.04 (1.07 - 1.78)</td>
<td>.000</td>
<td>.796 (1.653 - 3.71)</td>
<td>.024</td>
<td>.634 (.344)</td>
</tr>
</tbody>
</table>

Adjusted for age, sex and education.
<table>
<thead>
<tr>
<th></th>
<th>Memory Beta (SE)</th>
<th>Memory p-value</th>
<th>Executive Function Beta (SE)</th>
<th>Executive Function p-value</th>
<th>Visuospatial Beta (SE)</th>
<th>Visuospatial p-value</th>
<th>Attention Beta (SE)</th>
<th>Attention p-value</th>
<th>Language Beta (SE)</th>
<th>Language p-value</th>
<th>Timed Up and Go Beta (SE)</th>
<th>Timed Up and Go p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Status</td>
<td>-283 (0.666)</td>
<td>.000</td>
<td>-223 (0.367)</td>
<td>.000</td>
<td>-172 (0.398)</td>
<td>.000</td>
<td>-152 (0.372)</td>
<td>.000</td>
<td>-250 (0.469)</td>
<td>.000</td>
<td>264 (4.485)</td>
<td>.004</td>
</tr>
<tr>
<td>Satisfied SS</td>
<td>-301 (0.668)</td>
<td>.000</td>
<td>-243 (0.368)</td>
<td>.000</td>
<td>-190 (0.390)</td>
<td>.000</td>
<td>-168 (0.376)</td>
<td>.000</td>
<td>-264 (0.472)</td>
<td>.000</td>
<td>280 (4.694)</td>
<td>.000</td>
</tr>
<tr>
<td>Dissatisfied SS</td>
<td>-198 (0.433)</td>
<td>.165</td>
<td>-265 (0.467)</td>
<td>.029</td>
<td>012 (0.729)</td>
<td>.904</td>
<td>-009 (0.445)</td>
<td>.947</td>
<td>-212 (0.415)</td>
<td>.127</td>
<td>-200 (2.288)</td>
<td>.979</td>
</tr>
<tr>
<td>Often SS</td>
<td>-280 (0.174)</td>
<td>.000</td>
<td>-236 (0.373)</td>
<td>.000</td>
<td>-192 (0.393)</td>
<td>.000</td>
<td>-160 (0.379)</td>
<td>.000</td>
<td>-250 (0.766)</td>
<td>.000</td>
<td>262 (5.225)</td>
<td>.009</td>
</tr>
<tr>
<td>Not Often SS</td>
<td>-259 (0.172)</td>
<td>.000</td>
<td>-216 (0.398)</td>
<td>.038</td>
<td>-177 (0.252)</td>
<td>.076</td>
<td>-202 (0.396)</td>
<td>.001</td>
<td>-234 (0.190)</td>
<td>.009</td>
<td>131 (1.613)</td>
<td>.128</td>
</tr>
<tr>
<td>Enough SS</td>
<td>-202 (0.771)</td>
<td>.000</td>
<td>-223 (0.072)</td>
<td>.000</td>
<td>-186 (0.184)</td>
<td>.000</td>
<td>-150 (0.077)</td>
<td>.000</td>
<td>-232 (0.723)</td>
<td>.000</td>
<td>273 (6.476)</td>
<td>.002</td>
</tr>
<tr>
<td>Not Enough SS</td>
<td>-317 (2.15)</td>
<td>.000</td>
<td>-333 (2.223)</td>
<td>.000</td>
<td>-145 (3.330)</td>
<td>.080</td>
<td>-212 (2.222)</td>
<td>.003</td>
<td>-219 (2.641)</td>
<td>.009</td>
<td>317 (5.296)</td>
<td>.834</td>
</tr>
<tr>
<td>Age</td>
<td>-296 (0.002)</td>
<td>.000</td>
<td>-890 (0.002)</td>
<td>.000</td>
<td>-291 (0.003)</td>
<td>.000</td>
<td>-340 (0.002)</td>
<td>.000</td>
<td>-367 (0.002)</td>
<td>.000</td>
<td>303 (0.015)</td>
<td>.000</td>
</tr>
<tr>
<td>Sex</td>
<td>0.49 (1.030)</td>
<td>.010</td>
<td>0.16 (0.831)</td>
<td>.406</td>
<td>-101 (1.844)</td>
<td>.000</td>
<td>-022 (0.633)</td>
<td>.000</td>
<td>-028 (0.031)</td>
<td>.155</td>
<td>066 (2.19)</td>
<td>.003</td>
</tr>
<tr>
<td>Education</td>
<td>1.41 (0.330)</td>
<td>.000</td>
<td>1.21 (0.831)</td>
<td>.000</td>
<td>-1.56 (0.844)</td>
<td>.000</td>
<td>-0.70 (0.633)</td>
<td>.001</td>
<td>-1.38 (0.031)</td>
<td>.000</td>
<td>-0.98 (2.319)</td>
<td>.004</td>
</tr>
</tbody>
</table>
Table 4

Association between Cognitive Status and Successful Aging Domain 3 – Engagement with Life

<table>
<thead>
<tr>
<th>Cognitive Status</th>
<th>Cognitive Activity</th>
<th>Physical Activity</th>
<th>Social Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>p-value</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Satisfied SS</td>
<td>0.327 (0.213 - 0.491)</td>
<td>0.000</td>
<td>0.713 (0.544 - 0.944)</td>
</tr>
<tr>
<td>Dissatisfied SS</td>
<td>0.000 (0.000 - 0.995)</td>
<td>0.995</td>
<td>1.205 (0.323 - 4.374)</td>
</tr>
<tr>
<td>Often SS</td>
<td>0.311 (0.244 - 0.398)</td>
<td>0.000</td>
<td>0.704 (0.523 - 0.974)</td>
</tr>
<tr>
<td>Not Often SS</td>
<td>0.581 (0.241 - 1.400)</td>
<td>0.226</td>
<td>0.584 (0.492 - 0.993)</td>
</tr>
<tr>
<td>Enough SS</td>
<td>0.343 (0.222 - 0.536)</td>
<td>0.000</td>
<td>0.683 (0.512 - 0.913)</td>
</tr>
<tr>
<td>Not Enough SS</td>
<td>0.184 (0.042 - 0.797)</td>
<td>0.24</td>
<td>1.115 (0.518 - 2.397)</td>
</tr>
<tr>
<td>Age</td>
<td>0.974 (0.946 - 1.002)</td>
<td>0.068</td>
<td>0.961 (0.944 - 0.978)</td>
</tr>
<tr>
<td>Sex</td>
<td>3.194 (2.084 - 4.896)</td>
<td>0.000</td>
<td>0.619 (0.471 - 0.814)</td>
</tr>
<tr>
<td>Education</td>
<td>1.834 (1.166 - 2.884)</td>
<td>0.009</td>
<td>1.404 (1.072 - 1.840)</td>
</tr>
</tbody>
</table>

Adjusted for age, sex and education.
Clinical Dementia Rating (CDR) Scale

<table>
<thead>
<tr>
<th>Impairment</th>
<th>None</th>
<th>Questionable</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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<tbody>
<tr>
<td><strong>Memory</strong></td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>No memory loss of slight, inconsistent forgetfulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistent slight forgetfulness; partial recollection of events;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;benign&quot; forgetfulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate memory loss; more marked for recent events;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recent events with everyday activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe memory loss; only highly learned material retained;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New material rapidly lost</td>
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<td></td>
</tr>
<tr>
<td>Severe memory loss; only fragments remain</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Orientation</strong></td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Fully oriented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully oriented except for slight difficulty with time relationships</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate difficulty with time relationships;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oriented for place at examination; may have geographic disorientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elsewhere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe difficulty with time relationships; usually disoriented to time,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>often to place</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oriented to person only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Judgment &amp; Problem Solving</strong></td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Solves everyday problems &amp; handles business &amp; financial affairs well;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judgment good in relation to past performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slight impairment in solving problems, similarities, and differences</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Moderate difficulty in handling problems, similarities, and differences;</td>
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<tr>
<td>Social judgment usually maintained</td>
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<tr>
<td>Severely impaired in handling problems, similarities, and differences;</td>
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<tr>
<td>Social judgment usually impaired</td>
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<tr>
<td>Unable to make judgments or solve problems</td>
<td></td>
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<tr>
<td><strong>Community Affairs</strong></td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Independent function at usual level in job, shopping, volunteer,</td>
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<tr>
<td>and social groups</td>
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<tr>
<td>Slight impairment in these activities</td>
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<tr>
<td>Unable to function independently at these activities although may still</td>
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<tr>
<td>be engaged in some; appears normal to casual inspection</td>
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<tr>
<td>No pretense of independent function outside home</td>
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<tr>
<td>Appears well enough to be taken to functions outside a family home</td>
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<tr>
<td>Appears too ill to be taken to functions outside a family home</td>
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<tr>
<td><strong>Home and Hobbies</strong></td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Life at home, hobbies, and intellectual interests well maintained</td>
<td></td>
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<tr>
<td>Life at home, hobbies, and intellectual interests slightly impaired</td>
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<tr>
<td>Mild but definite impairment of function at home; more difficult chores</td>
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<tr>
<td>abandoned; more complicated hobbies and interests abandoned</td>
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<tr>
<td>Only simple chores preserved; very restricted interests; poorly maintained</td>
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<tr>
<td>No significant function in home</td>
<td></td>
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<tr>
<td><strong>Personal Care</strong></td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Fully capable of self-care</td>
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<tr>
<td>Needs prompting</td>
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<tr>
<td>Requires assistance in dressing, hygiene, keeping of personal effects</td>
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<tr>
<td>Requires much help with personal care; frequent incontinence</td>
<td></td>
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</tbody>
</table>

Score only as decline from previous usual level due to cognitive loss, not impairment due to other factors.
Appendix B

Letter of Permission: MYHAT Dataset (University of Pittsburgh)

October 23rd, 2017

Mary Ganguli, MD, MPH
University of Pittsburgh
3811 O’Hara Street
Pittsburgh, PA 15213

Dear Dr. Ganguli,

With your permission, I am requesting access to use a de-identified dataset from the Monongahela-Youthigneny Healthy Aging Team (MYHAT) database. Please sign below to indicate that I, Nicole Viviano, and Tiffany Hughes, Ph.D., MPH, have permission to use the de-identified dataset to conduct a secondary analysis thesis project.

I, ______Mary Ganguli_____, give Nicole Viviano and Dr. Tiffany Hughes access to a (print name) de-identified dataset from the MYHAT database until thesis completion (June 2018).

Signature

Date

Email: gangulim@upmc.edu

Phone: 412-647-6516

Thank you for your consideration,

Nicole A. Viviano, Graduate Assistant
Youngstown State University
Department of Sociology, Anthropology, and Gerontology
nviviano@student.ysu.edu
Appendix C

Institutional Review Board (IRB) Approval and Claim of Exemption Request

January 19, 2018

Dr. Tiffany Hughes, Principal Investigator
Ms. Nicole Viviano, Co-investigator
Department of Sociology, Anthropology and Gerontology
UNIVERSITY

RE: HSRC PROTOCOL NUMBER: 085-2018
TITLE: Successful Aging in Older Adults with Mild Cognitive Impairment: Effects of Social Support

Dear Dr. Hughes and Ms. Viviano:

The Institutional Review Board has reviewed the abovementioned protocol and determined that it is exempt from full committee review based on a DHHS Category 4 exemption.

Any changes in your research activity should be promptly reported to the Institutional Review Board and may not be initiated without IRB approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the IRB.

The IRB would like to extend its best wishes to you in the conduct of this study.

Sincerely,

Mr. Michael A. Hripko
Associate Vice President for Research
Authorized Institutional Official

cc:

Dr. Matt O’Mansky, Chair
Department of Sociology, Anthropology and Gerontology

Youngstown State University does not discriminate on the basis of race, color, national origin, sex, sexual orientation, gender identity and/or expression, disability, age, religion or veteran/military status in its programs or activities. Please visit www.ysu.edu/accessibility for contact information for persons designated to handle questions about this policy.
CLAIM OF EXEMPTION APPLICATION
Request for designation as Exempt for a research project involving no risk to human subjects

A. INVESTIGATOR INFORMATION

Please list all study personnel involved in the conduct of this study. All study personnel must complete required training in human subject research and provide to the IRB office documentation verifying completion of the requirement. The IRB will not review a study without such forms on file for all research personnel. Only YSU faculty, staff, students, or registered volunteers are considered YSU affiliated and thus covered by the YSU IRB review. All non-affiliated study personnel must have their participation reviewed by the appropriate IRB. (Attach a separate sheet if more space is needed.)

<table>
<thead>
<tr>
<th>STUDY TITLE</th>
<th>Successful Aging in Older Adults with Mild Cognitive Impairment: Effects of Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRINCIPAL INVESTIGATOR OR FACULTY ADVISOR</td>
<td>Dr. Tiffany Hughes</td>
</tr>
<tr>
<td>Phone Extension</td>
<td><a href="mailto:tthughes@ysu.edu">tthughes@ysu.edu</a></td>
</tr>
<tr>
<td>DEPARTMENT</td>
<td>Department of Sociology, Anthropology, and Gerontology</td>
</tr>
<tr>
<td>CO-INVESTIGATOR OR STUDENT INVESTIGATOR</td>
<td>Nicole Viviano</td>
</tr>
<tr>
<td>Phone Extension</td>
<td>412-335-5323</td>
</tr>
<tr>
<td>Email Address</td>
<td><a href="mailto:nviviano@student.ysu.edu">nviviano@student.ysu.edu</a></td>
</tr>
<tr>
<td>CO-INVESTIGATOR OR STUDENT INVESTIGATOR</td>
<td></td>
</tr>
<tr>
<td>Phone Extension</td>
<td></td>
</tr>
<tr>
<td>Email Address</td>
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</tbody>
</table>

B. SPONSOR/FUNDING INFORMATION

Will this project be supported by an external funding agency? ☐ Yes ☑ No

If yes, please identify the source and contact information

Agency: Contact Person: Phone: Email:

C. LOCATION OF RESEARCH

Where will the study take place? ☑ YSU ☐ Other Facility

If not at YSU, attach a letter of cooperation on the letterhead of the facility and provide contact information. If there are multiple facilities, attach an additional page with the information for each.

Facility Name: Contact Person: Phone: Email:
D. RATIONALE FOR EXEMPT CATEGORY CLAIMED

The information must include a brief specific description, written in lay terms, of the procedure(s) involving the human subjects in sufficient detail to demonstrate to the IRB reviewer that the research protocol meets the requirements for each category of exemption claimed in this human subjects research protocol. Complete all of the following:

Describe the background of the study and the objectives of the research project.

This study will include secondary analyses of data previously collected from the Monongahela-Youthlhogneny Health Aging Team (MYHAT) study. No data will be collected at YSU -- all data is already collected. My advisor and I wish to look at the associations between dimensions of successful aging and mild cognitive impairment (MCI) and the influence social support plays in these individuals.

Provide the rationale for the use of the selected subject population and plans for recruitment (include the number of subjects, inclusions/exclusions).

Participants are 65+ in a longitudinal study who have mild cognitive impairment (MCI). We are using older individuals because we are studying gerontological theories and we are looking at individuals who have MCI to examine their ability to successfully age. No new participants will be recruited for data collection by the student or faculty investigator.

Will your subjects be compensated? How?

No.

Describe the methods to be used for data collection and data analysis.

Our sample of participants will be drawn from the Monongahela-Youthlhogneny Healthy Aging Team (MYHAT) study where the cycle 1 cohort contained approximately 2,000 individuals with a minimum age of 65. These participants are followed annually. Recruitment criteria are that the participants are not in long-term care, they are not severely ill, vision/hearing impaired, and they can make their own legal decisions. All IRB requests from the MYHAT study were approved by the University of Pittsburgh IRB. The participants we will use will be those who were both normal and MCI (CDR = 0.5) at baseline. This is a secondary analysis and all data were previously collected by the MYHAT study. University of Pittsburgh resources and databases will allow for data sharing. Further, both linear and logistic regression will be used to examine associations between variables.

Describe the risks and benefits, if any, to the subjects.

For this secondary study, there are no risks or benefits.

What steps will be taken to protect the privacy (anonymity and/or confidentiality) of the subjects.

No identifiable information will be provided to the student or faculty advisors when databases are shared.

What plans do you have for data retention and document storage?

Password protected computers/documents will be used to protect all data.
You must notify the IRB immediately if an adverse event should occur during your project, however unlikely. What other procedures will you use to manage an adverse event if one should occur?

Contacting primary investigators (at Youngstown State University and the University of Pittsburgh).

E. SURVEYS AND QUESTIONNAIRES, IF APPLICABLE

Please attach a copy of each survey, questionnaire, or other instrument that you intend to use in this study.

Is the instrument you are using self-generated? If not, identify the source of the document.

N/A

Describe the setting and mode of administering the instrument (e.g., by phone, one-on-one, group)

N/A

F. ANALYSIS OF EXISTING DATA, IF APPLICABLE

Existing data is data that was collected before the research is proposed and must have been collected for reasons other than the proposed research project.

Describe the database or data to be analyzed.

Monogahela-Youghiogheny Health Aging Team (MYHAT) longitudinal data

If publicly available, give the name of the database and identify the holder of the data. If not, provide documentation that you have permission to access the data.

Monogahela-Youghiogheny Health Aging Team (MYHAT); Mary Ganguli, M.D., M.P.H. letter of permission to use database is separate document

How and when was the data originally collected and how large will your sampling be?

The MYHAT study contains longitudinal data, and most of the data were collected in interviews or over the phone; the sampling will include approximately 2,000 individuals 65+

Will you be recording identifiers (information items that could potentially identify human subjects)? Describe them.

No.

G. INFORMED CONSENT

Ethical and regulatory guidelines ensure that potential subjects must be fully informed about the research in a manner comprehensible to them and then be allowed to choose whether to participate in the research. Attach an Informed Consent Form of your own design, according to the YSU Guidelines for Fully Informed Consent for each subject population, or a Waiver of Informed Consent Request Form. The IRB has provided a template containing the Elements of Informed Consent/Assent (per 45 CFR 116) on the YSU IRB website: http://cms.ysu.edu/administrative-offices/research/human-subjects/institutional-review-board. Using the template is strongly suggested in order to eliminate errors and revisions.

If the subjects are children under 18 years of age, you must provide for both written Informed Consent of the parent or guardian and for Assent of the child.

N/A

Informed Consent for an anonymous survey can take the form of a statement preceding the survey that includes the Elements of Informed Consent and states that completion of the survey implies consent.
PRINCIPAL INVESTIGATOR’S ASSURANCE STATEMENT

I certify that the information provided in this claim of exemption is complete and correct.

I understand that as Principal Investigator, I have the ultimate responsibility for the protection of the rights and welfare of human subjects and the ethical conduct of this research protocol. I agree to comply with all IRB and institutional policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection of human subjects in research, including, but not limited to, the following:

- The research will not be initiated until written approval is secured from the IRB.
- The project will be performed by qualified personnel according to the research protocol.
- Maintain a copy of all questionnaires, survey instruments, interview questions, data collection instruments, signed Informed Consent Forms, and information sheets for human subjects for at least three years following termination of the project.
- Necessary review by the IRB will be sought if changes made in the research protocol may result in the research no longer meeting the criteria for exemption.

I will complete the required educational program on ethical principles and regulatory requirements in human subjects research before initiating a research project.

I have read and understand the above policy concerning IRB protocols.

[Signature of Investigator/Faculty Advisor] [Date]
[Signature of Investigator/Student Investigator] [Date]

[Signature of Approving Official] [DATE]
INVESTIGATOR PROCEDURES CHECKLIST

A. After completion of screening questions, fill out the appropriate form and submit to the Office of Research, Phelps Building (phone ext.2377). Your project will be logged, screened, and referred to a Committee Member for review. The Reviewer will contact the Principal Investigator via email with the results of the review within 5-10 days of submission and you may begin collecting data at that time. The Investigator will also receive a hard copy approval memo signed by the Authorized Institutional Official via campus mail.

B. Please review the following checklist for application completeness. IRB applications that are not complete or do not have the appropriate signatures or attachments will be returned for resubmission.

C. The following MUST be included with all applications:

- [ ] IRB Application with all of the appropriate signatures.

The following MUST be included IF APPLICABLE:

- [ ] Research Instruments (surveys, questionnaires, or other instruments) to be used
- [ ] Informed Consent/Assent Forms, if applicable
- [ ] Waiver of Informed Consent Form, if applicable
- [ ] Approval letters from other sites where research will be conducted.
- [ ] Recruitment Information