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## The effects of social support, social networks, and functional ability on life satisfaction among oldest old adults

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**The effects of social support, social networks, and functional ability  
on life satisfaction among oldest old adults**

by

**Rotem Arieli**

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of

**MASTER OF SCIENCE**

Major: Human Development and Family Studies

Program of Study Committee:  
Peter Martin, Major Professor  
Daniel Russell  
Megan Gilligan

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2020

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**ABSTRACT**

Social support is an important factor for the well-being and health of individuals across the lifespan. For older adults, social support has been linked with life satisfaction and functional health. However, there is little information on how social support and social networks can predict the functional health and life satisfaction for oldest old adults. The present study utilized a recent framework by Pietromonaco and Collins (2017), which identified interconnected processes from social connection to outcomes of health and well-being, mediated by psychosocial, biological, and lifestyle pathways. This theoretical framework was comprehensive in its lens of interpersonal processes through intrapersonal mediators to long-term outcomes of health and well-being. As such, the present study incorporated components from each section of the model, specifically adjusted to pathways of importance for oldest old adults. This study aimed to examine the social connection influences of social support and social network size as they predict the psychological well-being variable of life satisfaction for oldest old adults, through the mediating component of functional health. The contextual variables of age, gender, and residence type were included in the path model to measure how they individually predict the social support and social network of oldest old adults, which could in-turn influence functional health and life satisfaction.

This study included 208 cognitively-intact oldest old adults from the Georgia Centenarian Study (GCS). Additionally, the subgroup of centenarians and near-centenarians (age 98+) in the sample were examined as they represent unique, exceptionally long-lived individuals ( $n = 137$ ). Measures examined perceived social support (Cutrona Russell, & Rose, 1986), size of social network (Fillenbaum, 1988), activities of daily living (ADL) as functional health (Fillenbaum, 1988), and life satisfaction (Neugarten, Havighurst, & Tobin, 1961). Structural equation

modeling in *Mplus* examined the path models from the contextual variables (age, gender, residence type) to social network and social support, to functional health, and finally life satisfaction. Additionally, mediation was examined with 1000 bootstrap samples in *Mplus*.

Results demonstrated that the hypothesized model resulted in a marginal fit. Based on plausible modification indices, three paths were added, including age and residence type to functional health, as well as from social support directly to life satisfaction, resulting in an acceptable model fit. Centenarians reported smaller social networks, lower social support, and lower functional health compared to the octogenarians in the sample, and individuals who lived in care facilities reported less social support and lower functional health (ADL) scores. Overall, three significant mediation paths were examined with social support for the total sample of oldest old adults. Social support significantly mediated the relationships between age and ADL, age and life satisfaction, and between social network size and life satisfaction. Thus, social support seems to be the mechanism through which age and social network size influence ADL and life satisfaction, respectively. Interestingly, there was no significant association between ADL and life satisfaction in this study, which could indicate that oldest old adults could report high life satisfaction in late life regardless of their level of functional health. For the centenarian subgroup, findings indicate that the more people in one's social network, the greater their level of perceived social support. Overall, social support positively predicted life satisfaction for both the total group and for centenarians, confirming the hypothesis regarding the influence of social support for greater life satisfaction among oldest old adults. Future studies should continue to explore other factors from psychosocial, biological, and lifestyle pathways that influence the health and well-being of exceptionally long-lived adults.

## CHAPTER 1. INTRODUCTION

Though centenarians are considered a rare age group, they are the fastest growing demographic group, projected to more than quintuple between 2005 and 2030 (National Institute of Aging, 2007; Willcox, Willcox, & Poon, 2010). With the aging population increasing steadily, opportunities and challenges for economic well-being, social support, and health care are increasing (Czaja, Boot, Charness, Rogers, & Sharit, 2018). Past research has noted the importance of both inter- and intra-individual differences in several areas in gerontology applying a series of explanatory theoretical models (Baltes & Baltes, 1990; Ferring et al., 2004; Rowe & Kahn, 1997). Also established was the importance of certain well-being components of centenarians, including cognition, activities of daily living (ADL), mental health, and social support (Jopp, Park, Lehrfeld, & Paggi, 2016; Margrett, Hsieh, Heinz, & Martin, 2011; Willcox et al., 2010; Willcox, Willcox, Hsueh, & Suzuki, 2006). Pietromonaco and Collins (2017) introduced a theoretical framework aimed at linking social support with health and well-being outcomes, aligning with current research on the importance of social support. Social support has been identified as an influential factor for the health and well-being of older adults (Cutrona & Russell, 1987; Cutrona, Russell, & Rose, 1986; Czaja et al., 2018; Gerino, Rollè, Sechi, & Brustia, 2017; Jopp, Boerner, Ribeiro, & Rott, 2016; Martin, Long, & Poon, 2002; Randall et al., 2011; Willcox et al., 2010). Due to the natural losses of mobility and increases in health problems, variability in economic status and place of residence, as well as the loss of partners and friends due to death, social isolation is a critical issue for many older adults (Czaja et al., 2018). Social connectedness and positive feelings toward one's life may be especially crucial for the quality of life of individuals in very old age, especially as health-related quality of life declines (Ailshire & Crimmins, 2011).

To date, limited research has been conducted on centenarians' life satisfaction as predicted by social support and social network. What is known is the important role of social support for centenarians (Hensley et al., 2012; Jopp et al., 2016; Long & Martin, 2000). Additionally, research established the impact of social relationships on determinants of life satisfaction in older adults (Chen, Yang, & Feng, 2019; Cutrona et al., 1986; Liang, Dvorkin, Kahana, & Mazian, 1980; Young, 2006). The importance of life satisfaction in older adults has been established as a key association with longevity (Buono, Urciuoli, & De Leo, 1998; Celso, Ebener, & Burkhead, 2003; Xu & Roberts, 2010).

Furthermore, social support may differ from social network as it relates to older adults' well-being outcomes (Burholt et al., 2007; House & Kahn, 1985). Established research has identified the importance of social support on well-being outcomes for older adults. There is a gap in how social support adds to social resources (or networks) in identifying well-being outcomes for older adults. Burholt et al. (2007) explained that social resources apply to the "structure" within the network of social relationships, whereas social support plays the role of "function" or type of support provided (e.g., emotional, informational, or practical). Rather than seeing them as "quantity" versus "quality" of support (Burholt et al., 2007; Cooper, Arber, Fee, & Ginn, 1999; Randall, Martin, MacDonald, & Poon, 2010), viewing how the two work together to influence well-being can be beneficial for older adults.

Pietromonaco and Collins' (2017) model may help answer questions about social network size influencing social support and activities of daily living (ADL), which in-turn may impact life satisfaction. To the best of my knowledge, their recent framework has not been tested with an older adult population. This framework links social relationships to health and well-being outcomes, through mediators of psychosocial, biological, and lifestyle factors

(Pietromonaco & Collins, 2017). The identified pathway of social influences includes social network, social support, ADL, and life satisfaction.

Although the model encompasses important factors to explain health and well-being outcomes, this study narrowed the scope to the main identified pathway (i.e., social network and social support predicting life satisfaction, through ADL). I sought to evaluate the social connection process in such a way that acknowledged the individuality of social support versus social network, and how the two associations applied to oldest old adults. Additionally, the hypothesized model in this study included demographic and contextual differences and similarities among the centenarians in the sample.

The contextual characteristics in the current study include gender, age, and living environment. Past research has shown the importance of living environment among centenarian populations (Randall et al., 2011) and gender differences in the longevity of older adults (Austad, 2006; Ferring et al., 2004). For life satisfaction, several studies have demonstrated that older women reported significantly lower life satisfaction than men (Ferring et al., 2004; Giusta, Jewell, & Kambhampati, 2011; Pinguart & Sörensen, 2001), even among centenarian populations (Struckmeyer, Bishop, & Finchum, 2018). French, Gekoski, and Knox (1995) found substantial gender differences in the patterns of social relationships within their sample of community-residing older adults. Ferring et al. (2004) identified that lifestyle and health behaviors of women and men become more pronounced in older age.

Based on Pietromonaco and Collins' (2017) theoretical framework linking social processes to well-being outcomes, this study focused on social support, social network, ADL, and life satisfaction. The purpose of this study was to further the knowledge about the relationship from social support, social network, and functional ability to life satisfaction in older

adults, specifically identifying the unique sub-group of centenarians within the sample. Also, an additional purpose of this study was to confirm past research hypotheses and to introduce testable pathways of intrapersonal factors through interpersonal relations to outcomes of health and well-being (Pietromonaco & Collins, 2017).

The specific aims of the present study were to:

1. Examine the effects of age, gender, and living environment on the relationships between social support, social network, ADL, and life satisfaction for oldest old adults.
2. Examine the effects of social network, social support, and ADL on life satisfaction for oldest old adults.
3. Test for any mediating effects of ADL between social support, social network, and life satisfaction for oldest old adults.
4. Test for the buffering (i.e., moderation) effects of social support as it influences social network and ADL in predicting life satisfaction.

This study provides information on the impact of social support for oldest-old adults' psychological well-being. Pietromonaco and Collins' (2017) theoretical framework on social connection predicting health and well-being outcomes was used as the basis for the tested model. This study intends to show the influence of social support as it predicts life satisfaction in oldest old adults, as well as in the unique subgroup of centenarians. Chapter 2 will include the theoretical application of Pietromonaco and Collins' (2017) theoretical framework and what each component of the process represents. Next, the hypothesized model for this study will be introduced, including each factor that will be included in the analysis and how it will be applied to the centenarian population. Further, I will provide a brief rationale of how each component has been used and why it is so important to look at these factors in terms of social support for

oldest old adults, including centenarians. Furthermore, Chapter 3 will include the approach and methodology: details of the participants, measures included in the predicted model, operationalization of each measure, and data analysis steps. Following that, Chapter 4 addresses the results of the current study, including the comparison between the total older adult sample and the centenarian subgroup. Chapter 5 is the discussion section of the current study. This encompasses the overall findings in the present study, comparisons with past literature, study limitations, and future directions and conclusions.

## **CHAPTER 2. LITERATURE REVIEW**

The current research consisted of testing a theoretical framework of linking social relationships to health and well-being outcomes on octogenarians and centenarians from the Georgia Centenarian Study. To my current knowledge, there is no study that has researched social network, social support, and activities of daily living (ADL) predicting life satisfaction among oldest old adults using Pietromonaco and Collins' (2017) theoretical framework. This study tests a pathway from social network, social support, and ADL, predicting life satisfaction in an oldest old adult population (80 years and older). Furthermore, this pathway was also tested with a centenarian and near-centenarian subgroup (98 years and older) to identify unique characteristics of exceptionally long-lived individuals. By testing this model, the goal was to shed light on social connection constructs (i.e., perceived social support and social network size) as they predict life satisfaction for those in very late life. Navigating the functional, psychological, and social hurdles affecting oldest old adults' lives is crucial for working toward a better understanding of life satisfaction (Jopp et al., 2016). This study is important, as the findings may give a clearer picture of the roles that social support, social network, and ADL have on life satisfaction among oldest old adults. This could lead to possible interventions to improve the lives of the fastest growing population.

### **Theoretical Application**

#### **Current Study Framework**

In Figure 1, Pietromonaco and Collins' (2017) theoretical framework shows the pathways from interpersonal processes through intrapersonal mediators to long-term health and well-being outcomes. This framework introduced the opportunity for a comprehensive evaluation of well-being and health outcomes (Pietromonaco & Collins, 2017). The framework has not been established specifically for the older adult population. Therefore, the model will be adjusted to be

a better fit for the oldest old population. Research on older adults has included a comprehensive lens, including environmental, psychosocial, and biological components (Martin, 2002; Perls & Terry, 2003). This framework establishes the interconnected processes of social connection and disconnection to well-being and health outcomes, including mediators of psychosocial, biological, and lifestyle pathways. The present study incorporates components from the theorized framework model of interpersonal processes.

Pietromonaco and Collins' (2017) theoretical framework contains four main sections: interpersonal processes, intrapersonal mediators, individual differences, and long-term outcomes (Figure 1).

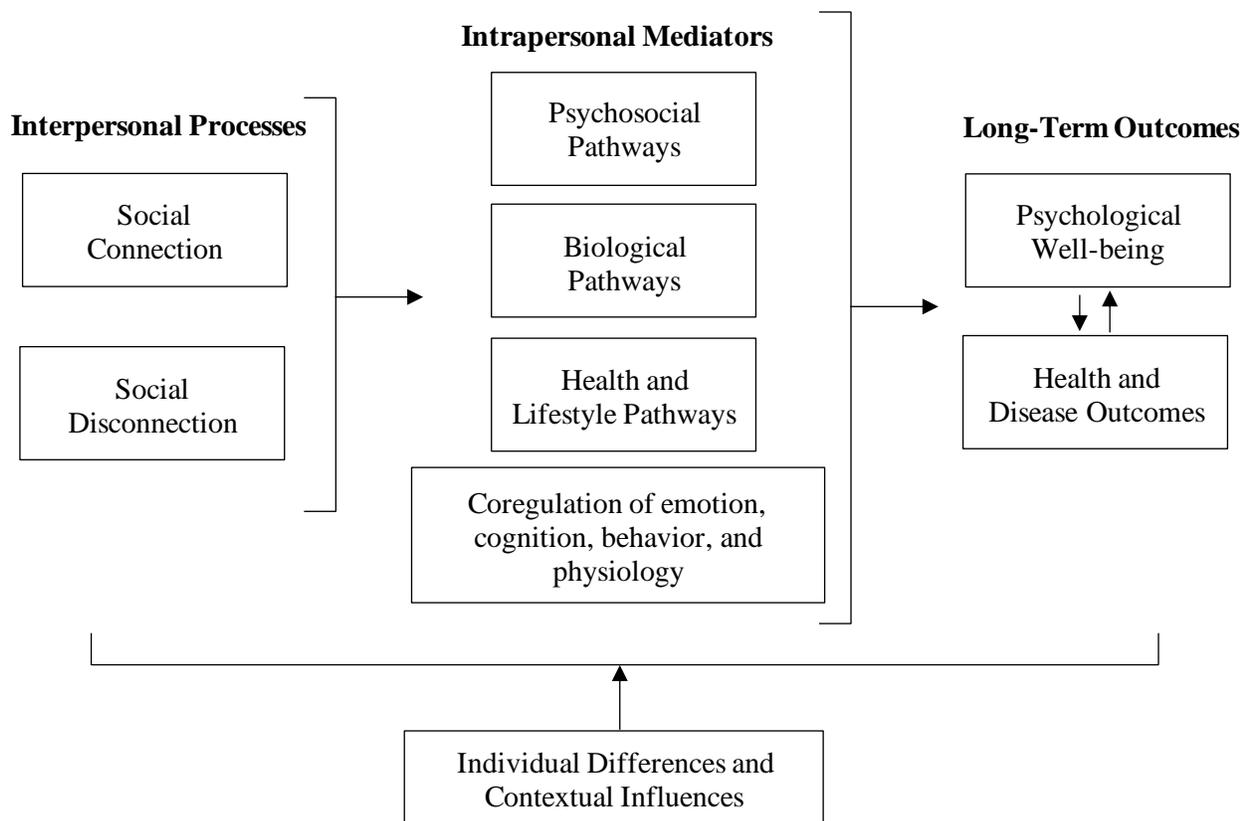


Figure 1. Theoretical framework after Pietromonaco & Collins' (2017) model.

The framework presents the interpersonal processes of social connection and social disconnection to begin the path model. Intrapersonal mediators include psychosocial, behavioral, and lifestyle pathways, as well as the “coregulation of emotion, cognition, behavior, and physiology” (Pietromonaco & Collins, 2017, p. 532). Furthermore, long-term outcomes as identified in the model are divided into two groups: psychological well-being and health and disease outcomes. This framework identifies the important role that social connections can have on the outcomes of older adults and their well-being.

For each process in the theoretical framework, there are examples given by Pietromonaco and Collins (2017) regarding every factor and their associated example variables. The authors posit that these are only sample variables of each process and are not comprehensive of the entirety of plausible variables (Pietromonaco & Collins, 2017). For example, the interpersonal processes section has sub-headings within social connection and disconnection. Each sub-heading provides examples for the category. For social connection, “secure base support,” “safe haven support,” “capitalization,” and “intimacy, affection, [and] love” are the established examples (Pietromonaco & Collins, 2017).

The theoretical framework for intrapersonal mediators, or the central section of the model, includes four identified aspects: (1) psychosocial pathways, (2) biological pathways, (3) health and lifestyle pathways, and (4) the coregulation of emotion, cognition, behavior, and physiology. Some examples that fall under psychosocial pathways include emotion-regulation, cognition, perceived resources, coping, and relationship satisfaction (Pietromonaco & Collins, 2017). The biological pathways in the model comprise of identified biomarker options including endocrine, immune, cardiovascular, and neural activation (Pietromonaco & Collins, 2017). Furthermore, the health and lifestyle pathway examples include eating/appetite, exercise/activity,

restorative activities such as sleep, and substance use. Among the long-term outcomes section, Pietromonaco and Collins (2017) include psychological well-being and health and disease outcomes. Psychological well-being examples from the model are mental health, hedonic well-being, and eudaimonic well-being. Eudaimonic well-being has been identified in research to focus on meaning and self-realization, whereas hedonic well-being focuses on happiness and pleasure attainment (Huta & Ryan, 2010). Health and disease outcomes in the model include health status, health recovery, and longevity as long-term outcome examples. Coregulation of emotion, cognition, behavior, and physiology seems to account for any intrapersonal factors that may have been overlooked within the model.

### Hypothesized Model

To investigate my specific research question as to the role that social support plays in life satisfaction for centenarians, a hypothesized model was developed to guide this research (Figure 2).

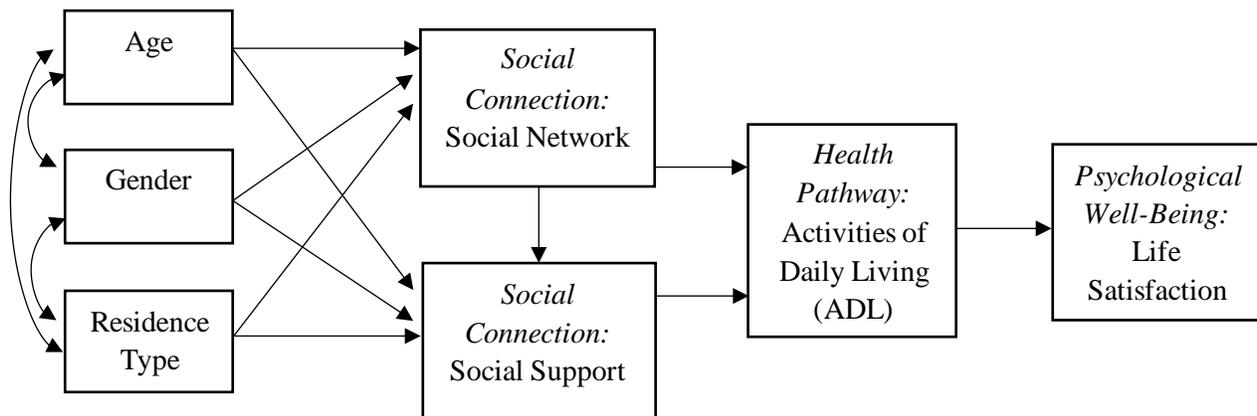


Figure 2. Hypothesized model.

Due to the comprehensiveness of the original theoretical framework, testing the full model was not a possibility for this study. One gap that this research is filling is testing specific components of this new theoretical framework. Another gap this research is modifying is the

original theoretical framework to better fit oldest old adults, specifically the unique subgroup of centenarians. This study also aims to add greater information on social support and social network predicting functional health and well-being of oldest old adults. The importance of filling these gaps includes greater knowledge about positive well-being and health, as well as possible intervention strategies for oldest old adults. Expanding upon the well-being and social health of older adults is crucial for better understanding and improving current well-being trajectories. For this research, a hypothesized model was developed to reflect the specific research questions relevant to oldest old adults, as well as specifically centenarians. The hypothesized model includes social support and social network predicting ADL and life satisfaction.

**Contextual variables.** As exogenous variables, age, gender, and residence type were hypothesized to contribute to the model by predicting life satisfaction through social network, social support, and ADL. In the original framework by Pietromonaco and Collins (2017), contextual variables were not included within the main path analysis. However, these variables *were* included in the current study. Pietromonaco and Collins' (2017) framework did not focus on older populations like the current study does. Therefore, residence type, gender, and age were included as a part of the hypothesized model.

Living arrangements of older adults have been identified as significantly related to health and mortality (Feng, Jones, & Wang, 2015). The place where one lives, especially in later years, may provide opportunities for social integration and engagement with others (Bromell, & Cagney, 2014). Connidis and Davies (1992) posited that spouses and friends act as the primary companionships for older adults, and Bromell and Cagney (2014) identified the importance of receiving that companionship tied to the specific living arrangement in an older adult's life.

Feng, Falkingham, Liu, and Vlachantoni (2017) underlined the importance of receiving social support in varying living environments for older adults. Ashida and Heaney (2008) noted that older adults who have social network members living near them perceived social connectedness more positively. Varying types of living environment have previously been associated with levels of life satisfaction (Kim, 2014; Uma devi, Kavitha Kiran, & Swachita, 2015). One study noted that older adults living inside a care facility reported significantly lower levels of life satisfaction than those not in a care facility (Uma devi et al., 2015). Kim (2014) acknowledged the importance that living arrangements can have on health and psychological well-being in older age. Additionally, Afonso et al. (2018) stated that type of living environment (especially rurality) could have a major effect for centenarians, especially with regard to social and health services. Past studies have identified that individuals living in private homes had better functional health compared to those living in care facilities (Ewen, Washington, Emerson, Carswell, & Smith; 2017; Paganini-Hill, 2013; Sarwari, Fredman, Langenberg, & Magaziner, 1998). Older adults with decreasing functional health may need more care assistance, requiring a move to a residential care facility (Berlau, Corrada, & Kawas, 2009). It is important to note that the association between residence type and ADL may well be bidirectional. Randall et al. (2011) examined the differences in types of living arrangement with centenarians. Thus, the current study included residence type as a major component of the model focused on social connection and life satisfaction for older adults.

The relationship between gender and life satisfaction has yielded mixed results in several studies (Batz-Barbarich, Tay, Kuykendall, & Chung, 2018; Joshanloo & Jovanovic, 2019). Some studies reported women having higher levels of life satisfaction than men (Stone, Schwartz, Broderick, & Deaton, 2010; Tay, Ng, Kuykendall, & Diener, 2014), some found that men

reported more satisfaction in life than women (Ferring et al., 2004; Giusta et al., 2011; Helliwell & Putnam, 2004; Pinquart & Sörensen, 2001; Priyanka & Mishra, 2010), and some reported no significant relationship (Glaesmer, Grande, Braehler, & Roth, 2011). Struckmeyer et al. (2018) reported that women reported lower life satisfaction than men in a centenarian sample. French et al. (1995) reported gender differences in patterns of social relationships among their sample of community-residing older adults. Oshio (2012) reported that in their sample of older Japanese adults, significant gender differences were found in the associations of life satisfaction with social relations. The study reported that a larger number of friends and social activities predicted higher life satisfaction for women, but not for men (Oshio, 2012). Poulain and Herm (2015) identified significant gender differences in their sample of 3,000 centenarians in Belgium. They found that living with a spouse was beneficial for men, but not for women and concluded that it was more advantageous for centenarian women to live alone than to live with a spouse (Poulain & Herm, 2015). Thus, the current study investigated gender associated with social connectedness and life satisfaction among older adults.

Age is the third contextual variable in the hypothesized model. Within the current study of older adults, especially centenarians, age is an integral variable to include as a part of the hypothesized model. The important role that age plays has been identified in several studies. Ferring et al. (2004) identified that lifestyle and health behaviors of both women and men become more pronounced in older age. Galiana, Gutiérrez, Sancho, Francisco, and Tomás (2016) reemphasized the importance of aging as a global issue, as the number of older adults is growing faster than any other age group. Jopp, Park, Lehrfeld, and Paggi (2016) noted that social relations are especially important in advanced age years due to the natural increase of age-related health conditions. However, the association between growing older and receiving social support tends

to be negatively related (Dai et al., 2016; Matt & Dean, 1993), suggesting that as individuals get older, their levels of social support reduces. Galiana et al. (2016) reported that people eighty years and older reported worse perceived health, life satisfaction, social relations, and emotional support, compared to a younger older adult group. A study by Weiner, Monin, Mota, and Pietrzak (2016) reported that community involvement may be more important for older rather than younger veterans in their study of male veterans. They suggested that the greater participation could increase the older adults' access to social support and further act as a protective factor from mental distress (Weiner et al., 2016). It is unclear whether this finding could apply to the current study's population of centenarians and octogenarians in Georgia. What is clear is that within older adult research, centenarians are an exceptional group of people (Willcox et al., 2010).

**Social support.** One predictor variable in this model is social support. Social support has been highly associated with positive health outcomes, well-being, and longevity for older adults, as well as throughout the life span (Antonucci & Akiyama, 1987; Cutrona & Russell, 1990; Cutrona et al., 1986; Czaja et al., 2018; Feeney & Collins, 2015; Hornstein & Eisenberger, 2017; Sarason, Levine, Basham, & Sarason, 1983; Sarason, Shearin, Pierce, & Sarason, 1987; Seeman, Lusignolo, Albert, & Berkman, 2001). White, Philogene, Fine, and Sinha (2009) posited that several million community-dwelling older adults were lacking adequate emotional support in the United States. Maintaining social relationships and staying socially connected are critically important for older adults' health, well-being, and overall quality of life (Antonucci, Ajrouch, & Birditt, 2014; Czaja et al., 2018). Social support has been identified as a crucial buffer for individuals in regard to dealing with life stresses, as well as both psychological and physiological threat responses (Cohen, 2004; Cutrona et al., 1986; Hornstein & Eisenberger, 2017; Mackin,

Perlman, Davila, Kotov, & Klein, 2017). Having adequate social support is defined as an important component of successful aging (Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010). Although some social interactions may not include an exchange of support from both individuals, Ashida and Heaney (2008) suggested that *receiving* social support may facilitate a sense of social connectedness. Social support is often used in this buffering role to moderate a relationship between predictor and outcome (Cohen & Wills, 1985; Nezlek & Allen, 2006) and may be a protective factor against cognitive decline in later years (Czaja et al., 2018; Seeman et al., 2001).

In comparison, the lack of social support and increase in social isolation is highly associated with poor mental and physical health, lower quality of life, lower life satisfaction, and increased cognitive decline (Aylaz, Aktürk, Erci, Öztürk, & Aslan, 2012; Burholt, Windle, Morgan, & CFAS Wales team, 2016; Czaja et al., 2018; Fratiglioni, Wang, Ericsson, Maytan, & Winblad, 2002). Perceived social isolation, sometimes referred to as loneliness, is linked to poor cognitive functioning and low mental and physical health outcomes (Cacioppo & Cacioppo, 2014; Czaja et al., 2018). Walsh and Callan (2010) found that people feared loneliness and isolation more than they did physical and cognitive decline. Further, net of demographic characteristics and health issues, social isolation is significantly associated with mortality (Czaja et al., 2018; Holt-Lunstad, Smith, & Layton, 2013; Steptoe, Shankar, Demakakos, & Wardle, 2013). The evidence linking loneliness and social isolation to negative health outcomes and poor quality of life identify the importance of developing interventions or protective factors in older adults (Cohen, 2004; Czaja et al., 2018).

Boerner, Jopp, Park, and Rott (2016) found that adult children were often the most influential sources of support for centenarians. Additionally, help with socializing and

companionship was reported by one-third of centenarians, regardless of residence type, presence of family, or living arrangements (Boerner et al., 2016). Because of the vast research on the importance of social support, it is included in these analyses as a main predictor.

**Social network.** In addition to social support, there is an important variable within social resources that accounts for the social network of the individual (Hughes, Andel, Small, Borenstein, & Mortimer, 2008). This may include the interactions that individuals have in the place where they are living, working, etc. (Burholt et al., 2007; Hughes et al., 2008). In the current study, social network was defined by the number of people known well enough to visit with in their home (Fillenbaum, 1988).

Research has shown that individuals with larger social networks, more access to social support resources, and higher quality social relationships have overall better mental and physical health, as well as decreased susceptibility to illnesses from the common cold to disease and death (Cherry et al., 2013; Cohen, Doyle, Turner, Alper, & Skoner, 2003; House, Landis, & Umberson, 1988; Hornstein & Eisenberger, 2017). Additionally, the link between cognition in older age and social networks has been identified in the literature (Avlund et al., 2004; Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004; Hughes et al., 2008; Keller-Cohen, Fiori, Toler, & Bybee, 2006). In a study of older adults over the age of 85, Keller-Cohen et al. (2006) reported better cognitive functioning outcomes for individuals who engaged in interactions with a variety of social partners.

Furthermore, Ashida and Heaney (2008) found that individuals with denser social network systems, including more network members living closer, reported better perceived support. Social resources have been associated with greater longevity and reduced risk of disability, dementia, and mortality (Barnes et al., 2004; Glass, Mendes de Leon, Marottoli, &

Berkman, 1999). Greater social networks of family and friends has been previously associated with higher life satisfaction among older adults (Tomini, Tomini, & Groot, 2016). Due to the uniqueness of the centenarian sample, the number of social networks for centenarians may be smaller than in older adults 65 years and older.

For centenarians, Boerner, Kim, Kim, Rott, and Jopp (2018) reiterated the importance of communication between individuals and their close social network members. In a past study with the Georgia Centenarian Study data, Randall et al. (2010) found that centenarians were more likely to report significantly lower levels of social resources than octogenarians in their sample. The item for social network used in the current study is encompassed within the larger social resources scale used by Randall et al. (2010). However, the 2010 study included both proxy and self-reports on centenarians and octogenarians without accounting for ADL or viewing the outcome of life satisfaction. Building on this past study, the variables of social support and social network are hypothesized to affect ADL, which in-turn affect life satisfaction with positive directionality, this time with only self-reports from cognitively-intact centenarians and octogenarians.

**Functional ability.** Within the hypothesized model, the health and lifestyle pathway variable utilized was activities of daily living, or ADL. According to the Centers for Medicare and Medicaid Services (CMS; 2008), ADL accounts for all activities related to personal care. This includes “bathing or showering, dressing, getting in and out of bed or a chair, walking, [toileting], and eating...[if a] person has difficulty performing an activity by himself/herself and without special equipment, or does not perform the activity at all because of health problems, the person is deemed to have a limitation in that activity” (Centers for Medicare and Medicaid Services, 2008, p. 199). ADL is known to be significantly associated with cognitive impairment

(Lee, Jang, & Chang, 2019; Mitchell et al., 2011). Centenarians are especially vulnerable to the negative consequences associated with lower levels of functional ability and are particularly at risk of functional dependency (Poon et al., 2007). Social support relates to activities of daily living, as ADL and social support are generally positively associated (Boerner et al., 2016). The relationship between social support and ADL is not directionally bound, as better ADL may lead to better opportunities for social support or vice versa (Bozo & Guarnaccia, 2010). Additionally, challenges with ADLs were negatively associated with life satisfaction (Enkvist, Ekstrom, & Elmstahl, 2012; Jopp et al., 2016). Enkvist et al. (2012) reported that investing in the ADL capacity in young-old adults has the potential to preserve or improve the life satisfaction in the oldest old. In the current study, social support was predicted to positively relate to ADL, and ADL then was predicted to positively relate to life satisfaction in a directional path model, based on Pietromonaco and Collins' (2017) framework.

**Life satisfaction.** For my hypothesized model, life satisfaction was applied as the outcome variable. Life satisfaction acts as the psychological construct reflecting subjective well-being and is an important outcome for individuals at any age (Prado, Rojas-Barahona, & Marín, 2009). For older adults, past research has noted the impact of social relationships on determinants of life satisfaction (Chen et al., 2019; Cutrona et al., 1986; Hutnik, Smith, & Koch, 2012; Ng, Tey, & Asadullah, 2017). Ng et al. (2017) identified that greater availability to social community services related to increased life satisfaction among oldest old adults (80+). Hutnik et al. (2012) found social support and happiness with life to be associated among centenarians. Previous studies linked life satisfaction with cognitive function, social interaction, social relationships, health status, ADL, and several other markers of aging (Kimm, Sull, Gombojav, Yi, & Ohrr, 2012).

Within life satisfaction, there is a “paradox of well-being” for older adults (Mroczek & Kolarz, 1998; Robnett, 2002; Swift et al., 2014). As people age, their subjective measures of well-being, such as life satisfaction, positive affect, and lack of negative affect, seem to remain steady even through age-related declines in health and increase in difficulties (Gana, Bailly, Saada, Joulain, & Alaphilippe, 2013; Mroczek & Kolarz, 1998; Robnett, 2002; Swift et al., 2014). This phenomenon of maintaining high quality of life and satisfaction with life is important to understand when assessing outcomes for older adults (Gana et al., 2013; Swift et al., 2014). Gaymu and Springer (2010) determined that older age positively predicted a linear increase in life satisfaction among their sample of European older adults. In contrast, Stone et al. (2010) found that life satisfaction graphically presents a non-linear “U”-shape profile in their large representative United States sample. However, when including only adults over the age of 50, Stone et al. (2010) found that their study confirms the positive linear association of age and well-being that Gaymu and Springer (2010) found for older adults. Gana et al. (2013) confirmed this finding with an eight-year longitudinal study resulting in a linear increase in life satisfaction for older adults. The current study tested for life satisfaction as the main outcome of this study.

**Contributing theories.** Although this study’s theoretical framework is exceptionally comprehensive and a promising directional path model, there are other theories that also influenced components of the current study. Such theories addressed integral components of aging covered in the current study, including the significant role that social support plays for older adults. Theories that contributed in some way to this study include the theory of successful aging, socioemotional selectivity theory, and activity theory.

Rowe and Kahn (1997; 1987) defined successful aging with three important components: continued engaging in an active life, maintenance on high mental and physical functioning, and

minimizing risk of disease and disease-related disability. The current study includes individuals who made it past the average life span and therefore should be considered “successful agers” (Cho, Martin, & Poon, 2012). The argument for direct social factors included in the theory has been emphasized several times throughout editorials and articles (Riley, 1998; Rowe & Kahn, 2015). Cho et al. (2012) tested the successful aging theory with Rowe and Kahn’s three factors (i.e., continued life engagement, maintaining high mental and physical functioning, and low probability of disease or disease-related risks) and found that it was a poor fit with the oldest old population. None of the centenarians qualified for all three of the successful aging categories, yet they all survived to 100 years of age. Cho et al. (2012) reported that by adjusting the qualifications for “successful aging” more toward realistic variables for centenarians, 73% of the centenarians reported high subjective health, 62% reported high perceived economic status, and 90% reported high levels of happiness. Almost half of their sample reported that they satisfied all three factors, as opposed to 0% of centenarians from the original model (Cho et al., 2012), with other studies finding similar results (Ogawa, Gondo, & Masui, 2008; Strawbridge, Wallhagen, & Cohen, 2002). These findings present the uniqueness of the centenarian population and that perhaps the 1987 version of Rowe and Kahn’s successful aging theory may need to be updated for oldest old adults.

This successful aging theory fits well within the current study, especially in regard to the older adults that make up the study participants. Because Cho et al. (2012) clarified that the Rowe and Kahn (1997) model may not be appropriate for centenarians, it is important to continue exploring what the more appropriate components of “successful aging” may be for centenarians.

Another theory that helped influence the current study is socioemotional selectivity theory (SST; Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999), which relates to social support, social networks, and end of life changes. SST posits that people get increasingly selective with their social and emotional energy when they see a limited time left in life (Carstensen, 1993; 2006), yet the relationships they do keep are satisfying, supportive, and fulfilling (Carstensen, 1993). In the current study, SST is relevant as the sample includes centenarians or near-centenarians (98 and older), who are close to the end of life. Additionally, SST has been applied in relation to social networks and relationships of older adults (Heinz, Cone, da Rosa, Bishop, & Finchum, 2017; Lang, 2001; Lansford, Sherman, & Antonucci, 1998), which is in line with the current study. For SST, it is important to consider how close older adults feel they are to the end of life and how that may affect their number of close social network members, influencing their score for the social network variable. Within the current study, the centenarians and octogenarians reported both their social network size and their perceived levels of social support. Incorporating SST, this study examines the important influence and support that social network members may provide for older adults. The number of closely supporting individuals for oldest old adults may or may not be important, as outlined by the SST.

The third theory that influenced the current study is activity theory (Havighurst, 1961). Activity theory established the link between an individual's life satisfaction directly and positively related to the degree of social interaction and activity they participate in (Knapp, 1977; Menec, 2003). Neugarten et al. (1961), who established the Life Satisfaction Index, asserted the relationship between life satisfaction and participation in activities in older age. Menec (2003) found that the greater the frequency of activity, the greater the life satisfaction, and that higher overall activity level was directly related to greater levels of happiness, higher functioning, and

reduced risk of mortality. The current study addresses activity theory as it relates to life satisfaction and continued engagement through one's social network. By incorporating activity theory into the current study, social interactions can be linked with higher levels of functional health, which is also aligned with Pietromonaco and Collins' (2017) organizing framework. By examining the organizing framework, in collaboration with these three established theories, this study is able to view the well-being and social health of oldest old adults through a unique theoretical lens.

### **Research Questions**

The following research questions and hypotheses are based on the available literature:

1. Do contextual variables (i.e., age, gender, residence type) predict social network and social support?
  - a. I hypothesize that oldest-old adults have smaller social networks and less social support than their younger counterparts.
  - b. I hypothesize that women will report greater social networks and social support than men.
  - c. I hypothesize that those living in care facilities will have fewer social networks and less social support than those living at home.
2. Are direct effects following the hypothesized model (Figure 2) significant in predicting the main outcome of life satisfaction?
  - a. I hypothesize that larger social networks will predict higher levels of perceived social support.
  - b. I hypothesize that larger social networks will positively predict greater functional health (ADL).

- c. I hypothesize that more perceived social support will positively predict greater functional health (ADL).
  - d. I hypothesize that better functional health (ADL) will positively predict higher life satisfaction.
3. Does functional health (ADL) mediate the relationships between social support and social network with life satisfaction?
- a. I hypothesize social support will positively predict ADL, which in turn positively relates to life satisfaction.
  - b. I hypothesize social network will positively predict ADL, which in turn positively relates to life satisfaction.
4. Does social network moderate the association between social support and life satisfaction, and does social support buffer the effect of ADL impairment and life satisfaction?
- a. I hypothesize that the interaction of social support with social network will significantly predict life satisfaction, indicating the effect of social support on life satisfaction only occurs when centenarians and octogenarians have a sufficiently large social network.
  - b. I hypothesize that the interaction of social support with ADL impairment will significantly predict life satisfaction, confirming the buffering hypothesis.

## CHAPTER 3. METHODOLOGY

### Participants

The study participants were from a population-based sample of Georgia (GCS; Poon et al., 2007). IRB was obtained for the study (Appendix 1). Phase 3 of the Georgia Centenarian Study (2001-2009) includes 375 participants, including centenarians, near-centenarians (98 and 99-year-old participants), and octogenarians. In the current study, only participants who scored a 17 or above on the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) were included in the sample, representing individuals with mild to moderate cognitive impairment or better. Furthermore, there were two participant groups: the total older adult group (everyone 80+), and the centenarian subgroup (combining centenarians and near-centenarians, 98+). This resulted in a total sample of 208 participants and a final centenarian group of 137 participants.

Table 1 presents the demographics of the participants. For the total sample, there were 153 female participants and 55 male participants. The sample consisted of primarily Caucasian older adults ( $n = 173$ ). The mean age of this sample was 94.40, with a range from 80 years to 108 years. The mean total years of schooling was 12.49 years, with ranges from 0 to 22 years. The majority of participants in the sample lived in private homes or apartments ( $n = 146$ ). In contrast, 29 participants lived in assisted living facilities and 33 lived in a skilled nursing facility. Participants in the skilled nursing and assisted living facilities were analyzed together as one group ( $n = 62$ ), resulting in a closer comparison to the private home/apartment group. Of the total sample, 71.6% were widowed ( $n = 149$ ), 4.8% never married ( $n = 10$ ), 19.2% were currently married ( $n = 40$ ), and 4.3% were divorced ( $n = 9$ ).

Table 1

*Demographic Characteristics for Older Adult Total Group and Centenarians (MMSE  $\geq 17$ ) from the Georgia Centenarian Study*

Characteristics	Older Adult Total ( <i>N</i> = 208)		Centenarian Only ( <i>N</i> = 137)	
	<i>M</i> ( <i>SD</i> ) or <i>n</i>	Range or %	<i>M</i> ( <i>SD</i> ) or <i>n</i>	Range or %
Age in years	94.40 (7.64)	80 – 108	99.67 (1.63)	98 – 108
MMSE Score	24.91 (3.84)	17 – 30	23.58 (3.94)	17 – 30
Total Years of Education	12.49 (3.64)	0 – 22	11.90 (3.61)	3 – 20
Gender				
Male	55	26.4%	29	21.2%
Female	153	73.6%	108	78.8%
Total	208	100.0%	137	100.0%
Ethnicity				
Caucasian	173	83.2%	114	83.2%
African American	35	16.8%	23	16.8%
Total	208	100.0%	137	100.0%
Residence Type				
Private Home/Apartment	146	70.2%	77	56.2%
Assisted Living	29	13.9%	28	20.4%
Skilled Nursing Facility	33	15.9%	32	23.4%
Total	208	100.0%	137	100.0%
Marital Status				
Married	40	19.2%	7	5.1%
Divorced	9	4.3%	5	3.6%
Widowed	149	71.6%	116	84.7%
Never Married	10	4.8%	9	6.6%
Total	208	100.0%	137	100.0%

*Note.* Percentages may not add up to 100% due to rounding.

Of the centenarians and near-centenarians in the sample, there were 108 female participants and 29 male participants. The sample consisted of primarily Caucasian participants ( $n = 114$ ). The mean age of this sample was 99.7, with a range from 98 years to 108 years. The mean total years of schooling was about 12 years, with ranges from 3 to 20 years of schooling. The majority of participants in the sample lived in private homes or apartments ( $n = 77$ ). In contrast, 32 participants lived in skilled nursing facilities and 28 lived in assisted living facilities. As with the total sample above, participants in the skilled nursing facilities and assisted living facilities were analyzed together as one group ( $n = 60$ ), resulting in a closer comparison to the private home/apartment group. Of the sample of centenarians and near-centenarians, about 85% were widowed ( $n = 116$ ), 6.6% never married ( $n = 9$ ), 5.1% were currently married ( $n = 7$ ), and 3.6% were divorced ( $n = 5$ ).

## Measures

The current study includes measures on social support, social network, ADL, and life satisfaction (Table 2).

Table 2

### *Measures for Current Study*

Variable	Measure	Author
Social Support	Social Provisions Scale	Cutrona et al., 1986
Social Network	Single Item	Fillenbaum, 1988
Activities of Daily Living (ADL)	OARS Functional Assessment	Fillenbaum, 1988
Life Satisfaction	Life Satisfaction Index	Neugarten et al., 1961

**Social provisions.** The Social Provisions Scale (Cutrona, Russell, & Rose, 1986) was used to assess perceived social support. In the Georgia Centenarian Study, an adapted 12-item shortened version of the scale was used. All questions are answered on a Likert scale, from “*strongly disagree*” (1) to “*strongly agree*” (4). Possible scores range from 12–48. The scale is

scored such that higher scores mean higher levels of perceived social support. This scale is divided into six sub-dimensions of support: attachment, social integration, reassurance of worth, reliable alliance, guidance, and opportunity for nurturance (Cutrona et al., 1986). Each of the six subscales contains two questions. The sub-dimension of attachment includes “I have close relationships that provide me with a sense of emotional security and well-being” and “I lack a feeling of intimacy with another person” (reversed coded). The social integration subscale includes, “There are people who enjoy the same social activities I do” and “There is no one who shares my interests and concerns” (reversed coded). Reassurance of worth includes, “I have relationships where my competence and skill are recognized” and “I do not think other people respect my skills and abilities” (reversed coded). Reliable alliance includes, “There are people I can depend on, if I really need it” and “If something went wrong, no one would come to my assistance” (reversed coded). Guidance includes, “There is a trustworthy person I could turn to for advice, if I were having problems” and “There is no one I can turn to for guidance” (reversed coded). Opportunity for nurturance includes, “I feel personally responsible for the well-being of another person” and “There is no one that relies on me for their well-being” (reversed coded). Cutrona et al. (1986) reported that the alpha coefficients for the individual subscales ranged from .64 to .76., and the reliabilities of the six subscales separately ranged from .76 to .84, and the total score reliability was .92 (Cutrona et al., 1986). Reliability for the total social provisions scale in the current study was .75. Reliabilities for the subscales were as follows: reliable alliance was .19, guidance was .43, integration was .53, attachment was .30, worth was .49, and nurturance was .77. Most of these subscales’ reliabilities were unacceptable to use within the current study. Therefore, the current study included the total social provisions score as well as the subscale for nurturance.

**Social network.** One item from the Older Americans Resources and Services (OARS) Social Resources scale (Fillenbaum, 1988) assessed the social network of older individuals. The item states, “How many people do you know well enough to visit with in your home or in their homes?” The question responses to choose from include “*five or more,*” “*three or four,*” “*one or two,*” or “*none.*” The social network variable ranged from 0 to 3, with a higher score indicating a larger social network.

**Activities of daily living.** Functional status was measured with the Older Americans Resources and Services (OARS) Multidimensional Functional Assessment Questionnaire (Fillenbaum & Smyer, 1981). ADL is scored so that high scores mean high levels of self-care functional ability. Participants were asked how much difficulty they had performing seven physical activities of daily living (PADLs) and seven instrumental activities of daily living (IADLs). PADLs cover the basic ability of a person to take care of themselves and IADLs cover slightly higher-level abilities, such as shopping or chores (Avlund, Schultz-Larsen, & Kreiner, 1993). The OARS assessment of functional health included questions such as ability to use the telephone, prepare meals for oneself, walking, dressing oneself, shopping for groceries, and taking a bath or shower. The responses were rated on a 3-point scale (0 = *cannot do without help*, 1 = *can do with some help*, and 2 = *can do without help*). The reliability for the total ADL score in the current study was .89. The reliability for the instrumental ADL score (items 1-7) was .83. The reliability for the physical ADL score (items 8-13) was .84.

**Life satisfaction.** The measure for life satisfaction used in the Georgia Centenarian Study is the Life Satisfaction Index (Neugarten, Havighurst, & Tobin, 1961). Life satisfaction was scored so that a high score indicated a high level of life satisfaction. The original scale by Neugarten et al. (1961) had 20 items of self-rating one’s own life satisfaction. The version of the

Life Satisfaction Index within the current study included seven items. The items are coded “Disagree” (-1), “Uncertain” (0), and “Agree” (1). There are two subscales in this measure: Happiness (4 items) and Congruence (3 items) (Bishop, Martin, & Poon, 2006; Liang, 1984). Happiness has four items, two of which are “I have gotten more of the breaks in life than most people I know,” and “I am just as happy as when I was younger.” Congruence has three items, two of which are “As I look back on my life, I am fairly well satisfied,” and “I would not change my past life even if I could.” The only item that is recoded in this measure is item 3, “My life could be happier than it is now.” With this recode, high scores in the Life Satisfaction Index indicate high life satisfaction. Prado et al. (2009) reported reliability with Cronbach’s alpha was .80 for their full sample, ranging from .77 and .84 by age, education level, and income level. Within the current study, the total reliability for the seven questions was .59.

An examination of the reliability in the scale identified that when deleting the first item, “I have gotten more of the breaks in life than most people I know,” the reliability increased to .61 for the scale. Thus, item 1 was left out of the total summary score for the analyses in the study. The updated life satisfaction variable ranged from -6 to 6, with a mean of 1.74 for the total sample and 1.47 for the centenarian sample. Reliability for the two sub-scales were both at .52, which was too low to be considered in further analyses.

**Contextual variables.** For these analyses, place of residence, age, and gender were included as predictive contextual variables. These were included to address what influence, if any, they had on social support, social network, ADL, and levels of life satisfaction. The Georgia Centenarian Study coded participants’ gender as *male* (0) and *female* (1). Residence type was coded into two groups: private home (1) and care facility (2). Within the total sample, age was used as a grouping categorical variable, comparing octogenarians and centenarians (and near

centenarians, 98+). Within the centenarian sample, age is included as a continuous variable, in order to capture any variation between individuals who were 98 and those who were 108 years of age. The full path model tested included age, gender, and residence type correlating with one another, as well as predicting social support, social network, ADL, and life satisfaction.

### **Data Analyses**

Descriptive analyses were calculated on the variables of interest (e.g., social support, social network, ADL, and life satisfaction) using SPSS Version 25. This included means, standard deviations, ranges, and frequencies. Mean group analyses using ANOVAs in SPSS were computed to determine any gender, age, or residence type differences in social network, social support, ADL, and life satisfaction. Bivariate correlations were computed to identify statistical associations and directional relationships among variables. The variables in these analyses included: gender, age, residence type, social support, social network, ADL, and life satisfaction.

**Structural equation modeling.** Next, the hypothesized path model was examined through structural equation modeling (SEM) in *Mplus*. The hypothesized model included age, gender, and residence type as the first predictors, then social network and social support as additional predictors and mediators, followed with ADL as another mediator, and finally life satisfaction as the outcome.

**Mediation.** Additionally, the SEM was evaluated for direct and indirect effects on life satisfaction. The indirect effects, or mediation, are the products of the pathways from the predictor to the mediator, as well as from the mediator to the outcome (Baron & Kenny, 1986; Shrout & Bolger, 2002). The current analyses were conducted using 1,000 bootstrap samples, or repetitions, and reported with confidence intervals for indirect effects (Cheung, 2009; Preacher & Kelley, 2011; Shrout & Bolger, 2002). Each mediator (e.g., ADL) specifies an indirect pathway

through which the independent variable (e.g., social support) relates to the dependent variable (i.e., life satisfaction). The current study includes three mediators: social network, social support, and ADL. Social network and social support were tested as mediators of the relationships between age, gender, and residence type as they associate with ADL and life satisfaction. ADL was the mediator of the relationships between age, gender, residence type, social support, and social network in predicting life satisfaction.

**Moderation.** Although moderation could be investigated in multiple ways and with various statistical programs, this study examined moderation through interaction terms in hierarchical regression analyses in SPSS Version 25. Two hierarchical regressions were analyzed: one on social support interacting with ADL, and one on social support interacting with social network. The first block included the three demographic characteristics (i.e., age, gender, and residence type). The second block included a mean-centered version of both the social support (SS) score as well as the independent variable (either ADL or social network). The third block included the interaction term that was created to test the buffering effect (either SS\*ADL or SS\*social network). Significant interaction terms and a significant *F*-difference indicate significant moderation effects of social support in predicting levels of life satisfaction.

**Missing data.** Within the current study, three of the scales used had at least one person missing all of the data for that scale. For the Social Provisions Scale, two participants were missing all of their responses for all 12 items in the scale. For the Life Satisfaction Index, two participants were missing all of their responses for the seven items. On the OARS Multidimensional Functional Assessment of Older Adults Scale measuring ADL, one participant was missing responses for all 14 items. Only one of the missing responses for the Social Provisions Scale and the Life Satisfaction Index were coming from the same participant, but all

other fully-missing responses for the measures mentioned were coming from different participants, meaning that four participants had missing data on at least one full measure.

Missing data were dealt with in a few different ways. First, missing data on the item level were replaced by mean substitution on the individual level in creating summary variables. This process addressed the issue of one or two questions missing from a large scale. For example, if someone had missed one of the six questions on the Life Satisfaction Index, the individual mean replacement would take the average of the five questions they did answer, and replace the missing item with that mean. This was only conducted for scales that were missing less than 20% of the total items. The example with the Life Satisfaction Index above would have data from six out of seven questions, representing about 87% of that scale. If scales had less than 80% of the scale left due to missing data, the missing data were defined as “system missing” and not replaced.

In addition to the Life Satisfaction Index, this process was also conducted on the Social Provisions Scale. Before the individual mean replacement, the Life Satisfaction Index had some missing items for 11 participants, and the Social Provision Scale had missing data on 31 participants. After conducting the individual mean replacements, both scales had only two participants missing data. This individual mean replacement was not conducted on all of the scales in the current study. For scales that had very few items, if two items were skipped, those items could not be mean replaced because less than 80% of the original variable’s data would be accounted for. The social network item had missing data for five participants, and the ADL summary score had missing data on six participants. As mentioned, one participant had missing data on all 14 ADL items. Question 11 (“Can you walk?”) had missing responses from three participants, and an additional six questions had two participants missing data. The ADL

measure items were not individual mean replaced, since each of the 14 items were examining different tasks of daily living (i.e., can you use the telephone, can you walk, can you take a shower/bath, etc.). None of the contextual variables (age, gender, residence type) had any missing data. For testing the structural equation model in *Mplus*, full information maximum likelihood (FIML) was used as the default method of handling missing data (Muthén & Muthén, 1998-2017).

## CHAPTER 4. RESULTS

This study focused on social support, social network, ADL, and contextual variables (age, gender, and residence type) as they predicted life satisfaction in centenarians and the total older adult group. In this section, results from the descriptive analyses, mean group differences, bivariate correlations, SEM path analyses, mediation analyses, and moderation analyses are presented to assess the association between age, gender, residence type, social support, social network, ADL, and life satisfaction.

### Descriptive Analyses

Descriptive statistics for social support, social network, ADL, and life satisfaction are presented in Table 3.

Table 3

#### *Descriptive Information for Study Variables*

Variable	Older Adult Total ( <i>N</i> = 208)			Centenarian Only ( <i>N</i> = 137)		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Social Support (12-48)	206	35.72	2.91	135	34.86	2.32
Nurturance (2-8)	200	4.57	1.03	129	4.23	.75
Social Network (0-3)	203	2.86	.44	133	2.81	.51
Activities of Daily Living (0-26)	202	21.08	4.97	132	19.09	4.98
Life Satisfaction (-6-6)	206	1.74	2.90	135	1.47	3.05

*Note.* The numbers in parentheses reflect the range for the scale/subscale.

The mean score for social support was 35.72 for the complete sample of older adults and 34.86 for the centenarian sample. The Social Provisions Scale ranged from 12 to 48, so both samples reported relatively high social support on average. Social network ranged from a score of 0 to 3, and the mean was 2.86 for the full older adult sample and 2.81 for the centenarian sample. For the social network variable, no one answered that they had nobody in their social network. This means that all individuals in this study had at least one person within their social

network that they knew well enough to go visit or have visit them.

Activities of daily living (ADL) ranged from 0, meaning low functional activity, to 26, meaning highly functionally able. The mean for ADL was 21.08 in the total sample and 19.09 in the centenarian sample. The mean for life satisfaction was 1.74 and 1.47 for the total sample and centenarian sample, respectively. When inspecting the means compared to the scale midpoint for life satisfaction, the results indicate that both the full sample and the centenarian sample were, on average, relatively satisfied with their lives.

### Mean Group Differences

Analysis of variance (ANOVA) computed in SPSS evaluated whether there were significant group differences in social network, social support, ADL, and life satisfaction. Several group differences were identified by age group, gender, and residence type (Table 4).

Table 4

#### *Mean Differences in Age, Gender, and Residence Type*

	Age			Gender			Residence Type		
	Oct.	Cent.	<i>F</i>	Female	Male	<i>F</i>	Private Home	Care Facility	<i>F</i>
Social Network	2.96 (.20)	2.81 (.51)	5.22*	2.84 (.46)	2.32 (.34)	1.28	2.89 (.39)	2.79 (.52)	2.06
Social Support	37.37 (3.22)	34.86 (2.32)	41.18***	35.61 (2.93)	36.04 (2.86)	.86	36.18 (3.00)	34.64 (2.38)	12.63***
Nurturance	5.18 (1.19)	4.23 (.75)	48.29***	4.40 (.96)	5.06 (1.07)	17.03***	4.77 (1.11)	4.05 (.52)	20.91***
ADL	24.83 (1.75)	19.09 (4.98)	86.97***	20.49 (5.12)	22.70 (4.17)	8.15**	22.27 (4.30)	18.12 (5.33)	33.46***
Life Satisfaction	2.27 (2.53)	1.47 (3.05)	3.65 <sup>+</sup>	1.70 (2.87)	1.86 (3.00)	.11	1.94 (2.85)	1.26 (2.99)	2.35

*Note.* Oct = Octogenarians. Cent = Centenarians.

<sup>+</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

Results demonstrate that octogenarians had larger social networks on average, compared to centenarians,  $F(1, 201) = 5.22, p < .05$ . Additionally, octogenarians and individuals living in private homes had higher perceived social support scores on average, compared to centenarians and people living in a care facility,  $F(1, 204) = 41.18, p < .001$ , and  $F(1, 204) = 12.63, p < .001$ , respectively. For nurturance, the sub-scale from the Social Provisions Scale focused on caring for another person, mean group differences in age, gender, and residence type were identified. Octogenarians, men, and people living in private homes had higher scores of nurturance on average,  $F(1, 198) = 48.29, p < .001$ ,  $F(1, 198) = 17.03, p < .001$ , and  $F(1, 198) = 20.91, p < .001$ , respectively. Furthermore, octogenarians, men, and individuals living in a private home reported higher average functional ability levels,  $F(1, 200) = 86.97, p < .001$ ,  $F(1, 200) = 8.15, p < .01$ , and  $F(1, 200) = 33.46, p < .001$ . Age group differences in life satisfaction approached significance,  $F(1, 204) = 3.65, p = .06$ , indicating a statistical trend toward octogenarians having higher life satisfaction levels than centenarians on average. No significant gender or residence differences were identified for life satisfaction.

### **Bivariate Correlations**

Pearson correlations among all of the study variables are presented in Table 5. The upper triangle includes the correlations of older adults aged 80 and over, and the lower triangle includes centenarians and near-centenarians as a unique sub-sample. Variables included in the bivariate correlations include: social provisions total scale (perceived social support), the social provisions subscale of nurturance, the social network item, the ADL summary score, the life satisfaction total scale, and the contextual variables of age, gender, and residence type.

### Correlations with Full Sample of Older Adults

Within the entire older adult sample, the results indicated that life satisfaction positively and significantly related to perceived social support and the subscale of nurturance, as well as negatively related to age. The correlation between perceived social support and life satisfaction indicated the higher the level of social support, the higher the level of life satisfaction,  $r(205) = .23, p < .001$ . The correlation between nurturance and life satisfaction indicated a positive association similar to the social support variable above,  $r(200) = .15, p < .05$ . Age negatively correlated with life satisfaction, indicating that older individuals had lower scores in life satisfaction,  $r(206) = -.15, p < .05$ .

Table 5

#### *Correlations Among the Study Variables*

Variable	1	2	3	4	5	6	7	8
1. Social Support	-	.52***	.19**	.33***	.23***	-.42***	-.07	-.24***
2. Nurturance	.36***	-	.12	.28***	.15*	-.45***	-.28***	-.31***
3. Social Network	.18*	.03	-	.10	.08	-.16*	-.08	-.10
4. ADL	.15 <sup>+</sup>	.02	-.00	-	.13 <sup>+</sup>	-.56***	-.20**	-.38***
5. Life Satisfaction	.21*	.09	.08	.06	-	-.15*	-.02	-.11
6. Age	.00	.04	-.02	-.15	-.07	-	.19**	.45***
7. Gender (Female)	-.01	-.13	-.07	-.14	.04	.13	-	.13 <sup>+</sup>
8. Residence Type	-.07	-.20*	-.04	-.20*	-.06	.20*	.06	-

*Note.* Correlations for the total sample of older adults are contained in the upper triangle.

Correlations for the centenarian-only sample is are contained in the lower triangle. Nurturance is a subscale of the Social Provisions Scale. Gender is coded as: Male (0), Female (1). Residence type is coded as: Private Home/Apartment (1), Care Facility (2).

<sup>+</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Several other significant correlations were identified. Social support correlated positively with social network, ADL, and life satisfaction, indicating that greater levels of social support related to greater nurturance, social network, ADL, and life satisfaction. Social support negatively correlated with age and residence type, indicating that the older adults and those

living in care facilities had lower social support levels. The single item for social network negatively correlated with age, indicating that the older adults had a smaller social network.

### **Correlations with Centenarian Sample**

Within the centenarian-only sample, the results indicated that life satisfaction positively correlated with social support,  $r(134) = .21, p < .05$ . This association demonstrated that higher levels of perceived social support related to higher levels of life satisfaction for centenarians and near-centenarians. Additionally, a larger social network related to higher perceived social support. Further, better functional health (ADL) related to individuals living in private homes, as well as marginally related to increased social support. Age in years and residence type were also related, indicating that older centenarians were more likely to reside in in care facilities.

### **Structural Equation Modeling**

Next, structural equation modeling was conducted in *Mplus*. This included assessing the fit of the data to the theoretical model, evaluating the hypothesized path model, and testing for mediation through bootstrap modeling. The hypothesized path model tested was from age, gender, and residence type, to social network and social support, then social network to social support, social support to ADL, and ADL to the life satisfaction. Additionally, the contextual variables (i.e., age, gender, and residence type) were allowed to correlate with one another.

### **Model Fit**

The direct effects in the model included: 1) age, gender, and residence type to social network, 2) age, gender, and residence type to social support, 3) social network to social support, 4) social support to ADL, and 5) ADL to life satisfaction. Table 6 presents the model fit information within the current study.

Table 6

*Model Fit for Hypothesized Model*

Model	$\chi^2$	<i>df</i>	<i>RMSEA</i>	<i>CFI</i>	$\Delta\chi^2$
Total Older Adult Sample, <i>N</i> = 208					
Hypothesized Model	72.29***	8	.20	.51	
Model 2: add SS to LS	64.30***	7	.20	.56	7.99**
Model 3: add age to ADL	11.13 <sup>+</sup>	6	.06	.96	53.17***
Model 4: add res. type to ADL	3.81	5	.00	1.00	7.32**
Centenarian Sample, <i>N</i> = 137					
Hypothesized Model	15.89*	8	.09	.00	
Model 2: add SS to LS	10.56	7	.06	.51	5.33*
Model 3: add age to ADL	7.39	6	.04	.81	3.17 <sup>+</sup>
Model 4: add res. type to ADL	3.49	5	.00	1.00	3.90*

*Note.*  $\chi^2$  = chi square; *df* = degrees of freedom; *RMSEA* = root mean square error of approximation; *CFI* = comparative fit index; The cutoff criteria for acceptable fit are as follows: *CFI*  $\geq$  .95; *RMSEA*  $<$  .08. LS = life satisfaction. SS = social support. ADL = activities of daily living. Res. Type = residence type. The  $\Delta\chi^2$  compares the model directly before it (i.e., Model 2  $\Delta\chi^2$  is compared to the Hypothesized Model; Model 3  $\Delta\chi^2$  is compared to Model 2; Model 4  $\Delta\chi^2$  is compared to Model 3).

<sup>+</sup>*p*  $<$  .10. \**p*  $<$  .05. \*\**p*  $<$  .01. \*\*\**p*  $<$  .001.

**Total Older Adult Sample.** The hypothesized path model resulted in a less than optimal fit with the data,  $\chi^2(8) = 72.29$ ,  $p < .001$ , *CFI* = .51, *RMSEA* = .20. Acceptable cutoff fit indices for structural equation modeling include  $\geq$  .95 for *CFI* and  $\leq$  .08 for *RMSEA* (Hu & Bentler, 1999). Model 2 incorporated a plausible additional pathway from social support to life satisfaction and resulted in an improved fit,  $\chi^2(7) = 64.30$ ,  $p < .001$ , *CFI* = .56, *RMSEA* = .20. A  $\chi^2$  difference test identified that Model 2 was a significantly better model for the data compared to the hypothesized model,  $\Delta\chi^2(df = 1) = 7.99$ ,  $p < .01$ . Additionally, a plausible direct pathway from age directly predicting activities of daily living was added (Model 3), resulting in an improved fit,  $\chi^2(6) = 11.13$ ,  $p = .08$ , *CFI* = .96, *RMSEA* = .06. The chi-square difference test identified a significant difference between Model 2 and Model 3,  $\Delta\chi^2(df = 1) = 53.17$ ,  $p < .001$ . As a next step, Model 4 included an additional direct plausible pathway from residence type to

functional ability (ADL), resulting in an optimal fit.  $\chi^2(5) = 3.81, p = .58, CFI = 1.00, RMSEA = .00$ . The chi-square difference test identified a significant difference between Model 3 and Model 4,  $\Delta\chi^2(df = 1) = 7.32, p < .01$ . Model 4 was accepted as the final model.

**Centenarian Sample.** Similar to above, the hypothesized path model was tested with the centenarian-only sample. The hypothesized path model resulted in an unacceptable fit,  $\chi^2(8) = 15.89, p < .05, CFI = .00, RMSEA = .09$ . Therefore, similar to the full sample, Model 2 incorporated an additional plausible pathway from social support to life satisfaction and resulted in an improved fit,  $\chi^2(7) = 10.56, p = .16, CFI = .51, RMSEA = .06$ . A  $\chi^2$  difference test identified that Model 2 was a significantly better model for the data compared to the hypothesized model,  $\Delta\chi^2(df = 1) = 5.33, p < .05$ . As a next step, Model 3 included age directly predicting activities of daily living, resulting in an improved fit,  $\chi^2(6) = 7.39, p = .29, CFI = .81, RMSEA = .04$ . The chi-square difference test identified a marginal difference between Model 2 and Model 3,  $\Delta\chi^2(df = 1) = 3.17, p < .10$ . The model structures for both the full sample of older adults and the centenarian-only sample were kept the same in order to be comparable for this study. Thus, Model 4 included an additional direct plausible pathway from residence type to ADL, resulting in an acceptable fit,  $\chi^2(5) = 3.49, p = .62, CFI = 1.00, RMSEA = .00$ . The chi-square difference test identified a significant difference between Model 3 and Model 4,  $\Delta\chi^2(df = 1) = 3.90, p < .05$ . Model 4 was the final model.

### **Structural Model**

The direct effects of the variables were examined following the structural path model with suggested pathways established above (Model 4). The direct effects tested were: 1) age, gender, and residence type predicting social support and social network; 2) social network predicting social support; 3) social support, social network, age, and residence type predicting ADL; and 3) ADL and social support predicting life satisfaction.

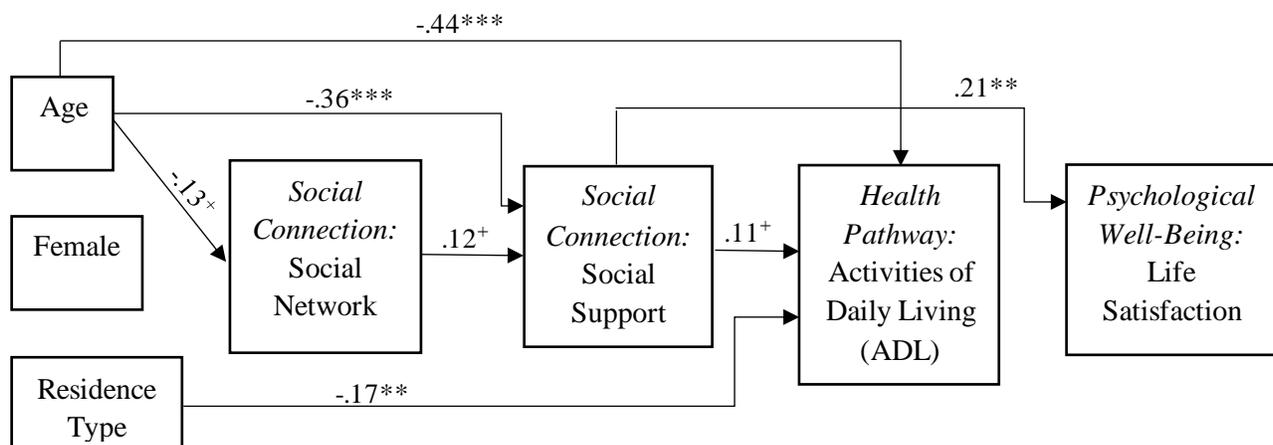
**Total Older Adult Sample.** Results of the structural path model with the full sample of older adults are presented in Table 7 and Figure 3.

Table 7

*Structural Path Model with Full Older Adult Sample*

	<i>B</i>	<i>SE</i>	$\beta$	Variance Explained
Social Support				18.8%
Age Group	-2.21	.43	-.36***	
Gender	.10	.42	.02	
Residence Type	-.48	.44	-.08	
Social Network	.82	.44	.12 <sup>+</sup>	
Social Network				2.9%
Age Group	-.12	.07	-.13 <sup>+</sup>	
Gender	-.05	.07	-.05	
Residence Type	-.04	.07	-.04	
Activities of Daily Living				34.0%
Social Support	.18	.11	.11 <sup>+</sup>	
Social Network	-.20	.69	-.02	
Age Group	-4.55	.70	-.44***	
Residence Type	-1.89	.69	-.17**	
Life Satisfaction				5.4%
Activities of Daily Living	.03	.04	.06	
Social Support	.21	.07	.21**	

Note. <sup>+</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



Note. Only significant paths (standardized values) shown.  
<sup>+</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Figure 3. Results of structural model with total older adult sample.

Overall, several significant associations were identified. Age directly and negatively predicted both social support,  $\beta = -.36, p < .001$ , and activities of daily living,  $\beta = -.44, p < .001$ . This negative relationship with age indicated that the older the person is, the lower their levels of perceived social support and functional ability (ADL). Social support had significant and direct positive effects on life satisfaction,  $\beta = .21, p < .01$ , indicating that higher levels of perceived social support were associated with higher levels of life satisfaction. For residence type, results demonstrated that older adults living in their private homes had better levels of functional health (ADL),  $\beta = -.17, p < .01$ . Social network approached significance in predicting social support, indicating that people who had a greater social network also reported marginally better perceived social support. Another two statistical trends were observed for age to social network and social support to ADL. Age marginally predicted social network, indicating that older people had smaller social network sizes. Additionally, social support marginally predicted ADL, indicating that greater perceived social support had a weak association with better functional ability.

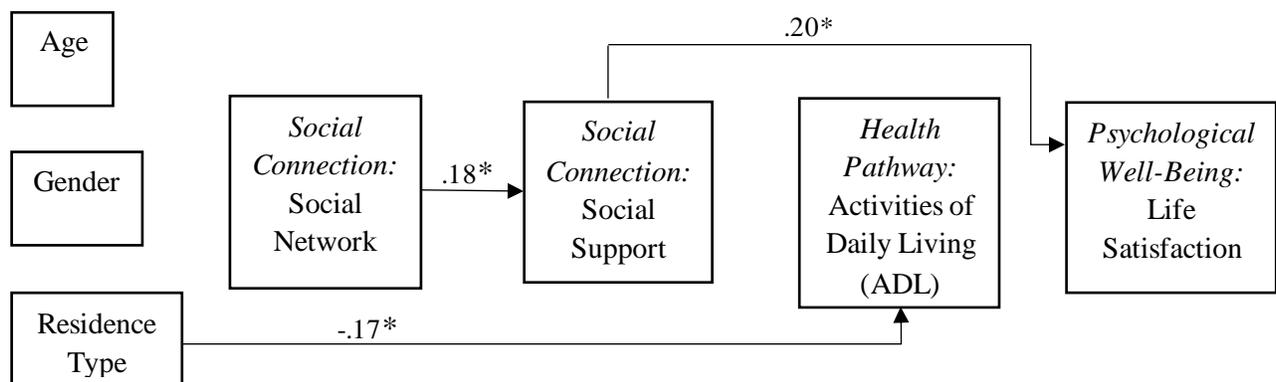
**Centenarian Sample.** Results of the structural model with the sample of centenarians are presented in Table 8 and Figure 4. There were three notable significant associations: social network positively predicted social support,  $\beta = .18, p < .05$ , social support positively predicted life satisfaction,  $\beta = .20, p < .05$ , and individuals who lived in private homes had higher functional ability (ADL),  $\beta = -.17, p < .05$ . The first significant pathway indicated that centenarians and near-centenarians with larger social networks reported higher levels of perceived social support. Secondly, reporting higher social support levels also predicted higher levels of life satisfaction for centenarians and near-centenarians. Further implications of these findings are discussed in the following discussion chapter.

Table 8

*Structural Path Model with Centenarian-Only Sample*

	<i>B</i>	<i>SE</i>	$\beta$	Variance Explained
Social Support				3.7%
Age in Years	.03	.12	.02	
Gender	.02	.49	.00	
Residence Type	-.31	.40	-.07	
Social Network	.82	.39	.18*	
Social Network				0.6%
Age in Years	-.00	.03	-.01	
Gender	-.08	.11	-.06	
Residence Type	-.04	.09	-.04	
Activities of Daily Living				7.4%
Social Support	.29	.18	.14	
Social Network	-.35	.84	-.04	
Age in Years	-.39	.27	-.13	
Residence Type	-1.70	.86	-.17*	
Life Satisfaction				4.3%
Activities of Daily Living	.01	.05	.02	
Social Support	.27	.11	.20*	

Note.  $^+p < .10$ .  $*p < .05$ .  $**p < .01$ .  $***p < .001$ .



Note. Only significant paths (standardized values) shown.  $*p < .05$ .  $**p < .01$ .  $***p < .001$ .

Figure 4. Results of structural model with the centenarian sample.

## Mediation

Mediation effects were tested with *Mplus* using 1,000 bootstrap samples to examine indirect effects. The current study included three mediators: perceived social support, social network, and ADL. Five mediation paths were tested for the total sample, and one mediation path was tested for the centenarian sample (Table 9), based on the direct effects obtained.

Table 9

### *Mediation Bootstrap Results for Indirect Effects*

Indirect Pathways	<i>B</i>	<i>SE</i>	$\beta$	95% CI
Total Older Adult Sample:				
Age → SN → SS → ADL	-.02	.02	-.00	(-.01, .00)
Age → SN → SS	-.10	.07	-.02	(-.04, .01)
Age → SS → ADL	-.40	.21	-.04*	(.00, .05)
Age → SS → LS	-.46	.19	-.08*	(-.14, -.02)
SN → SS → LS	.17	.08	.03*	(-.08, .00)
Centenarian Sample:				
SN → SS → LS	.22	.13	.04 <sup>+</sup>	(-.01, .08)

*Note.* 95% CI = 95% Confidence Interval. Standardized CI results shown.  
 LS = life satisfaction. SS = social support. ADL = activities of daily living.  
 SN = social network. <sup>+</sup> $p < .10$ . \* $p \leq .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

For the total sample, social support significantly mediated the relationship between age and life satisfaction,  $\beta = -.08$ ,  $p < .01$ , between age and ADL,  $\beta = -.04$ ,  $p = .05$ , and between social network and life satisfaction,  $\beta = .03$ ,  $p < .05$ . The first significant mediation pathway indicates that the relationship between age group and functional health was influenced by the level of social support. Younger older adults reported higher levels of social support, which in turn related to better functional health (ADL), so social support acted as the influential factor between age and ADL. Furthermore, social support significantly mediated the negative relationship between age and life satisfaction for the total sample, indicating that social support is the mechanism through which age impacted life satisfaction for older adults. Finally, the last

significant mediation result was from social network influencing life satisfaction *through* social support. This indicates that social support was the mechanism through which social network size influenced life satisfaction. In other words, the size of one's social network influence life satisfaction through perceived social support.

Additionally, the centenarian sample presented one statistical trend of mediation. The path from social network to life satisfaction was mediated through social support,  $\beta = .04$ ,  $p = .09$ . This mediation trend indicates that social network may indirectly influence life satisfaction through the level of perceived social support for centenarians and near-centenarians.

### **Moderation**

Moderation was computed using hierarchical regressions in SPSS. Two hierarchical regressions were analyzed, one for the total sample and one for the centenarian sample. The hierarchical regression was formatted as such: the first block included the mean-centered social support variable. The second block included the first block, as well as mean-centered social network and mean-centered ADL. The third block included everything from the second block, as well as two interaction terms (social support interacting with ADL, and social support interacting with social network). There were no significant moderation effects identified in either sample (Table 10).

Table 10

*Moderation Effect Interactions on Life Satisfaction*

Variable	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Total Sample:				
Social Support	.25	.08	.25**	2.92
Social Network	.09	.64	.01	.15
ADL	.02	.05	.03	.43
SS*SN	-.11	.25	-.04	-.44
SS*ADL	-.02	.02	-.09	-1.16
Centenarian Sample:				
Social Support	.30	.13	.23*	2.43
Social Network	.18	.62	.03	.29
ADL	.01	.06	.02	.23
SS*SN	-.11	.29	-.04	-.36
SS*ADL	-.03	.02	-.11	-1.19

*Note.* SS = Social Support. SN = Social Network. ADL = Activities of Daily Living. SS\*SN represents the interaction term of social support X social network. SS\*ADL represents the interaction term of social support X ADL. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## CHAPTER 5. DISCUSSION

The present study focused on addressing salient social and functional health factors that affect life satisfaction for oldest old adults. The longevity of older adults into very old age is of great interest to longevity researchers. Previous research has established the importance of studying social support influencing oldest old adults (Boerner et al., 2018; Cherry et al., 2013; Jopp et al., 2016), as well as the issue that social support is often lacking for centenarians when it is needed most (Hensley et al., 2012; Long & Martin, 2000). Additionally, past studies have addressed the importance of social relationships impacting life satisfaction (Chen et al., 2019; Cutrona et al., 1986; Bai, Yang, & Knapp, 2018; Hutnik et al., 2012; Liang et al., 1980). In the current study, social support and social network were included as different approaches toward examining the social resources of oldest old adults.

There were four specific aims for the current study. Aim 1 examined the effects of age, gender, and living environment on the relationships between social networks, social support, ADL, and life satisfaction for oldest old adults. Aim 2 examined the effects of social networks, social support, and functional ability (ADL) on the outcome of life satisfaction for oldest old adults. Aim 3 was to test for any mediating effects of ADL between social support, social network, and life satisfaction for oldest old adults. Aim 4 was to test the buffering moderation effect of social support as it influences both social network and ADL in predicting life satisfaction. By covering these four aims, this study provided information on the social networks, social support, functional health, and life satisfaction of oldest old adults from the Georgia Centenarian Study. Additionally, this study used a recent theoretical framework (Pietromonaco & Collins, 2017), specifically focusing on well-being and social variables of importance to the oldest old population.

Although prior research has addressed the importance of social support and life satisfaction, the association between social support and life satisfaction had yet to be tested with Pietromonaco and Collins' (2017) theoretical framework. Additionally, this study was the first to examine the framework with a sample of oldest old adults, as well as compute comparisons with the unique subgroup of centenarians. This study, based on the theoretical framework by Pietromonaco and Collins (2017), conducted analyses based on the assumption that contextual variables, social network, perceived social support, and functional health affect life satisfaction for oldest old adults.

Pietromonaco and Collins (2017) asserted the importance of investigating the link between close social relationships as well as health and well-being *across* domains. They emphasized the influence of social connection and disconnection through the “interpersonal processes” and “intrapersonal pathways” that impact health outcomes (Pietromonaco & Collins, 2017). The organizing framework by Pietromonaco and Collins (2017) was thorough and comprehensive, including numerous plausible mechanisms or factors through which social connection and disconnection impact health and well-being. Variables for the current study were chosen based on past literature on oldest old adults and their associated well-being factors, as well as my research interests of examining the social support and resources of oldest old adults, including the uniqueness of the centenarian population. Several hypothesized pathways of the Pietromonaco and Collins' theoretical framework were not examined within the current study due to the large number of the suggested variables. Other variables that could be included in future research are the emphasis on social disconnection (i.e., negativity, hostility, rejection) and social connection (i.e., intimacy, affection), biological (i.e., immune, cardiovascular, endocrine), psychosocial (i.e., emotion regulation, coping, cognition), and health/lifestyle pathways (i.e.,

eating/appetite, sleep, substance use), as well the psychological well-being (i.e., mental health, eudaimonic well-being) and health and disease outcomes (i.e., longevity, health recovery, health status; Pietromonaco & Collins, 2017).

This study used the two types of social resources in conjunction with one another and how they influenced well-being. The social network variable focuses on the number of people known well enough to visit with in your/their home. Everyone in the current study reported having at least one person in their social network. Furthermore, although this social network variable aims to identify the *quantity* of people in one's social network, the measure for perceived social support is more focused on the *quality* of proposed support. By using both of these variables, this study provides a more holistic picture of the social health and well-being of oldest old adults.

Accordingly, this study included the associated constructs (social network, social support, activities of daily living) to predict life satisfaction. Additionally, activities of daily living (ADL), social support, and social networks were hypothesized to be mediators, or pathways, through which life satisfaction is influenced. This study aimed to (1) examine the effects of age, gender, and living environment on the relationships between social support, social network, ADL, and life satisfaction, (2) examine the effects of social networks, social support, and ADL on life satisfaction, (3) test for any mediating effects of ADL, social network, and social support in predicting life satisfaction, and (4) examine any interactions of social support with social network and ADL as they separately influence life satisfaction for oldest old adults. Additionally, analyses compared the findings with the total older adult sample (80 years or older) with the unique centenarian-only sample in the study.

The decision to conduct the analyses comparing the total sample with the subgroup of

centenarians and near centenarians aimed to explore the exceptionally long-lived individuals of 98 years or older with the larger sample of individuals 80 or older. Past research previously established the exceptionality of centenarians with regard to several well-being and health components, and I was interested in examining the social resources of these unique individuals surpassing 98 years of life and comparing their well-being. An alternative approach considered for this study was to assess multiple group differences among centenarians and octogenarians in the study. However, there were fewer octogenarians ( $n = 71$ ) compared to centenarians ( $n = 137$ ) in the current study, and this study aimed to use advanced structural modeling analyses requiring a larger sample. Thus, this study was conducted with one total oldest old adult group (80+), as well as a unique subsample of individuals 98+ for exceptional centenarians and near-centenarians. As established in the previous chapter, there were important distinctions identified among the total group and the unique centenarian subgroup, which are discussed below.

### **Group Differences in Social Resources, Activities of Daily Living, and Life Satisfaction**

Overall, participants in this study reported relatively high average scores on social support, social network, activities of daily living, and life satisfaction. Group difference tests identified that men were more likely to feel personally responsible for the well-being of another person (nurturance), as well as reporting better functional health (ADL) than women. Past studies noted similar findings among older adults and ADL levels, reporting men to have better ADL levels compared to women (Alexandre et al., 2014; Liang et al., 2008; Merrill, Seeman, Kasl, & Berkman, 1997). To my knowledge, no other studies have compared older men and women feeling responsible for the well-being of another person. In this study, men may report being responsible for the well-being of another person more than women due to several different reasons. For one, women tend to live longer than men (Austad, 2006; Regan & Partridge, 2013). This could result in women possibly outliving their spouses, thus not being responsible for the

well-being of another person. Additionally, although women live longer, studies have examined that women tend to have greater health problems compared to men (Freedman, Wolf, & Spillman, 2016). Thus, men could be serving as caregivers to their spouses who may be in poorer health. Furthermore, men may be more likely to over-report their care for another person, compared to women. Past research has established that men tend to overestimate their helping around the house in regard to division of household labor tasks (Lee & Waite, 2005; Press & Townsley, 1998), so it may be that older men in this study over-reported and misrepresented their provision of support for another person as well. Additionally, the traditional gender roles that the men in this study were accustomed to may play a role. Previous research has acknowledged that older cohorts may have more conventional gender beliefs, including the notion of men as the breadwinner (Boerner, Jopp, Carr, Sosinsky, & Kim, 2014; Zuo & Tang, 2000), which could include feeling responsible for one's household. Perhaps these beliefs remain ingrained with the older men in this study, leaving them feeling somewhat responsible for the well-being of family members.

Turning to age differences, octogenarians had significantly larger social networks, more social support, higher levels of nurturance, and better functional health compared to centenarians. This is to be expected, as centenarians may outlive their loved ones closest to them (Hensley et al., 2012; Manning, Leek, & Radina, 2012; Smith, 1997), yet may have greater functional impairments in their advanced ages (Poon et al., 2007). However, it is important to keep in mind the variation in functional health among centenarians (Ailshire, Beltrán-Sánchez, Crimmins, & Kritchevsky, 2015). Cherry et al. (2013) reported in their study that the oldest-old group (90+) was less likely to have a close social support or "confidant" than the young-old adult group (60-89 years). Further, the authors supported the link between social involvement and

health outcomes into very late life, emphasizing the importance of social interaction and having a close social support relationship (Cherry et al., 2013). Regarding life satisfaction by age group, no significant group differences were identified in the current study. This is consistent with Ailshire and Crimmins' (2011) study which found that their older adult group (ages 70-79) and oldest-old group (ages 90-104) both reported similar levels of overall life satisfaction.

Older adults living in private homes reported greater social support, higher nurturance, and better functional health, compared to participants living in care facilities. Consistent with the current study, Randall et al.'s (2010) study also using the Georgia Centenarian Study identified that centenarians and individuals living in care facilities reported lower social resource scores. Additionally, as Bromell and Cagney (2014) stated, living environments may provide varied opportunities for social integration, companionship, and engagement with others. Within the current study, living in a private home was related to better social support, which indicates that people living at home may have close family or friends nearby to maintain close connections, which is consistent with past studies (Ashida & Heaney, 2008; Feng et al., 2017). Ewen et al. (2017) confirmed the findings that older adults living in private homes reported better functional health, but also stated that factors such as type of home- or community-based services could impact this. Future studies should aim to explore this perceived influence of home- and community-based services within residence type and functional health levels for older adults.

### **Relationships Among Social Resources, Activities of Daily Living, and Life Satisfaction**

Significant correlation results in the present study included positive associations between social support with life satisfaction, ADL, and social network. Boerner et al. (2016) confirmed the finding in which higher levels of social support positively related to better functional health (ADL). However, it is important to remember that this association between social support and

ADL is not necessarily causal, as better ADL may also lead to better opportunities for social support (Bozo & Guarnaccia, 2010). One previous study also expressed that although social provisions was positively associated with better IADL levels for older adults, this could differ depending on gender, age, and types of activity within different samples (Tomioka, Kurumatani, & Hosoi, 2017). Furthermore, previous studies confirmed the positive association between perceived social support and life satisfaction among older adults (Shen & Yeatts, 2013).

In the current study, centenarians and near-centenarians were more likely to live in care facilities, have lower levels of social support, and smaller social networks compared to octogenarians. These associations could be due to several reasons. For one, the decrease in social network size is consistent with the socioemotional selectivity theory (SST; Carstensen, 1993). SST posits that people get increasingly selective with their social and emotional energy when they see limited time left in life (Carstensen, 1993; 2006), yet the relationships they do keep are satisfying, supportive, and fulfilling (Carstensen, 1993). Additionally, as age increases, so does the likelihood for more difficulty with activities of daily living (Berlau et al., 2009). Therefore, older adults who need more help with their ADLs may choose to live in a care facility where those needs can be tended to. Paganini-Hill (2013) identified that in their study with older adults 90+, individuals living in private homes reported better health and were likely to go outside and stay active, as well as talk with family and friends. The current study identified that individuals living in private homes related to better levels of functional ability, confirming the findings by Paganini-Hill (2013).

The correlation results in the current study presented different results for the total older adult sample and the centenarian subsample, but it is also worth noting that the magnitude of the correlations are much larger for the total older adult sample compared to the centenarian

subgroup. One reason for this could be due to a power issue and a lower number of participants in the centenarian sample. Not having enough participants could decrease the effect given the variables in the structural path model. Future studies should explore the model with a larger sample of oldest old adults.

The present study included four research questions addressing direct effects, indirect effects (mediation), and moderating effects among contextual variables, social support, social network, ADL, and life satisfaction. The first research question addressed the contextual variables (age, gender, and residence type), and whether they predicted social networks and social support. The second research question hypothesized direct effects from (a) social network to social support, (b) social network to ADL, (c) social support to ADL, and (d) ADL to life satisfaction. The third research question posed whether functional health (ADL) mediated the relationship between social support and social network as related to life satisfaction. The fourth and final research question covered the buffering hypothesis of social resources, identifying whether social network moderated the relationship among social support and life satisfaction, and whether social support moderated the relationship between ADL and life satisfaction.

### **Direct Effects of Contextual Variables**

The first research question included three hypotheses regarding how the contextual variables (i.e., age, gender, and residence type) directly related to social network, social support, ADL, and life satisfaction.

**Age, social support, and social networks.** Hypothesis 1a predicted that oldest-old adults would have smaller social networks and less social support than their younger counterparts. This hypothesis was supported, as octogenarians reported larger social networks and better perceived social support. This was the second-highest influential association among the total sample of older adults. It is important to address this issue as social support resources may become more

diminished for oldest old adults and could result in greater vulnerability to loneliness (Martin, Hagberg, & Poon, 1997). Ailshire and Crimmins (2011) suggested that age-related differences regarding social characteristics may occur due to the oldest-old outliving their family and friends, thus contracting their social network and relationships. In addition to people of importance around oldest old adults decreasing, their perceived levels of social support could decrease in tandem. For example, if older adults lose someone close to them (i.e., a spouse, sibling, close friend, etc.), they could answer the questionnaire knowing that they will move into the next years of their lives without that social support that the person or people had given them over the years. Another possible reason for the lower levels of perceived social support by age group could be due to perceived burden on the family. As some older adults age, they may need more attentive care from their family members, however, would not want to feel like a burden on their loved ones (Del-Pino-Casado, Frías-Osuna, Palomino-Moral, Ruzafa-Martínez, & Ramos-Morcillo, 2018). Feeling like a burden on loved ones could make older adults feel like they could (or should) not have the social support they would like or need. Kowal, Wilson, McWilliams, Péloquin, and Duong (2012) posited that older adults' self-perceived feelings of burden were significantly associated with negative health and well-being outcomes, including functional limitations, depressive symptoms, and pain-related variables, among others. Thus, as older adults age, it may be important to further identify the reasons for the reduced self-reported levels of perceived social support.

This association is important to be aware of, so older adults can try to combat this with a purposeful increase of social interaction. This is also integral for family members and loved ones of the older adults. Knowing this association exists, loved ones can actively work to be a part of counteracting this decreased number of social interactions that can better influence the health and

well-being of the older adults. Within the subgroup of centenarian and near-centenarians, there was no significant association between age in years to levels of perceived social support or social network size. This indicates that for individuals 98 years of age and older, the level of perceived support and size of social network did not differ across age.

Another significant path identified was from age group to functional health (ADL) for the total sample. This was the strongest association in the current study. Octogenarians reported significantly higher functional health than centenarians did, consistent with the mean differences examined above. Past studies have confirmed this finding, reporting that levels of functional health and ability (ADL) tended to decrease with age (Diehr, Thielke, Newman, Hirsch, & Tracy, 2013; Liang, Song, Du, Guralnik, & Qiu, 2015; Vaughan et al., 2016).

**Gender, social support, and social networks.** Hypothesis 1b predicted that women would report larger social networks and social support than men. This hypothesis was not supported in the current study. There were no significant path differences for women or men having larger social networks or more social support. Similar findings were identified in Jopp et al.'s (2016) study, which identified no significant gender differences in their study with centenarians and near-centenarians in New York City. Past studies have hypothesized the homogeneity of centenarians as a population (Arai et al., 2014), which may contribute to this finding. Another reason could be because there are generally very few centenarian men who live exceptionally long lives compared to women (Phillips, 2006; Poulain, Pes, & Salaris, 2011).

**Residence type, social support, and social network.** Hypothesis 1c predicted that individuals living in care facilities would have smaller social networks and less perceived social support than those living at home. The current study found no significant effects of residence type on social support or social network. This affirms previous findings by Boerner et al. (2016),

indicating that centenarians did not differ in socializing and companionship based on residence type or living arrangements.

It is worth noting that although residence type did not predict social support or social network, it did significantly predict functional health in the current study. Individuals who lived in private homes had significantly better functional health compared to those living in care facilities. This is consistent with past studies (Ewen et al., 2017; Paganini-Hill, 2013; Sarwari et al., 1998). However, it is important to remember that due to this study's cross-sectional design, causality cannot be inferred. Older adults may be more likely to move to care facilities due to increased functional health problems (Gill, Williams, Richardson, Berkman, & Tinetti, 1997; Roy, Dubé, Després, Freitas, & Légaré, 2018). It is important to consider the many factors that influence residence type and functional health to get a better understanding of the exceptional longevity of oldest old adults.

### **Direct Effects of Social Network, Social Support, and ADL on Life Satisfaction**

Research question 2 included four hypotheses regarding the direct effects of social network, social support, and ADL in predicting life satisfaction for oldest old adults.

**Social networks and social support.** Hypothesis 2a predicted that older adults with larger social networks would also have higher levels of perceived social support. This hypothesis was partially supported. For the total sample, the pathway from social network to social support identified a statistical trend, suggesting that larger social networks positively related to higher levels of perceived social support. It is important to note that everyone in the current study reported that they had at least one person in their social network. For centenarians, larger social networks significantly predicted a higher level of perceived social support. Caetano, Silva, and Vettore (2013) discussed the importance of examining both social networks and social support when predicting health and well-being outcomes, especially within the older adult population.

For the total oldest old sample, it is interesting that the association between social network and social support is less strong than it is for the centenarian subsample. Perhaps having a larger network is more important for centenarians in order to obtain actual social support. Future studies should explore this finding further, as well as examining how social network size may influence levels of perceived social support for more diverse oldest old adult samples, and whether the current study's findings can be replicated.

**Social networks and functional health.** Hypothesis 2b stated that larger social networks would positively predict better functional health. This hypothesis was not supported in the current study. As mentioned above, everyone in the study had at least one person in their social network. Thus, the influence of social network on levels of functional health may not be significant if the older adult has at least one close person.

**Social support and functional health.** Hypothesis 2c predicted that higher levels of perceived social support would predict better functional health. This hypothesis was partially supported among participants in the total group, but not for the centenarian sub-group. The marginal association suggests that older adults who perceived greater social support also tended to have better functional health (ADL). Past research has noted that increased social participation can help support older adults' physical health (Avlund et al., 2004; Mendes de Leon, Glass, & Berkman, 2003; Wu et al., 2017). However, the centenarian subgroup showed no significant association between social support and ADL, contrary to past studies. Wu et al. (2017) in their study of centenarians living in rural China reported that centenarians who had fewer social interactions with others tended to have lower functional health (ADL) as well. Furthermore, Hensley et al. (2012) noted that the relationship could be bidirectional, as greater functional limitations could hinder opportunities for social interaction.

The bidirectionality among social support and ADL is important to consider among oldest old adults, especially as greater difficulty and barriers related to ADL could also inhibit social support and interaction opportunities. However, as previous studies have noted, greater social participation could support the physical health and ability of older adults (Avlund et al., 2004; Mendes de Leon et al., 2003; Wu et al., 2017). Future studies with longitudinal data could examine growth curve modeling to explore whether social support changes from Time 1 to Time 2 affect changes in ADL, or vice versa. Examining and testing alternative pathways with social support and ADL would improve and expand the current literature for oldest old adults and should be considered in regard to future research directions. However, for the current study, this remains a limitation of its cross-sectional research design.

For the centenarian subsample, the lack of significant associations among social support and functional health could be due to several reasons. One reason could be the various types of support that centenarians were receiving. For example, centenarians with a caregiver may report greater levels of social support, but that caregiver may also be helping them with their activities of daily living (e.g., getting the mail, doing the dishes, preparing dinner, etc.), which would decrease their ADL score. Thus, their ADL score would be lower even though their support would actually be high. Additionally, many centenarians in the current study resided in care facilities where they were given high ADL support and assistance. However, not all centenarians may perceive this assistance as *social* support, since it is not a specific caregiver. Finally, our sample of centenarians had relatively high levels of perceived social support to begin with, which may account for less variability overall.

**ADL and life satisfaction.** Hypothesis 2d predicted that greater levels of functional health (ADL) would be positively associated with higher levels of life satisfaction. However,

contrary to the hypothesis and previous literature, there was no significant association. Interestingly, even the correlational association between functional health and life satisfaction was marginal. This finding is inconsistent with past studies that have reported significant associations among ADL and life satisfaction (Enkvist et al., 2012; Jopp et al., 2016).

However, this lack of a significant finding could be a positive attribute for oldest old adults. This non-association could suggest that regardless of the functional health status of older adults, their life satisfaction would not be affected. For example, individuals could still be highly satisfied with their life in their older years even if they have difficulty with their functional health and conducting everyday tasks. Another possible reason could be due to lowered expectations regarding ADL functioning for oldest old adults (Buono et al., 1998). Buono et al. (1998) suggested that centenarians' adaptability of living exceptionally long lives may also adjust their expectations regarding their physiological capabilities, normalizing the decrease in functional health. With this consideration for their exceptional age in mind, centenarians may continue to indicate high levels of life satisfaction regardless of their functional health.

**Perceived social support and life satisfaction.** A pathway from perceived social support directly to life satisfaction was added in the adjusted path model in the current study. This direct path was significant for both the total sample and for the centenarian subgroup. Social support has been established as a crucial component for older adults' health, well-being, and overall quality of life (Antonucci et al., 2014; Czaja et al., 2018; Dai et al., 2016; White et al., 2009). This finding is consistent with previous literature that identified links between social support and life satisfaction (Antonucci et al., 2014; Czaja et al., 2018; Menec, 2003) and confirmed the importance of perceived social support in predicting life satisfaction for oldest old adults.

### **Indirect Effects of Demographics and Social Resources on Life Satisfaction**

Results from the structural path model identified six possible mediation pathways. Five of those paths were for the total sample of older adults in this study and one path was identified for the centenarian subsample. Of the five indirect paths examined for the total group, three demonstrated significant indirect effects. The centenarian subgroup had one indirect path examined, but only marginal associations were obtained. All of the significant mediation pathways had perceived social support as the mediator.

**Age, social support, and ADL.** Perceived social support significantly mediated three pathways in the current study. The first significant mediation pathway was from age group to ADL through perceived social support. This association represented that octogenarians reported higher levels of perceived social support, and higher levels of perceived social support related to better functional health. Perceived social support acted as the mechanism through which age group influenced functional health. Lachman and Agrigoroaei (2010) identified social support as a part of the protective mechanisms related to age-related declines in health, specifically examining functional health changes over time.

**Age, social support, and life satisfaction.** The next significant mediating path through social support was from age group to life satisfaction. Similar to the last significant indirect pathway, social support acted as the mechanism through which age influenced life satisfaction among oldest old adults. Past studies have examined social support as the mediating mechanism between life satisfaction and other psychosocial variables, such as personality type (Dumitrache, Rubio, & Rubio-Herrera, 2018). Dumitrache et al. (2018) posited how crucial social support and social relationships are for older adults' life satisfaction. Bishop et al. (2006) examined social support and life satisfaction using the Georgia Centenarian Study, identifying significant links among them, but without including age. Other studies confirmed that older adults tended to

report higher levels of life satisfaction during their social interactions compared to the younger group (Birditt & Fingerman, 2003; Luong, Charles, & Fingerman, 2011).

**Social network, social support, and life satisfaction.** The next two important mediation pathways through social support were the same pathway, showing associations for both the total sample and for the centenarian subgroup. The pathway was from social network to life satisfaction through levels of perceived social support. This relationship indicated that participants who had a larger social network group were also predicted to have increased levels of perceived social support, which in-turn related to greater satisfaction with life. Overall, this trend indicates that social network size may indirectly influence life satisfaction through the level of perceived social support for octogenarians, centenarians, and near-centenarians. Past studies have identified the importance of social relationships as they influence life satisfaction for older adults (Bai et al., 2018; Bishop et al., 2006; Young, 2006), which is consistent with the current study's findings. Furthermore, Burholt et al. (2007) addressed how the social network was more of the "structure" of social relationships, whereas social support acted as the "function" or type of support provided. The current study identified how the structure (social network) influences the function (social support) as it influences life satisfaction.

### **Moderation of Social Support and Social Network**

This research question included two hypotheses, covering moderating effects of social network and social support in relation to ADL and life satisfaction. These moderating hypotheses of social support and social network refer to the buffering hypothesis of social support (Cohen & Wills, 1985). This "buffering hypothesis" mostly focuses on the importance of social resources for decreasing the effect of stress and stressful events on well-being. However, the current study aimed to identify how social support influences the strength of the relationship between social networks and life satisfaction, or how social network size may influence the strength of the

relationship between perceived social support and life satisfaction. Additionally, the study aimed to examine how the moderating factor of social support could influence the strength of the relationship between functional health (ADL) and life satisfaction.

The two hypotheses regarding the moderation of social support and social network were not supported in the current study. Although direct influences of social support were identified for both samples in predicting life satisfaction, no significant moderation effects were found. Hypothesis 4a predicted that the strength of the relationship between social support and life satisfaction would be influenced by the social network size of the older adults. One reason this moderating effect was not significant could be due to the fact that everyone in this study reported having at least one close social network member. Having at least one close relationship may be more influential than a larger number of social network members, especially for oldest old adults and considering the socioemotional selectivity theory. Yorgason et al. (2018) posited that while some centenarians may have a smaller social circle, the close connections they do keep become stronger and may contribute to their longevity.

The second moderating effect with social support and ADL, hypothesis 4b, was also not supported in the current study. The hypothesis had predicted that the strength of the relationship between functional ability (ADL) and life satisfaction would be influenced by the level of perceived social support for older adults in this study. Previous studies identified the role of social support as a buffer against life stressors (Cohen, 2004; Hornstein & Eisenberger, 2017; Mackin et al., 2017). Although the current study did not specifically focus on life stressors, ADL impairment such as difficulty with everyday personal tasks could be seen as a stressor for older adults. However, the structural path model did not include a direct relationship between ADL and life satisfaction in the current study, which influences the lack of a moderating effect. Future

studies could examine different well-being outcomes for older adults to see whether perceived social support or network sizes influence the relationship between ADL and that outcome variable.

### **Limitations and Future Directions**

There are several limitations to consider within the current study. First, the sample of centenarians in the study included 137 people who were cognitively healthy enough to respond to the self-rated questions. Of course, including more participants would be advantageous. However, it is important to consider the unique nature of centenarians. The centenarians in the current study were born between 1900 and 1910. The Centers for Disease Control and Prevention (2011) reported that the average life expectancy for individuals born in 1900 was 47.3 years. That means that the centenarians in the current study lived more than 50 years past their average expected life span. With that in mind, having 137 people live to the extraordinary age of 98+ is notable.

Another limitation of the current study is its cross-sectional design. This study can establish associations among significant variables, but is unable to predict the directionality of the association due to the lack of longitudinal data. This is particularly an issue in regard to the association among social support and ADL. This study is unable to examine changes over time in social resources as they may impact functional health for oldest old adults. This is a limitation in this study, as the bidirectionality of the association with social support and ADL must be acknowledged. Past studies have also posited that the association may be bidirectional among older adults (in that functional health status influences the level of social support). Therefore, future studies could consider testing a similar path model using centenarian data with multiple time points. By having multiple data time points, longitudinal growth-curve modeling could be applied to examine the change in social network size or change in level of perceived social

support as it predicts the changes in functional health and life satisfaction at different time points. Additionally, as residence type may shift as adults may need increased care, longitudinal studies could examine the changes over time, specifically with regard to social resources and ultimately, life satisfaction. Further, future studies examining intraindividual changes over time could better understand the complexity of social support as a “trait” versus “state” variable. This would add to the knowledge regarding whether social resources tend to remain steady (trait-like) or whether they change over time (state-like) for older adults. There is more complexity to examine regarding social resources and social support for oldest old adults, including: exploration into perceived versus received support, oldest-old adults giving support to others, and amount of support available to oldest old adults.

Another limitation to consider is that this research was conducted with older adults aged 80+ in the state of Georgia, which affects the generalizability. Furthermore, Pietromonaco and Collins’ (2017) theoretical framework was not specifically created for or aimed toward older adults, including centenarians. This could be one reason why it was not as successful in predicting certain paths with the centenarian sample. Future studies should further explore age group differences of oldest old adults and examine whether differences similar to the current study are identified.

One limitation in this study is regarding the measures used. The current study’s measures were not specifically developed for oldest old adults and especially not for centenarians. For example, although the questions in the Life Satisfaction Index (Neugarten, Havighurst, & Tobin, 1961) have demonstrated high reliability and validity with general older adult samples, this was not the case in the current study. The current study reported a Cronbach’s alpha for the Life Satisfaction Index items of .59. Due to this somewhat unreliable result, item analysis for

improved reliability resulted in a removal of item 1 in the scale, resulting in a marginal Cronbach's alpha of .61. This could be due to factors such as the uniqueness of the oldest adult group, since oldest old adults have been established as an exceptional group (Poon & Cohen-Mansfield, 2011). It could be that the variable of life satisfaction may not be the most ideal outcome to test for octogenarians and centenarians. Additionally, perhaps the significant role of life satisfaction is relevant, but the questions from this index are targeted toward the general population and do not encapsulate the unique characteristics and experiences of oldest old adults. Perhaps the questions posed in the Life Satisfaction Index, such as "These are the best years of my life" and "I am just as happy now as when I was younger" (Neugarten et al., 1961) may not capture the satisfaction with life of exceptional oldest old adults. Questions may need to be adjusted for oldest old adults to take into account their longevity, including increased barriers and how their physical and social health may be affected, rather than comparing their happiness to a younger time when their social companions and physical health may have been larger and healthier, respectively. For the current sample, about 72% of participants were widowed, which may affect responses to questions asking about a time when they were younger (and possibly before widowhood). Oldest old adults may outlive loved ones (Hensley et al., 2012; Manning et al., 2012) or need an increase in care for their ADL needs (Berlau et al., 2009) requiring a move into a care facility, any of which could influence their responses to questions comparing their satisfaction with life compared to a younger age. Future studies could examine the measures of life satisfaction among oldest old adults and identify the mechanisms for which there may be lower reliability and/or lack of significant associations with ADL, contrary to previous literature for older adults 65 and older. Other questionnaires and surveys have been adjusted for specific demographics or age groups; for example, attachment theory is designed for use with younger

children, while adult attachment theory is targeted toward adults. Perhaps the Life Satisfaction Index, the Social Provisions Scale, the Social Resources Scale, etc. are not targeted specifically enough for the oldest old population, especially centenarians. These exceptionally long-lived adults may have other factors driving their well-being and health, and it is important to consider that this may have been a limiting factor for the current study. Future directions could include updating certain well-being measures to account for the specific and individualized factors of centenarians.

Another limitation worth noting is regarding the social network item in the current study and the item's sensitivity. The social network item asks the number of people known well-enough to visit with at home and includes four response categories: "*none*," "*one or two*," "*three or four*," or "*five or more*." Although everyone in the current study reported at least 1 or more people in their social network, the majority of the responses were "*five or more*." This seems to be a positive outcome regarding the size of social network for oldest old adults, but it is a limitation regarding the sensitivity of the question itself. Specifically, there is lack of specificity regarding whether the number of social network members is being measured precisely enough. Since a large proportion of the current sample reported "*five or more*" individuals in their social networks, it could be worth investigating a more specific response category for future studies with oldest old adults. Perhaps separating response categories into numerical responses instead of larger categories, future studies could examine whether the same associations among social network size with age and social support are identified among oldest old adults, and specifically answering the question whether it is more important to have one person to depend on rather than more than five individuals in the wider social network. Additionally, future studies should examine the composition of the social support networks of older adults, specifically identifying

the types of relationships and how they may differently influence well-being and life satisfaction. For example, exploring whether the close support individual is a husband or wife, versus an adult child or other family member, versus a hired caregiver, etc., and whether the various relationships have a significantly different effect.

Future directions for the field of centenarian research may need to focus on establishing what social support really looks like for those over 100 years of age. To date, limited research has attempted to identify the life satisfaction of centenarians as predicted by social support and social network. At this time in their life span, centenarians may have outlived their spouses, friends, other family members, and sometimes even their children. This “survival” aspect, although extraordinary and full of opportunity for learning about extending a healthy life span, may also come with the harsh reality of possibly out-living loved ones. For this reason, social support may not play as big of a role as hypothesized for those over 100 years of age.

It is also worth noting that future studies will need to include much more information on the role of technology within the social support of older adults. This could include greater technology supports within the home such as interactive smart speakers, as well as the use of video chatting with loved ones, to using an application to communicate with healthcare professionals. Additionally, the use of social media and online messaging platforms could supplement the social support given and received by older adults. The world tends to be moving toward greater virtual communication and future studies will need to take that into account. For older adults, technology may not replace in-person communication or even be their form of communication. However, identifying what roles interactive technologies play for their social support and social network will be integral to understanding how older adults communicate. It will be important to identify how this shift may affect their life satisfaction or similar well-being

outcomes, and how it compares to the current study's findings. Future studies could explore replications of the current study with the addition of greater technological communication options, and whether the same relationship of social support predicting life satisfaction for older adults is identified.

Another future direction of importance may include for future studies to work on identifying specific constructs, theories, and scales for the oldest old population. Just as Cho et al. (2012) established that successful aging theory does not work well with the centenarian population, other theories may need to be tested and adjusted to better fit this unique population. In addition to theory adjustment, something to consider is the constructs themselves and how they relate to oldest old adults. For example, asking a social interaction question on the "number of times traveling to visit a friend" might not be as telling for centenarians, as some important social interactions could be happening within their own home or community. Additionally, social interaction questions asking about the frequency of telephone calls could miss individual differences for why some older adults may have less telephone communication. For example, if older adults are hard of hearing due to natural hearing loss (National Institute on Deafness and Other Communication Disorders, 2016), they may interact less with loved ones via telephone calls, and more in person. Those individuals would score lower for a measure of social interaction, but the scale could be missing an integral part of the story. Another aspect to consider with these scales is the update of technological communication. Some scales, due to the state of technology at the time created, do not include any form of email, text message, or video communication, as well as the increased use of interactive speakers within the older adult community (Choi, Demiris, & Thompson, 2018). These scales may be missing key components of socializing and communication among present-day centenarians. Future studies should make

sure that their scales are up-to-date enough to capture some of the updated forms of communication in today's day and age.

In conclusion, this study identified important pathways of health and well-being for older adults, and specifically the unique sub-group of centenarians. Perhaps the most influential finding is that perceived social support significantly predicts life satisfaction for both the total sample, and for the centenarian subsample. Although there were several variables that varied for each of the two groups, the significant role of social support remained meaningful in predicting the levels of life satisfaction throughout. This adds to the growing literature on older adults, which previously established the importance of social relationships influencing life satisfaction (Bai et al., 2018; Chen et al., 2019; Cutrona et al., 1986; Larson, 1978; Liang et al., 1980; Young, 2006). Life satisfaction should also be further explored in future studies with centenarians, as it has been established as a key association with longevity (Buono et al., 1998; Celso et al., 2003; Xu & Roberts, 2010). Additionally, future research should try to further investigate the association between higher activity levels, as they have been directly related to greater levels of happiness, higher functioning, and reduced risk of mortality in past studies (Menec, 2003), yet perhaps not with the oldest old population. Further research is needed to delve into what other variables influence the life of centenarians and their satisfaction with life. Additionally, investigating the role of social support with larger populations of more diverse older adult groups will add to the breadth of knowledge, and can help identify other important outcomes of health and well-being at 100+ years of age.

Future studies examining the association of social involvement and health persisting into very late life is an expansive opportunity (Cherry et al., 2013). Past research has noted the potential of social support interventions for better health and well-being outcomes (Uchino,

2009), but the effectiveness targeted toward specific older adult groups remains unclear (Cattan, White, Bond, & Learmouth, 2005). Interventions focused on increasing social support levels to improve the well-being of older adults could help maximize their physical health outcomes, including their functional abilities (ADL; Dai et al., 2016). Cherry et al. (2013) posited the importance of interventions targeted toward the oldest old population, as they are more likely to encounter health-related declines. Krause (2004) noted that emotional support moderated some of the traumatic experiences influencing the life satisfaction of older adults in his study, but especially within the oldest-old group (85 years and older). Dai et al. (2016) added that interventions targeted toward oldest old adults may need to be cohort-specific, as well as unique to each sample's demographic and contextual characteristics.

In closing, the current study has added to the knowledge surrounding the social support and well-being of oldest old adults, as well as testing a new theoretical framework with an adjusted model fitted to the oldest old sample in this study. Finally, this study hopefully encourages future researchers to dive deeper into the connection between social support and life satisfaction among the oldest old population, especially as survivability into exceptional ages continues to climb. As the number of centenarians is expected to more than quadruple by 2030 (National Institute of Aging, 2007; Willcox et al., 2010), it is crucial to continue expanding the knowledge and understanding for how to live healthier, *satisfied* lives, surrounded by supportive people that help make life worth living.

## REFERENCES

- Ailshire, J. A., Beltrán-Sánchez, H., Crimmins, E. M., & Kritchevsky, S. (2015). Becoming centenarians: Disease and functioning trajectories of older U.S. adults as they survive to 100. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, 70(2), 193-201. doi:10.1093/gerona/glu124
- Ailshire, J. A., & Crimmins, E. M. (2011). Psychosocial factors associated with longevity in the United States: Age differences between the old and oldest-old in the Health and Retirement Study. *Journal of Aging Research*, 2011, 530534. doi:10.4061/2011/530534
- Alexandre, T., Corona, L. P., Nunes, D. P., Santos, J. L., Duarte, Y. A., & Lebrão, M. L. (2014). Disability in instrumental activities of daily living among older adults: Gender differences. *Revista de Saude Publica*, 48(3), 379–389. doi:10.1590/s0034-8910.2014048004754
- Antonucci, T. C., Ajrouch, K. J., & Birditt, K. S. (2014). The convoy model: Explaining social relations from a multidisciplinary perspective. *The Gerontologist*, 54(1), 82-92. doi:10.1093/geront/gnt118
- Antonucci, T. C., & Akiyama, H. (1987). Social networks in adult life and a preliminary examination of the convoy model. *Journal of Gerontology*, 42(5), 519-527. doi:10.1093/geronj/42.5.519
- Arai, Y., Inagaki, H., Takayama, M., Abe, Y., Saito, Y., Takebayashi, T., Gondo, Y., & Hirose, N. (2014). Physical independence and mortality at the extreme limit of life span: Supercentenarians study in Japan. *Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, 69(4), 486-494. doi:10.1093/gerona/glt146
- Ashida, S., & Heaney, C. A. (2008). Differential associations of social support and social connectedness with structural features of social networks and the health status of older adults. *Journal of Aging and Health*, 20(7), 872–893. doi:10.1177/0898264308324626
- Austad, S. N. (2006). Why women live longer than men: sex differences in longevity. *Gender Medicine*, 3(2), 79-92. doi:10.1016/S1550-8579(06)80198-1
- Avlund, K., Lund, R., Holstein, B.E., Due, P., Sakari-Rantala, R., & Heikkinen, R.L. (2004). The impact of structural and functional characteristics of social relations as determinants of functional decline. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 59(1), 44-51. doi:10.1093/geronb/59.1.S44
- Avlund, K., Schultz-Larsen, K., & Kreiner, S. (1993). The measurement of instrumental ADL: Content validity and construct validity. *Aging Clinical and Experimental Research*, 5, 371-383. doi:10.1007/BF03324192

- Aylaz, R., Aktürk, Ü., Erci, B., Öztürk, H., & Aslan, H. (2012). Relationship between depression and loneliness in elderly and examination of influential factors. *Archives of Gerontology and Geriatrics*, *55*, 548–554. doi:10.1016/j.archger.2012.03.006
- Bai, X., Yang, S., & Knapp, M. (2018). Sources and directions of social support and life satisfaction among solitary Chinese older adults in Hong Kong: The mediating role of sense of loneliness. *Clinical Interventions in Aging*, *13*, 63–71. doi:10.2147/CIA.S148334
- Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. In P. B. Baltes & M. M. Baltes (Eds.), *Successful aging: Perspectives from the behavioral sciences* (pp. 1-34). New York, NY: Cambridge University Press.
- Barnes, L. L., Mendes de Leon, C. F., Wilson, R. S., Bienias, J. L., & Evans, D. A. (2004). Social resources and cognitive decline in a population of older African Americans and whites. *Neurology*, *63*(12), 2322-2326. doi:10.1212/01.WNL.0000147473.04043.B3
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182. doi:10.1037/0022-3514.51.6.1173
- Batz-Barbarich, C., Tay, L., Kuykendall, L., & Cheung, H. K. (2018). A meta-analysis of gender differences in subjective well-being: Estimating effect sizes and associations with gender inequality. *Psychological Science*, *29*(9), 1491–1503. doi:10.1177/0956797618774796
- Berlau, D. J., Corrada, M. M., & Kawas, C. (2009). The prevalence of disability in the oldest-old is high and continues to increase with age: Findings from the 90+ Study. *International Journal of Geriatric Psychiatry*, *24*(11), 1217–1225. doi:10.1002/gps.2248
- Birditt, K. S., & Fingerman, K. L. (2003). Age and gender differences in adults' descriptions of emotional reactions to interpersonal problems. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *58*(4), 237-245. doi:10.1093/geronb/58.4.p237
- Bishop, A. J., Martin, P., & Poon, L. (2006). Happiness and congruence in older adulthood: A structural model of life satisfaction. *Aging & Mental Health*, *10*(5), 445-453. doi:10.1080/13607860600638388
- Boerner, K., Jopp, D. S., Carr, D., Sosinsky, L., & Kim, S. K. (2014). “His” and “her” marriage? The role of positive and negative marital characteristics in global marital satisfaction among older adults. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *69*(4), 579-589. doi:10.1093/geronb/gbu032

- Boerner, K., Jopp, D. S., Park, M.-K. S., & Rott, C. (2016). Whom do centenarians rely on for support? Findings from the Second Heidelberg Centenarian Study. *Journal of Aging & Social Policy, 28*(3), 165–186. doi:10.1080/08959420.2016.1160708
- Boerner, K., Kim, K., Kim, Y., Rott, C., & Jopp, D. S. (2018). Centenarians' end-of-life thoughts and plans: Is there social network on the same page? *Journal of the American Geriatric Society, 66*(7), 1311-1317. doi:10.1111/jgs.15398
- Bozo, Ö. & Guarnaccia, C. (2010). Activities of daily living, social support, and future health of older Americans. *The Journal of Psychology, 144*(1), 1-14. doi:10.1080/00223980903356032
- Bromell, L., & Cagney, K. A. (2014). Companionship in the neighborhood context: Older adults' living arrangements and perceptions of social cohesion. *Research on Aging, 36*(2), 228–243. doi:10.1177/0164027512475096
- Buono, M. D., Urciuoli, O., & De Leo, D. (1998). Quality of life and longevity: A study of centenarians. *Age and Ageing, 27*(2), 207-216. doi:10.1093/ageing/27.2.207
- Burholt, V., Windle, G., Morgan, D. J., & CFAS Wales team (2016). A social model of loneliness: The roles of disability, social resources, and cognitive impairment. *The Gerontologist, 57*(6), 1020–1030. doi:10.1093/geront/gnw125
- Burholt, V., Windle, G., Ferring, D., Balducci, C., Fagerström, C., Thissen, F., Weber, G., & Wenger, C. (2007). Reliability and validity of the older Americans resources and services (OARS) social resources scale in six European countries. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 62*(6), 371-379. doi:10.1093/geronb/62.6.S371
- Cacioppo, J. T., & Cacioppo, S. (2014). Social relationships and health: The toxic effects of perceived social isolation. *Social and Personality Psychology Compass, 8*, 58–72. doi:10.1111/spc3.12087
- Caetano, S. C., Silva, C. M., & Vettore, M. V. (2013). Gender differences in the association of perceived social support and social network with self-rated health status among older adults: A population-based study in Brazil. *BMC Geriatrics, 13*, 122. doi:10.1186/1471-2318-13-122
- Carstensen, L. L. (1993). Motivation for social contact across the life span: A theory of socioemotional selectivity. In J.E. Jacobs (Ed.), *Current theory and research in motivation, Vol. 40. Nebraska Symposium on Motivation, 1992: Developmental perspectives on motivation* (pp. 209-254). Lincoln, NE: University of Nebraska Press.
- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science, 312*(5782), 1913-1915. doi:10.1126/science.1127488

- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously. A theory of socioemotional selectivity. *American Psychologist*, *54*, 165-181. doi:10.1037/0003-066X.54.3.165
- Cattan, M., White, M., Bond, J., & Learmouth, A. (2005). Preventing social isolation and loneliness among older people: A systematic review of health promotion interventions. *Ageing & Society*, *25*, 41-67. doi:10.1017/S0144686X04002594
- Celso, B. G., Ebener, D. J., & Burkhead, E. J. (2003). Humor coping, health status, and life satisfaction among older adults residing in assisted living facilities. *Aging & Mental Health*, *7*(6), 438-445. doi:10.1080/13607860310001594691
- Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, National Center for Health Statistics. (2011). *Health, United States, 2010: With special feature on death and dying* (DHHS Pub No. 2011-1232). Location: Hyattsville, MD. Retrieved from <https://www.cdc.gov/nchs/Data/Hus/hus10.pdf>
- Centers for Medicare and Medicaid Services (USgov) (2008). *Activities of daily living*. Retrieved from [https://www.cms.gov/research-statistics-data-and-systems/research/mcbs/downloads/2008\\_appendix\\_b.pdf](https://www.cms.gov/research-statistics-data-and-systems/research/mcbs/downloads/2008_appendix_b.pdf)
- Chen, Y., Yang, C., & Feng, S. (2019). The effect of social communication on life satisfaction among the rural elderly: A moderated mediation model. *International Journal of Environmental Research and Public Health*, *16*(20), 3791. doi:10.3390/ijerph16203791
- Cherry, K. E., Walker, E. J., Brown, J. S., Volaufova, J., LaMotte, L. R., Welsh, D. A., Su, L. J., Jazwinski, S. M., Ellis, R., Wood, R. H., & Frisard, M. I. (2013). Social engagement and health in younger, older, and oldest-old adults in the Louisiana Healthy Aging Study. *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society*, *32*(1), 51-75. doi:10.1177/0733464811409034
- Cheung, M. W. L. (2009). Comparison of methods for constructing confidence intervals of standardized indirect effects. *Behavior Research Methods*, *41*(2), 425-438. doi:10.3758/BRM.41.2.425
- Cho, J., Martin, P., & Poon, L. W. (2012). The older they are, the less successful they become? Findings from the Georgia Centenarian Study. *Journal of Aging Research*, *2012*, 1-9. doi:10.1155/2012/695854
- Choi, Y., Demiris, G., & Thompson, H. (2018). Feasibility of smart speaker use to support aging in place. *Innovation in Aging*, *2*(1), 560. doi:10.1093/geroni/igy023.2073
- Cohen, S. (2004). Social relationships and health. *American Psychologist*, *59*, 676-684. doi:10.1037/0003-066X.59.8.676

- Cohen, S., Doyle, W. J., Turner, R. B., Alper, C. M., & Skoner, D. P. (2003). Sociability and susceptibility to the common cold. *Psychological Science, 14*, 389-395. doi:10.1111/1467-9280.01452
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310-357. doi:10.1037/0033-2909.98.2.310
- Connidis, I. A., & Davies, L. (1992). Confidants and companions: Choices in later life. *Journal of Gerontology, 47*(3), S115-S122. doi:10.1093/geronj/47.3.S115
- Cooper, H., Arber, S., Fee, L., & Ginn, J. (1999). The influence of social support and social capital on health: A review and analysis of British data. *London: Health Education Authority.*
- Cutrona, C. E., & Russell, D. (1987). The provisions of social relationships and adaptation to stress. *Advances in Personal Relationships, 1*, 37-67.
- Cutrona, C. E., Russell, D., & Rose, J. (1986). Social support and adaptation to stress by the elderly. *Psychology and Aging, 1*(1), 47 - 54. doi:10.1037/0882-7974.1.1.47
- Cutrona, C. E., & Russell, D. W. (1990). Type of social support and specific stress: Toward a theory of optimal matching. In B. R. Sarason, I. G. Sarason, & G. R. Pierce (Eds.), *Social support: An interactional view* (pp. 319–366). New York: Wiley.
- Czaja, S., Boot, W., Charness, N., Rogers, W., & Sharit, J. (2018). Improving social support for older adults through technology: Findings from the PRISM randomized controlled trial. *The Gerontologist, 58*(3), 467-477. doi:10.1093/geront/gnw249.
- Dai, Y., Zhang, C. Y., Zhang, B. Q., Li, Z., Jiang, C., & Huang, H. L. (2016). Social support and the self-rated health of older people: A comparative study in Tainan Taiwan and Fuzhou Fujian province. *Medicine, 95*(24), e3881. doi:10.1097/MD.0000000000003881
- Del-Pino-Casado, R., Frías-Osuna, A., Palomino-Moral, P. A., Ruzafa-Martínez, M., & Ramos-Morcillo, A. J. (2018). Social support and subjective burden in caregivers of adults and older adults: A meta-analysis. *PLoS ONE, 13*(1), e0189874. doi:10.1371/journal.pone.0189874
- Diehr, P. H., Thielke, S. M., Newman, A. B., Hirsch, C., & Tracy, R. (2013). Decline in health for older adults: Five-year change in 13 key measures of standardized health. *Journals of Gerontology, Series A: Biological Sciences and Medical Sciences, 68*(9), 1059-1067. doi:10.1093/gerona/glt038
- Dumitrache, C. G., Rubio, L., & Rubio-Herrera, R. (2018). Extroversion, social support and life satisfaction in old age: A mediation model. *Aging & Mental Health, 22*(8), 1063-1071. doi:10.1080/13607863.2017.1330869.

- Enkvist, A., Ekstrom, H., & Elmstahl, S. (2012). Associations between functional ability and life satisfaction in the oldest old: Results from the longitudinal population study 'Good Aging' in Skåne. *Clinical Interventions in Aging*, 7, 313–320. doi:10.2147/CIA.S33610
- Ewen, H. H., Washington, T. R., Emerson, K. G., Carswell, A. T., & Smith, M. L. (2017). Variation in older adult characteristics by residence type and use of home- and community-based services. *International Journal of Environmental Research and Public Health*, 14(3), 330. doi:10.3390/ijerph14030330
- Feeney, B., & Collins, N. (2015). A new look at social support: A theoretical perspective on thriving through relationships. *Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology Inc*, 19(2), 113-47. doi:10.1177/1088868314544222
- Feng, Z., Falkingham, J., Liu, X., & Vlachantoni, A. (2017). Changes in living arrangements and mortality among older people in China. *Social Science & Medicine: Population Health*, 3, 9–19. doi:10.1016/j.ssmph.2016.11.009
- Feng, Z., Jones, K., & Wang, W. W. (2015). An exploratory discrete-time multilevel analysis of the effect of social support on the survival of elderly people in China. *Social Science & Medicine*, 130, 181–189. doi:10.1016/j.socscimed.2015.02.020
- Ferring, D., Balducci, C., Burholt, V., Wenger, C., Thissen, F., Weber, G., & Hallberg, I. (2004). Life satisfaction of older people in six European countries: Findings from the European Study on adult well-being. *European Journal of Ageing*, 1(1), 15–25. doi:10.1007/s10433-004-0011-4
- Fillenbaum, G.G. (1988). *Multidimensional functional assessment of older adults: The Duke older Americans resources and services procedures*. Hillsdale: Lawrence Erlbaum Associates.
- Fillenbaum, G. G., & Smyer, M. A. (1981). The development, validity, and reliability of the OARS multidimensional functional assessment questionnaire. *Journal of Gerontology*, 36(4), 428-434. doi:10.1093/geronj/36.4.428
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12(3), 189-198. doi:10.1016/0022-3956(75)90026-6
- Fratiglioni, L., Wang, H. X., Ericsson, K., Maytan, M., & Winblad, B. (2002). Influence of social network on occurrence of dementia: A community-based longitudinal study. *Lancet*, 355, 1315–1319. doi:10.1016/S0140-6736(00)02113-9
- Freedman, V. A., Wolf, D. A., & Spillman, B. C. (2016). Disability-free life expectancy over 30 years: A growing female disadvantage in the US population. *American Journal of Public Health*, 106(6), 1079–1085. doi:10.2105/ajph.2016.303089

- French, S. L., Gekoski, W. L., & Knox, V. J. (1995). Gender differences in relating life events and well-being in elderly individuals. *Social Indicators Research*, *35*, 1–25. doi:10.1007/BF01079235
- Galiana, L., Gutiérrez, M., Sancho, P., Francisco, E.-H., & Tomás, J. M. (2016). Socio-demographic variables and successful aging of the Angolan elderly. *Scientifica*, *2016*, 5306756. doi:10.1155/2016/5306756
- Gana, K., Bailly, N., Saada, Y., Joulain, M., & Alaphilippe, D. (2013). Does life satisfaction change in old age: Results from an 8-year longitudinal study. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *68*(4), 540–552. doi:10.1093/geronb/gbs093
- Gaymu, J., & Springer, S. (2010). Living conditions and life satisfaction of older Europeans living alone: A gender and cross-country analysis. *Ageing & Society*, *30*, 1153–1175. doi:10.1017/S0144686X10000231
- Gerino, E., Rollè, L., Sechi, C., & Brustia, P. (2017). Loneliness, resilience, mental health, and quality of life in old age: A structural equation model. *Frontiers in Psychology*, *8*, 1-12. doi:10.3389/fpsyg.2017.02003
- Gill, T. M., Williams, C. S., Richardson, E. D., Berkman, L. F., & Tinetti, M. E. (1997). A predictive model for ADL dependence in community-living older adults based on a reduced set of cognitive status items. *Journal of the American Geriatrics Society*, *45*(4), 441-445. doi:10.1111/j.1532-5415.1997.tb05168.x
- Giusta, M. D., Jewell, S. L., & Kambhampati, U. S. (2011). Gender and life satisfaction in the UK. *Feminist Economics*, *17*(3), 1-34. doi:10.1080/13545701.2011.582028
- Glaesmer, H., Grande, G., Braehler, E., & Roth, M. (2011). The German version of the satisfaction with life scale (SWLS) psychometric properties, validity, and population-based norms. *European Journal of Psychological Assessment*, *27*, 127-132. doi:10.1027/1015-5759/a000058
- Glass, T. A., Mendes de Leon, C. F., Marottoli, R. A., & Berkman, L. F. (1999). Population based study of social and productive activities as predictors of survival among elderly Americans. *BMJ*, *319*, 478-483. doi:10.1136/bmj.319.7208.478
- Havighurst, R. J. (1961). Successful ageing. *The Gerontologist*, *8*(1), 8–13. doi:10.1093/geront/1.1.8.
- Heinz, M., Cone, N., Da Rosa, G., Bishop, A. J., & Finchum, T. (2017) Examining supportive evidence for psychosocial theories of aging within the oral history narratives of centenarians. *Societies*, *7*(8), 1-20. doi:10.3390/soc7020008

- Helliwell, J. F., & Putnam, R. D. (2004). The social context of well-being. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 359(1449), 1435–1446. doi:10.1098/rstb.2004.1522
- Hensley, B., Martin, P., Margrett, J. A., MacDonald, M., Siegler, I. C., Poon, L. W., & The Georgia Centenarian Study 1. (2012). Life events and personality predicting loneliness among centenarians: Findings from the Georgia Centenarian Study. *The Journal of Psychology*, 146(1-2), 173-188. doi:10.1080/00223980.2011.613874
- Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2013). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine*, 7(7), e1000316. doi:10.1371/journal.pmed.1000316.
- Hornstein, E., & Eisenberger, N. (2017) Unpacking the buffering effect of social support figures: Social support attenuates fear acquisition. *PLoS ONE* 12(5): e0175891. doi:10.1371/journal.pone.0175891
- House, J. S., & Kahn, R. L. (1985). Measures and concepts of social support. In S. Cohen & L. Syme (Eds.), *Social support and health* (pp. 83–108). New York: Academic Press.
- House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science*, 241(4865), 540-545. doi:10.1126/science.3399889
- Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55. doi:10.1080/10705519909540118
- Hughes, T. F., Andel, R., Small, B. J., Borenstein, A. R., & Mortimer, J. A. (2008). The association between social resources and cognitive change in older adults: Evidence from the Charlotte County Healthy Aging Study. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 63(4), 241-244. doi:10.1093/geronb/63.4.p241
- Huta, V. & Ryan, R. M. (2010). Pursuing pleasure or virtue: The differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies*, 11(6), 735-762. doi:10.1007/s10902-009-9171-4
- Hutnik, N., Smith, P., & Koch, T. (2012). What does it feel like to be 100? Socio-emotional aspects of well-being in the stories of 16 Centenarians living in the United Kingdom. *Aging and Mental Health*, 7(16), 811-818. doi:10.1080/13607863.2012.684663
- Jopp, D. S., Boerner, K., Cimarolli, V., Hicks, S., Mirpuri, S., Paggi, M., Cavanagh, A., & Kennedy, E. (2016). Challenges experienced at age 100: Findings from the Fordham Centenarian Study. *Journal of Aging & Social Policy*, 28(3), 187–207. doi:10.1080/08959420.2016.1163652

- Jopp, D. S., Boerner, K., Ribeiro, O., & Rott, C. (2016) Life at age 100: An international research agenda for centenarian studies. *Journal of Aging & Social Policy*, 28(3), 133-147. doi:10.1080/08959420.2016.1161693
- Jopp, D. S., Park, M.-K. S., Lehrfeld, J., & Paggi, M. E. (2016). Physical, cognitive, social and mental health in near-centenarians and centenarians living in New York City: Findings from the Fordham Centenarian Study. *BMC Geriatrics*, 16(1). doi:10.1186/s12877-015-0167-0
- Joshanloo, M., & Jovanović, V. (2019). The relationship between gender and life satisfaction: Analysis across demographic groups and global regions. *Archives of Women's Mental Health*. doi:10.1007/s00737-019-00998-w
- Keller-Cohen, D., Fiori, K., Toler, A., & Bybee, D. (2006). Social relations, language, and cognition in the 'oldest old'. *Ageing and Society*, 26(04), 585–605. doi:10.1017/S0144686X06004910
- Kim, B. R. (2014). *Health and living arrangements among older adults in diverse social and cultural contexts* (Doctoral dissertation). Retrieved from Deep Blue. (2014-10-13T18:20:21Z)
- Kimm, H., Sull, J. W., Gombojav, B., Yi, S. W., & Ohrr, H. (2012). Life satisfaction and mortality in elderly people: The Kangwha Cohort Study. *BMC Public Health*, 12(54). doi:10.1186/1471-2458-12-54.
- Knapp, M. R. J. (1977). The activity theory of aging: An examination in the English context. *The Gerontologist*, 17(6), 553-559. doi:10.1093/geront/17.6.553
- Kowal, J., Wilson, K. G., McWilliams, L. A., Péloquin, K., & Duong, D. (2012). Self-perceived burden in chronic pain: Relevance, prevalence, and predictors. *PAIN®*, 153(8), 1735–1741. doi:10.1016/j.pain.2012.05.009
- Krause, N. (2004). Lifetime trauma, emotional support, and life satisfaction among older adults. *The Gerontologist*, 44(5), 615-623. doi:10.1093/geront/44.5.615
- Lachman, M. E., & Agrigoroaei, S. (2010). Promoting functional health in midlife and old age: Long-term protective effects of control beliefs, social support, and physical exercise. *PLoS ONE*, 5(10), e13297. doi:10.1371/journal.pone.0013297
- Lang, F. R. (2001). Regulation of social relationships in later adulthood. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 56, 321–326. doi:10.1093/geronb/56.6.P321
- Lansford, J. E., Sherman, A. M., & Antonucci, T. C. (1998). Satisfaction with social networks: An examination of socioemotional selectivity theory across cohorts. *Psychology and Aging*, 13, 544–552. doi:10.1037/0882-7974.13.4.544

- Larson, R. (1978). Thirty years of research on the subjective well-being of older Americans. *Journal of Gerontology*, *33*, 109-125. doi:10.1093/geronj/33.1.109
- Lee, M. T., Jang, Y., & Chang, W. Y. (2019). How do impairments in cognitive functions affect activities of daily living functions in older adults? *PLoS ONE*, *14*(6), e0218112. doi:10.1371/journal.pone.0218112
- Lee, Y.-S., & Waite, L. J. (2005). Husbands' and wives' time spent on housework: A comparison of measures. *Journal of Marriage and Family*, *67*(2), 328-336. doi:10.1111/j.0022-2445.2005.00119.x
- Liang, J. (1984). Dimension of the Life Satisfaction Index A: A structural formulation. *Journal of Gerontology*, *39*(5), 613-622. doi:10.1093/geronj/39.5.613
- Liang, J., Bennett, J. M., Shaw, B. A., Quiñones, A. R., Ye, W., Xu, X., & Ofstedal, M. B. (2008). Gender differences in functional status in middle and older age: Are there any age variations? *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *63*(5), S282-S292. doi:10.1093/geronb/63.5.s282
- Liang, J., Dvorkin, L., Kahana, E., & Mazian, F. (1980). Social integration and morale: A re-examination. *Journal of Gerontology*, *35*(5), 746-757. doi:10.1093/geronj/35.5.746
- Liang, Y., Song, A., Du, S., Guralnik, J. M., & Qiu, C. (2015). Trends in disability in activities of daily living among Chinese older adults, 1997-2006: The China health and nutrition survey. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, *70*(6), 739-745. doi:10.1093/gerona/glu204
- Long, M. V., & Martin, P. (2000). Personality, relationship closeness, and loneliness of oldest old adults and their children. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *55*(5), 311-319. doi:10.1093/geronb/55.5.P311
- Luong, G., Charles, S. T., & Fingerman, K. L. (2011). Better with age: Social relationships across adulthood. *Journal of Social and Personal Relationships*, *28*(1), 9-23. doi:10.1177/0265407510391362
- Mackin, D. M., Perlman, G., Davila, J., Kotov, R., & Klein, D. N. (2017). Social support buffers the effect of interpersonal life stress on suicidal ideation and self-injury during adolescence. *Psychological Medicine*, *47*(6), 1149-1161. doi:10.1017/S0033291716003275
- Manning, L. K., Leek, J. A., & Radina, M. E. (2012). Making sense of extreme longevity: Explorations into the spiritual lives of centenarians. *Journal of Religion, Spirituality & Aging*, *24*(4), 345-359. doi:10.1080/15528030.2012.706737

- Margrett, J. A., Hsieh, W.-H., Heinz, M., & Martin, P. (2011). Cognitive status and change among Iowa centenarians. *International Journal of Aging and Human Development*, 75(4), 317-335. doi:10.2190/AG.75.4.b
- Martin, P. (2002). Individual and social resources predicting well-being and functioning in the later years: Conceptual models, research and practice. *Ageing International*, 27, 3-29. doi:10.1007/s12126-002-1000-6
- Martin, P., Hagberg, B. & Poon, L.W. (1997). Predictors of loneliness in centenarians: A parallel study. *Journal of Cross-Cultural Gerontology*, 12, 203–224. doi:10.1023/A:1006587502257
- Martin, P., Long, M. V., & Poon, L. W. (2002). Age changes and differences in personality traits and states of the old and very old. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 57(2), 144–152. doi:10.1093/geronb/57.2.P144
- Matt, G. E., & Dean, A. (1993). Social support from friends and psychological distress among elderly persons: Moderator effects of age. *Journal of Health and Social Behavior*, 34(3), 187–200. doi:10.2307/2137201
- Mendes de Leon, C. F., Glass, T. A., & Berkman, L. F. (2003). Social engagement and disability in a community population of older adults: The New Haven EPESE. *American Journal of Epidemiology*, 57(7), 633-642. doi:10.1093/aje/kwg028
- Menec, V. H. (2003). The relation between everyday activities and successful aging: A 6-year longitudinal study. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 58, 74–82. doi:10.1093/geronb/58.2.S74
- Merrill, S. S., Seeman, T. E., Kasl, S. V., & Berkman, L. F. (1997). Gender differences in the comparison of self-reported disability and performance measures. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, 52(1), M19-M26. doi:10.1093/gerona/52a.1.m19
- Mitchell, M. B., Miller, S. L., Woodard, J. L., Davey, A., Martin, P., Burgess, M., & Poon, L. W. (2011). Regression-based estimates of observed functional status in centenarians. *The Gerontologist*, 51(2), 179-189. doi:10.1093/geront/gnq087
- Mroczek, D. & Kolarz, C. (1998). The effect of age on positive and negative affect: A developmental perspective on happiness. *Journal of Personality and Social Psychology*, 75(5), 1333-1349. doi:10.1037/0022-3514.75.5.1333
- Muthén, L. K., & Muthén, B. O. (1998-2017). Mplus user's guide. Eighth Edition. Los Angeles, CA: Muthén & Muthén.
- National Institute on Aging (2007). *Why population aging matters: A global perspective*. Technical Report by the National Institute on Aging, Summit on Global Aging.

- National Institute on Deafness and Other Communication Disorders. (2016). *Age-related hearing loss* (NIH Publication. No. 97-4235). Bethesda, MD: NIDCD Information Clearinghouse.
- Neugarten, B. L., Havighurst, R. J., & Tobin, S. S. (1961). The measurement of life satisfaction. *Journal of Gerontology, 16*, 134-143. doi:10.1093/geronj/16.2.134
- Nezlek, J. & Allen, M. R. (2006). Social support as a moderator of day-to-day relationships between daily negative events and daily psychological well-being. *European Journal of Personality, 20*, 53-68. doi:10.1002/per.566.
- Ng, S. T., Tey, N. P., & Asadullah, M. N. (2017). What matters for life satisfaction among the oldest-old? Evidence from China. *PLoS ONE, 12*(2), e0171799. doi:10.1371/journal.pone.0171799
- Ogawa, M., Gondo, Y., & Masui, Y. (2008). Holistic classification of elderly by psychological, physical and social aspects. *Japanese Journal of Gerontology, 30*, 3-14.
- Oshio, T. (2012). Gender differences in the associations of life satisfaction with family and social relations among the Japanese elderly. *Journal of Cross-Cultural Gerontology, 27*(3), 259-274. doi:10.1007/s10823-012-9169-y.
- Paganini-Hill, A. (2013). Aging in place in a retirement community: 90+ year olds. *Journal of Housing for the Elderly, 27*(1-2), 191-205. doi:10.1080/02763893.2012.754822
- Perls, T., & Terry, D. (2003). Understanding the determinants of exceptional longevity. *Annals of Internal Medicine, 139*, 5-2, 445-449. doi:10.7326/0003-4819-139-5\_part\_2-200309021-00013
- Phillips, S. P. (2006). Risky business: Explaining the gender gap in longevity. *Journal of Men's Health and Gender, 3*(1), 43-46. doi:10.1016/j.jmhg.2005.08.004
- Pietromonaco, P. R., & Collins, N. L. (2017). Interpersonal mechanisms linking close relationships to health. *American Psychologist, 72*(6), 531-542. doi:10.1037/amp0000129
- Pinquart, M., & Sörensen, S. (2001). Gender differences in self-concept and psychological well-being in old age: A meta-analysis. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 56*(4), 195-213. doi:10.1093/geronb/56.4.P195
- Poon, L. W., & Cohen-Mansfield, J. (Eds.). (2011). *Understanding well-being in the oldest old*. Cambridge University Press. doi:10.1017/CBO9780511920974

- Poon, L. W., Jazwinski, M., Green, R. C., Woodard, J. L., Martin, P., Rodgers, W. L., Johnson, M.A., Hausman, D., Arnold, J., Davey, A., Batzer, M. A., Markesbery, W. R., Gearing, M., Siegler, I. C., Reynolds, S., & Dai, J. (2007). Methodological consideration in studying centenarians. In L. W. Poon, & T. T. Perls (Eds.), *Annual Review of Gerontology and Geriatrics*, 27, 231–264. New York: Springer.
- Poulain, M., Pes, G., & Salaris, L. (2011). A population where men live as long as women: Villagrande Strisaili, Sardinia. *Journal of Aging Research*, 2011, 153756. doi:10.4061/2011/153756
- Poulain, M., & Herm, A. (2015). Centenarians' marital history and living arrangements: Pathways to extreme longevity. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 71(4), 724-733. doi:10.1093/geronb/gbv082
- Prado, B. Z., Rojas-Barahona, C., & Marín, C. (2009). Validity and reliability of the Neugarten, Havighurst & Tobin's Life Satisfaction Index (LSI-A) in a sample of adults and older adults in Chile. *Terapia Psicológica*, 27(1), 15-26. doi:10.4067/S0718-48082009000100002
- Preacher, K. J., & Kelley, K. (2011). Effect size measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, 16(2), 93-115. doi:10.1037/a0022658
- Press, J. E., & Townsley, E. (1998). Wives' and husbands' housework reporting: Gender, class, and social desirability. *Gender and Society*, 12(2), 188-218. doi:10.1177/089124398012002005
- Priyanka, & Mishra, S. (2010). Gender differences in life satisfaction of elderly people. *Advance Research Journal of Social Science*, 1(2), 176-179.
- Pruchno, R. A., Wilson-Genderson, M., Rose, M., & Cartwright, F. (2010). Successful aging: Early influences and contemporary characteristics. *The Gerontologist*, 50, 821–833. doi:10.1093/geront/gnq041
- Randall, K., Martin, P., MacDonald, M., & Poon, L. W. (2010). Social resources and longevity: Findings from the Georgia Centenarian Study. *Gerontology*, 56, 106-111. doi:10.1159/000272026
- Randall, K., Martin, P., MacDonald, M., Margrett, J., Bishop, A., & Poon, L. W. (2011). Comparing the support-efficacy model among centenarians living in private homes, assisted living facilities, and nursing homes. *Journal of Aging Research*, 2011, 1-10. doi:10.4061/2011/280727
- Regan, J. C., & Partridge, L. (2013). Gender and longevity: Why do men die earlier than women? Comparative and experimental evidence. *Best Practice and Research: Clinical Endocrinology & Metabolism*, 27(4), 467-479. doi:10.1016/j.beem.2013.05.016

- Riley, M. W. (1998). Letter to the editor. *The Gerontologist*, 38(2), 151.  
doi:10.1093/geront/38.2.151
- Robnett, R. H. (2002). Quality of life and aging: Exploring the “paradox of well-being”.  
*Occupational Therapy Faculty Publications*. Paper 9. [http://dune.une.edu/ot\\_facpubs/9](http://dune.une.edu/ot_facpubs/9)
- Rowe, J. W., & Kahn, R. L. (2015). Successful aging 2.0: conceptual expansions for the 21st century. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 70(4), 593–596. doi:10.1093/geronb/gbv025.
- Rowe, J. W., & Kahn, R. L. (1987). Human aging: Usual and successful. *Science*, 237, 143-149.  
doi:10.1126/science.3299702
- Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *The Gerontologist*, 37(4), 433–440.  
doi:10.1093/geront/37.4.433
- Roy, N., Dubé, R., Després, C., Freitas, A., & Légaré, F. (2018). Choosing between staying at home or moving: A systematic review of factors influencing housing decisions among frail older adults. *PLoS ONE*, 13(1), e0189266. doi:10.1371/journal.pone.0189266
- Sarason, B. R., Shearin, E. N., Pierce, G. R., & Sarason, I. G. (1987). Interrelations of social support measures: Theoretical and practical implications. *Journal of Personality and Social Psychology*, 52, 813-832. doi:10.1037/0022-3514.52.4.813
- Sarason, I. G., Levine, H. M., Basham, R. B., & Sarason, B. R. (1983). Assessing social support: The Social Support Questionnaire. *Journal of Personality and Social Psychology*, 44(1), 127-139. doi:10.1037/0022-3514.44.1.127
- Sarwari, A. R., Fredman, L., Langenberg, P., & Magaziner, P. (1998). Prospective study on the relation between living arrangement and change in functional health status of elderly women. *American Journal of Epidemiology*, 147(4), 370-378.  
doi:10.1093/oxfordjournals.aje.a009459
- Seeman, T. E., Lusignolo, T. M., Albert, M., & Berkman, L. (2001). Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging. *Health Psychology*, 20, 243–255.  
doi:10.1037//0278-6133.20.4.243.
- Shen, Y., & Yeatts, D. E. (2013). Social support and life satisfaction among older adults in China: Family-based support versus community-based support. *International Journal of Human Development*, 77(3), 189-209. doi:10.2190/AG.77.3.b
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7(4), 422-445.  
doi:10.1037/1082-989X.7.4.422

- Smith, D. W. E. (1997). Centenarians: Human longevity outliers. *The Gerontologist*, *37*(2), 200–207. doi:10.1093/geront/37.2.200
- Step toe, A., Shankar, A., Demakakos, P., & Wardle, J. (2013). Social isolation, loneliness, and all-cause mortality in older men and women. *Proceedings of the National Academy of Sciences of the USA*, *110*, 5797–5801. doi:10.1073/pnas.1219686110
- Stone, A. A., Schwartz, J. E., Broderick, J. E., & Deaton, A. (2010). A snapshot of the age distribution of psychological well-being in the United States. *Proceedings of the National Academy of Sciences*, *107*(22), 9985-9990. doi:10.1073/pnas.1003744107
- Strawbridge, W. J., Wallhagen, M. I., & Cohen, R. D. (2002). Successful aging and well-being: self-rated compared with Rowe and Kahn. *The Gerontologist*, *42*, 727-33. doi:10.1093/geront/42.6.727
- Struckmeyer, K., Bishop, A., & Finchum, T. (2018). Examining cohort and gender differences in centenarian life satisfaction. *Innovation in Aging*, *2*(1), 277–278. doi:10.1093/geroni/igy023.1026
- Swift, H. J., Vauclair, C. M., Abrams, D., Bratt, C., Marques, S., & Lima, M. L. (2014). Revisiting the paradox of well-being: The importance of national context. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *69*(6), 920-929. doi:10.1093/geronb/gbu011
- Tay, L., Ng, V., Kuykendall, L., & Diener, E. (2014). Demographic factors and worker well-being: An empirical review using representative data from the United States and across the world. *Research in Occupational Stress and Well Being*, *12*, 235-283. doi:10.1108/S1479-355520140000012007.
- Tomini, F., Tomini, S. M., & Groot, W. (2016). Understanding the value of social networks in life satisfaction of elderly people: A comparative study of 16 European countries using SHARE data. *BMC Geriatrics*, *16*, 203. doi:10.1186/s12877-016-0362-7
- Tomioka, K., Kurumatani, N., & Hosoi, H. (2017). Age and gender differences in the association between social participation and instrumental activities of daily living among community-dwelling elderly. *BMC Geriatrics*, *17*(99). doi:10.1186/s12877-017-0491-7
- Uma devi, L., Kavitha Kiran, V., & Swachita, P. (2015). Satisfaction with life in elderly with reference to gender, age, and residence. *IOSR Journal of Humanities and Social Science*, *4*(5), 57-59. doi:10.9790/0837-20455759
- Vaughan, L., Leng, X., La Monte, M. J., Tindle, H. A., Cochrane, B. B., & Shumaker, S. A. (2016). Functional independence in late-life: Maintaining physical functioning in older adulthood predicts daily life function after age 80. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, *71*, S79–S86. doi:10.1093/gerona/glv061

- Walsh, K., & Callan, A. (2010) Perceptions, preferences, and acceptance of information and communication technologies in older-adult community care settings in Ireland: A case-study and ranked-care program analysis. *Ageing International*, 36(1): 102–22. doi:10.1007/s12126-010-9075-y
- Weiner, M. R., Monin, J. K., Mota, N., & Pietrzak, R. H. (2016). Age differences in the association of social support and mental health in male U.S. veterans: Results from the National Health and Resilience in Veterans Study. *The American Journal of Geriatric Psychiatry: Official Journal of the American Association for Geriatric Psychiatry*, 24(4), 327–336. doi:10.1016/j.jagp.2015.11.007
- White, A. M., Philogene, G. S., Fine, L., & Sinha, S. (2009). Social support and self-reported health status of older adults in the United States. *American Journal of Public Health*, 99(10), 1872–1878. doi:10.2105/AJPH.2008.146894
- Willcox, D., Willcox, B., Hsueh, W., & Suzuki, M. (2006). Genetic determinants of exceptional human longevity: Insights from the Okinawa Centenarian Study. *Age*, 28, 313–32. doi:10.1007/s11357-006-9020-x
- Willcox, D., Willcox, B., & Poon, L. W. (2010). Centenarian studies: Important contributors to our understanding of the aging process and longevity. *Current Gerontology and Geriatrics Research*, 6. doi:10.1155/2010/484529
- Wu, T., Lu, L., Luo, L., Guo, Y., Ying, L., Tao, Q., Zeng, H., Han, L., Shi, Z., & Zhao, Y. (2017). Factors associated with activities of daily life disability among centenarians in rural Chongqing, China: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 14(11), 1364. doi:10.3390/ijerph14111364
- Xu, J., & Roberts, R. E. (2010). The power of positive emotions: It's a matter of life or death—Subjective well-being and longevity over 28 years in a general population. *Health Psychology*, 29(1), 9-19. doi:10.1037/a0016767
- Yorgason, J. B., Draper, T. W., Bronson, H., Nielson, M., Babcock, K., Jones, K., Hill, M. S., & Howard, M. (2018). Biological, psychological, and social predictors of longevity among Utah centenarians. *The International Journal of Aging and Human Development*, 87(3), 225–243. doi:10.1177/0091415018757211
- Young, K. W. (2006). Social support and life satisfaction. *International Journal of Psychosocial Rehabilitation*, 10(2), 155-164.
- Zuo, J., & Tang, S. (2000). Breadwinner status and gender ideologies of men and women regarding family roles. *Sociological Perspectives*, 43(1), 23-43. doi:10.2307/2F1389781

## APPENDIX. IRB APPROVAL

IOWA STATE  
UNIVERSITY

<b>▼ Study</b>	
<b>Study:</b> XX-026	<b>Sponsor(s):</b> FED - HHS - NIH - National Institute on Aging (NIA) (Primary)
<b>Committee:</b> IRB #1	<b>Sponsor Id:</b>
<b>Category:</b>	<b>Grants:</b>
<b>Department:</b> Human Development and Family Studies	
<b>Agent Types:</b> SBER	<b>CRO:</b>
<b>Title:</b> Resources and Adaptation in Centenarians	<b>Year:</b> 2000
<b>2018 Common Rule Date:</b> 09/20/2019	<b>HIPAA:</b> No
<b>Expedited Categories:</b> 8c - The remaining research activities are limited to data analysis.	<b>FDA Study:</b> No
<b>Comments:</b>	

<b>Study-Site</b>	
<b>Site(s):</b> 00 - Unspecified	<b>PI:</b> Martin, Peter
<b>Status:</b> Active	<b>Additional:</b> N
<b>Approval:</b> January 24, 2020	<b>Expiration:</b> N/A
<b>Initial Approval:</b> October 5, 2010	<b>Other Expirations:</b> Non-Exempt Approval Expiration - 01/22/2023
<b>Tags:</b> Federally Funded	
<b>Comments:</b>	

<b>▼ Study-Site Contacts (4)</b>	
Name	Role
Arieli, Rotem	Research Staff
Kim, Joseph	Research Staff
Lee, Gina	Research Staff
Steffensmeier, Chloe	Research Staff

<b>▼ Reference xForms (1)</b>					
Form	Identifier	Stage	As Of	Ref Active	Inactivated
IRB Application	Modification Resourced and Adaptation in Centenarians	Complete	01/24/2020 3:18:43 PM ET	01/24/2020 3:18:42 PM ET	

<b>▼ Events (22)</b>						
Event	Att	FE	Instance/UDF	Start	Complete	Last Mtg
Modification	1		Personnel Change	01/24/2020		
Modification	1		Personnel Change	12/11/2019	12/17/2019	12/17/2019
Modification	1		Personnel Change	10/04/2019	10/15/2019	10/15/2019