SOCIAL DETERMINANTS OF HEALTH AMONG OLDER ADULTS: EVIDENCE FROM THE UTAH FERTILITY, LONGEVITY, AND AGING (FLAG) STUDY

by

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ABSTRACT

For some decades, social relationship has been a central theme in research on health and wellbeing. The literature documents two separate but related components of social relationship—social network and social support—both of which are believed to impact health independent of the other. Using data from the Utah Fertility, Longevity, and Aging (FLAG) study, the current study investigated the associations of dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) to physical and mental health, and examined whether or not the association between social connectedness and physical and mental health of older adults was attributable to perceived social support.

Results of the study showed the dimensions of social connectedness (network, and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) were positively correlated. These dimensions, with the exception of the network dimension, were also positively associated with physical and mental health. Independent samples *t*-test showed individuals who obtained higher scores on the satisfaction with network dimension, and affective, confidant, and instrumental support dimensions were more likely to have higher physical and mental health scores than those who obtained lower scores on these dimensions. Logistic regression analyses showed high scores on affective and instrumental support were associated with higher odds of reporting good physical health. Similarly, high scores on the satisfaction with

network dimension were associated with higher odds of reporting good mental health. Hierarchical multiple regression analyses showed affective and instrumental support, and satisfaction with network dimension were significant predictors of physical and mental health when the effects of covariates were controlled for. Results of moderation analyses showed significant conditional effects of social connectedness and perceived social support on physical and mental health. The interaction term (Connectedness_X_Support) was not significant. Perceived social support did not moderate the relationship between social connectedness and physical and mental health.

Other correlates of physical and mental health included age, gender, and socio-economic status (SES). An increase in age corresponded with favorable mental health. Higher SES was associated with reporting good physical and mental health. Being female was associated with greater likelihood of reporting poor physical and mental health.

Findings generally suggest social connectedness and perceived social support may affect different aspects of health independent of the other. Findings also suggest perceived social support may be relatively more important to the health and wellbeing of older adults than social connectedness and underscore the relative importance older adults attach to quality rather than quantity of social ties. Implications for social work practice and education, policy, and research are discussed.

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CHAPTER 1

INTRODUCTION

In the next few decades, the U.S. will experience a transformation in the demographic structure, with the proportion of older adults, 65 years and older, projected to outnumber those younger than 18 years by 2060 (US Census Bureau, 2013). In 2011, the U.S. Census Bureau estimated there were 41.4 million persons aged 65 and older, which represented 13% of the national population. By 2030, this number is expected to increase to more than 72 million and, by 2050, more than double to 88 million, with the more frail (85 years and older) projected to quadruple to 19 million (Administration on Aging (AoA), 2013). The healthy aging of the population, from the medical standpoint, is seen as the result of numerous factors including improvement in health and medicine (Perkins, Multhaup, Perkins, & Barton, 2008).

From a social viewpoint, however, scholars contend that productive and healthy aging is the result of active integration and participation of older adults in society, two important conditions made possible through social relationships (British Columbia Ministry of Health (BCMH), 2004; Lennartsson & Silverstein, 2001; Zunzunegui, Alvarado, Del Ser, & Otero, 2003). Erikson and colleagues' (1986) classical work emphasized that successful aging and healthy development in late life involves reflection and renewal of previous life balances around "themes of hope, purpose, competence,

commitment, love and care" (pp. 55-56). Older persons achieve these thematic renewals by their engagement with people, institutions, organizations, and relationships that in the present life, constitute their world, and by reexamining earlier life commitments, interactions, and relationships.

Social relationships are fundamental to human survival, and are significantly involved in the attainment and maintenance of good health and wellbeing (Ashida & Heaney, 2008; Steptoe, Shankar, Demakakos, & Wardle, 2013). Social relationship has been variously defined and measured diversely across studies and disciplines. Regardless of the differences, however, two major components of social relationships have consistently been studied and documented. These include social network, and social support (Antonucci, Birditt, & Ajrouch, 2011; Antonucci, Birditt, & Akiyama 2009; Fiori, Antonucci, & Cortina, 2006; Holt-Lunstad, Smith, & Layton, 2010). These components, also considered as the structural and functional characteristics of social relationships, have been linked to mental health (Fiori et al., 2006), physical health morbidity (DiMatteo, 2004; Perkins, Ball, Kemp, & Hollingsworth, 2013), and mortality (Antonucci, Birditt, & Webster, 2010; Cornwell & Waite, 2009; Holt-Lundstad et al., 2010).

Social relationships are considered important for older adults' physical health and psychological wellbeing (Choi & McDougall, 2009; Fiori et al., 2006; Steptoe et al., 2013). Strong ties with families and friends have been found to improve mental and physical health, positively influence health behaviors, reduce mortality risk (BCMH, 2004; Chen, Hicks, & While, 2013; DiMatteo, 2004; Steptoe et al., 2013; Uchino, 2013; Umberson & Karas, 2010), and enable older adults to stay in the community rather than

being institutionalized (Aschbrenner, Mueser, Bartels, & Pratt, 2011). Additionally, supportive relationships have been linked to the provision of emotional security (Fiori et al., 2006). With its absence often experienced as emotional (loneliness) and social isolation, older adults appraise their social relationships on the basis of the degree to which they feel connected and supported (Ashida & Heaney, 2008; BCMH, 2004; Cornwell & Waite, 2009; Golden et al., 2009; McPherson, Smith-Lovin, & Brashears, 2006; Steptoe et al., 2013).

Social connectedness and social support have not always been considered separately in previous studies. This is partly the result of their linear relationship, with social support being a function of social relations that is provided by members in one's social network. In most studies, for instance, having a companion was synonymous with social support (Aboim, Vasconcelos, & Wall, 2013; Hawkley, Masi, Berry, & Cacioppo, 2006; Kroenke, Kubzansky, Schernhammer, Holmes, & Kawachi, 2006; Pedersen, Andersen, & Curtis, 2012; Yuan et al., 2011) regardless of whether or not support was provided. Again studies examining isolation and loneliness have to a large extent been conducted in the context of social support (Chen et al., 2013; Dykstra, & Fokkema, 2007; Liu & Guo, 2007; Tomaka, Thompson, & Palacios, 2006) where availability of social support indicated the presence of social relations or ties and thus the absence of loneliness feelings.

Some studies, however, suggest that availability of companionship does not guarantee that social support will actually be provided (Antonucci et al., 2009; Ashida & Heaney, 2008; Nurullah, 2012). It is important to note that not all social relationships involve the exchange of support (Antonucci et al., 2009). To be clear, individuals can feel

socially disconnected or isolated and unsupported while surrounded by a multitude of potential support providers.

A few studies on social relationships have examined the influence of isolated aspects of social relationships such as total level of connectedness and amount of social support on health and wellbeing of older adults (Antonucci, 2009; Broadhead et al., 1998; Kahn, 1979; Wong, Yoo, Stewart, 2005). While this method is important and enlightening, there are theoretical and empirical reasons to suspect that adding up the individual aspects of relationships to create a unidimensional construct (level of connectedness and perceived social support) does not compare the effect of being nested in a relationship with particular set of characteristics (e.g., frequent interaction with family and friends or receiving emotional support). In other words, by examining social connectedness and social support as singular, nondimensional constructs, it becomes difficult to distinctly identify the dimensions within each construct and their health implications, particularly among older adults for whom the importance of social relationships cannot be underestimated.

In spite of the empirical evidence linking some of these dimensions of connectedness and social support to health (Alpass & Neville, 2003; Chen et al., 2013; Hsu, 2007; Moon, Park & Cho, 2010; Tay, Tan, Diener, & Gonzalez, 2013), a limited number of studies exists that simultaneously examines the dimensions of social connectedness and social support and their relationship with health, thus making it difficult to draw a firm conclusion on the health implications of dimensions of social connectedness and social support. It, therefore, may be more informative to examine some of these dimensions and their association to physical health and mental wellbeing

of older adults. This study aims to investigate the association of dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental) in relation to physical and mental health.

As previously indicated, research on social relationships and health has focused on both structural (e.g., network—connectedness) and functional (e.g., social support) characteristics of social relationships. The structural characteristics, however, have received more attention compared to the functional characteristics. Few of these studies have examined the mechanisms by which social relationship and health are related. Given that the functional characteristics have generally been found to have greater impact on health than the structural characteristics (Besser & Priel, 2008; Teo, Choi, & Valenstein, 2013), it is important to investigate the influence of the major functional characteristic of social relationships which might be the singular, most important underlying mechanism through which the structural characteristics of social relationships and health are related: namely perceived social support.

Purpose of study

This study aimed to (1) investigate the association of dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental) in relation to physical and mental health; and (2) to determine whether or not the association between social connectedness and physical and mental health of older adults is attributable to perceived social support. The study employed a quantitative design, utilizing secondary data from the longitudinal Utah Fertility, Longevity, and Aging (FLAG) study. Standardized measures included the

Medical Outcome Study Short Form 36 (SF 36), which examines functioning and wellbeing in older adults (McHorney, Ware, & Raczek, 1993), the Duke—UNC Functional Social Support Questionnaire (DUNCFSSQ), which measures an individual's perception of the amount and type of social support (Broadhead et al., 1998), and the Duke Social Support Index (DSSI), which measures the degree of a person's connectedness with others (Landerman, Georage, Campbell, & Blazer, 1989).

The results may inform social work practice, education, policy, and research. Findings could lead to development of practice and policy interventions intended to increase social support and improve social ties through which support is given and received. Findings could also direct future research towards finding positive contributions older adults might make toward society (through which they would stay connected and supported) rather than focusing on their support needs and their demands on service provision.

Research questions and hypotheses

This study addressed the following research questions and hypotheses:

- (Q1) Are there associations between the dimensions of social connectedness, perceived social support, and physical and mental health of older adults?

  Hypothesis 1: Dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) will be positively associated with physical and mental health of older adults.

- (Q2) Are there differences in how the dimensions of social connectedness and perceived social support relate with the physical and mental health of older adults?

  Hypothesis 2: Compared to the dimensions of social connectedness, higher scores on the dimensions of perceived social support will correspond with self-rated high physical and mental health scores.

- (Q3) What dimensions of social connectedness and social support are important to physical and mental health of older adults?

  Hypothesis 3: Compared to the dimensions of social connectedness, the dimensions of social support will be significantly stronger predictors of self-rated physical and mental health.

- (Q4) Does perceived social support moderate the relationship between social connectedness and physical and mental health of older adults?

  Hypothesis 4: Perceived social support will moderate the relationship between social connectedness and physical and mental health of older adults.

Organization of study

This study is organized into five chapters. Chapter 1 presents the study background, and highlights the purpose of the study, research questions, and research hypotheses guiding the study. Chapter 2 reviews the literature and highlights previous studies and theories that provide the foundation for this study. Chapter 3 focuses on research methods, including study design, sample, data collection procedures, measures, and statistical analyses. Chapter 4 focuses on results and presentation of findings. Chapter

5 addresses the discussion and conclusion. The results are interpreted in light of previous studies and theories forming the foundation of the study, and implications for social work practice, research, and policy are discussed.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews the literature on social relationship and health in the population under study. The theoretical foundation of the study is also discussed. The chapter ends with a discussion on theoretical and methodological issues commonly found in social relationship and health studies.

The aging of the population

Currently, older adults are the fastest growing population on earth (Population Division, DESA, United Nations, 2013). It is estimated that 605 million people (about 9% of the world's population), aged 60 years and older are currently living around the globe. This figure is projected to rise to 2 billion by 2050, representing 16% of the world's population (World Health Organization (WHO), 2013a). Although age offers a benchmark for categorizing one as older adult, it is important to note that the term *older adult* means different thing to different people and often varies by geographic location (Gavrilov & Heuveline, 2007). On the basis of life expectancy at birth, there is a huge divide between the Western industrialized societies and the less industrialized societies of the world. While the age limit is set at 60 or 65 years for most contemporary Western societies, many developing countries consider old age as a period occurring anywhere

from the mid-40s to the 70s (Encyclopedia Britannica, 2013). Most international documents use the term older adult loosely to indicate an individual who is 60 years and older (WHO, 2013b).

Much of the world's older population is now concentrated in the more industrialized regions of the world, with six countries (China, US, India, Japan, Germany, and Russian Federation) accounting for 54% of the total (Population Division, DESA, United Nations, 2013). In the U.S., for instance, the Census Bureau in 2011 estimated there were 41.4 million individuals, aged 65 and older. This number represented 13% of the national population. By 2030, this number is expected to increase to more than 72 million, representing 20% of the national population, and more than double to 88 million by 2050 (US Census Bureau, 2011).

The trend in population concentration around the globe is expected to change in the next few decades with most of the older population living in less industrialized regions of the world (Shetty, 2012; WHO, 2013). Since mortality rates among females are lower than male rates at old age, women constitute a significant majority of the older population.

Influenced by decreasing fertility rates and remarkable increases in life expectancy, the aging of the population will continue, and even accelerate (National Institute of Health (NIH), 2013; WHO, 2013b; United Nations Population Fund (UNFPA), 2013). From the health or medical standpoint, population aging, in part, reflects successes in the areas of medicine and technology, which have both added years to life and life to years (Perkins et al, 2008; Takahashi & Tokoro, 2002). From the social standpoint, scholars contend that productive and healthy aging is the result of active

engagement of older adults in the society, a condition made possible through social relationships (BCMH, 2004; Lennartsson & Silverstein, 2001; Zunzunegui, Alvarado, Del Ser, & Otero, 2003).

Social relationships and health of older adults

The first major work on social relationship dates back to the industrial revolution of the 19th century. New phenomena such as migration, individualization, changing family structure, and unemployment drove new research into human relationships by sociologists, economists, and philosophers. As society was transformed by the industrial revolution, relationships were considered to have the ability to hold or disintegrate society (Coser 1971, pp. 133-136, pp. 184-185).

Human beings are social by nature. As social beings, we possess a need to belong, a characteristic that is foundational to our emotions, thoughts, and interpersonal behaviors. The need to belong comprises a general "desire to form and maintain at least a minimum quantity of lasting, positive and significant interpersonal relationships" (Baumeister & Leary, 1995, p. 497). While differences exist in individual's need for belongingness and the means through which the need is met, satisfying this need inevitably involves a continual, emotionally satisfying interaction with others in a stable context that allows individuals to express concerns for one another's welfare (Baumeister & Leary, 1995; Heinrich & Gullone, 2006).

Social relationship, for decades, has been a central theme in research on health and wellbeing, and is often represented with indicators that vary within and across disciplines. Social and health scientists interested in social networks, an indicator of

social relationships, have examined the health benefits and health risks associated with both large and small social networks (Cacioppo, Fowler & Christakis, 2009; Christakis & Fowler, 2008; Cornwell & Waite, 2009; Fowler & Christakis, 2008). Similarly, researchers have investigated and documented the effects of participation in social activities on people's health and wellbeing (Hsu, 2007; Moon et al., 2010). Researchers from disciplines such as social work, sociology, and nursing, who are interested in social support networks, have also examined the association between social support and health, and the extent to which people evaluate the support they receive as beneficial or detrimental (Golden et al., 2009; Kirke, 2013; Stephens, Alpass, Towers, & Stevenson, 2011; Uchino, 2006).

Scholars have examined the direct influence of relationships on the psychological states of people. In his classical analysis of suicide, for instance, Durkheim (1897, p. 212) indicated the significant role that relationships play in suicide occurrence in a population. Compared to those more socially integrated, people who were less socially integrated were more likely to commit suicide. This finding has been confirmed in several studies across major social and behavioral disciplines (Compton, Thompson, & Kaslow, 2005; Cutright & Fernquist, 2001). Three major components of social relationships have been identified in the literature: social networks (a measure of social connectedness), social support, and support satisfaction (Antonucci & Akiyama, 2002; Antonucci & Wong, 2010; Antonucci et al., 2009). Together these components help determine the extent to which social relationship is a resource or a risk factor to individual's health and wellbeing.

Social relationships are considered important for older adults' physical health and psychological wellbeing (Choi & McDougall, 2009; Fiori et al., 2006) and are frequently seen as indicators of successful and healthy aging (Agahi & Parker, 2008; Canbaz, Sunter, Dabak & Peksen, 2003). It is widely accepted that relationships often provide older adults with meaningful roles, larger social networks, and different kinds of support, which have been linked to improved physiological functioning, coping abilities, and health behaviors (Agahi & Parker, 2008; Fiori et al., 2006, Lennartsson & Silverstein, 2001).

Social connectedness (social network)

The idea that humans need relationships to survive and that relationships are critical to human development is not new. The works of developmental psychologists including Erikson (1950), Bowlby (1988), and Ainsworth (1989) clearly indicate the importance of social relationships as the driving force in human development. From infancy to late adulthood, individuals live within webs of social ties, which are often called social networks (Ashida & Heaney, 2008; Kahn, 1979). The concept of social network is used to describe a finite set of actors and the relationship between them (Kirke, 2013). It has consistently been used in research as a measure of how connected one is to the social environment (Cornwell & Waite, 2009). Other indicators or dimensions of connectedness reported in the literature include frequency of interaction among network members and engagement in social activities (Cornwell & Waite, 2009; Lennartsson & Silverstein, 2001).

Social networks can vary enormously in size, type, and pattern and benefits or

resources one may obtain (Thoit, 1982; Cohen & Wills, 1985). They are subject to change over time as new ties are formed or broken (Kirke, 2013; Shaw, Krause, Liang, & Bennett, 2007). Social networks are typically grouped into two categories: formal and informal (Kirke, 2013). Formal network involves one's association to formal organization such as a health care agency. Informal network involves family ties (e.g., spouse, children, and siblings) and friendship ties (often involving association with friends, and neighbors) (Clutier-Fisher, Kobayashi, Hogg-Jackson, & Roth, 2006). Although these ties are sometimes considered a source of psychological distress by exerting excessive demands on the individual, belonging to a healthy social network makes people feel respected, useful, cared for, loved, and cherished (Birditt, Jackey, & Antonucci, 2009; Gurung, Taylor, & Seeman, 2003). This has a strong protective effect on physical health and psychological wellbeing (WHO, 2003).

The absence of social network is often experienced in the form of social isolation and emotional isolation (loneliness) (Victor, Scambler, Bond, & Bowling, 2000). As in all age groups, maintaining large and supportive social networks is important for older adults. From a combined standpoint of biological (e.g., simple deterioration theory) and social (e.g., activity theory) theories aging typically involves profound challenges to remaining socially connected (Bengtson, Gan, Putney, & Silverstein, 2009, pp. 31-32; Goldsmith, 2012). While the decrease in ability to form new relationship obviously leads to a decrease in social contact, research has shown that aging is marked by a renewal, maintenance, and formation of new and meaningful relationships (Antonucci et al., 2009; Kahn, 1979; Marjolein, Hoogendijk, & van Tilburg, 2013).

Researchers have contended with the idea that social isolation is a normal aspect

of aging, and that loss of ties is characteristic of old age. Findings, however, are mixed. While some studies report a negative association between age and properties of network (size, and frequency of interaction), others indicate a positive relationship between these elements (Shaw et al., 2007). These findings are incongruous with the widely held view that aging generally has a negative influence on social ties (Cornwell, 2008).

Research has shown that older adults who maintain large and supportive networks are often those who live with others, at least with a spouse (Wong, 2011). Although there are instances where older adults live alone, it is often argued that such adults tend to have large networks due to their perceived need for interaction and constant need of support (Schroot, Fernandez-Ballesteros, & Rudinger, 1999). Large and supportive networks ensure frequent contact with others through regular participation in social activities (Perkins et al., 2008). Some studies have also shown that greater sense of belongingness and lower levels of isolation and loneliness among older adults are indicative of larger proximate networks characterized by more intensive support exchanges (Ashida & Heaney, 2008; Golden et al., 2009; Kobayashi, Cloutier-Fisher, & Roth, 2009; Schroot et al., 1999). Older adults with meaningful connections report that involvement with others enhances self-image, and contributes to a positive self-attitude and self-acceptance (Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010), two important elements that contribute to life satisfaction (Abu-Bader, Rogers, & Barusch, 2002; Kaushik, 2005).

Perceived social support

Social support, although studied across all major disciplines, is a concept that carries considerable colloquial meaning. Although it has several definitions, none has

been accepted as definitive (Kahn, 1979; Williams, Barclay, & Schmied, 2004). Beginning with the seminal work on social support in the mid-70s, Cobb (1979) defined social support as communicating caring, purely informational, which leads the recipient to "believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations" (pp. 93). This definition, however, seems to emphasize providing emotional assistance to others.

In an attempt to offer a holistic meaning of the concept, scholars have extended the definition offered by Cobb to include the provision of material aid. Kahn (1979) considered social support as "interpersonal transactions that involve one or more of the following: expression of a positive affect of one person toward another; the affirmation or endorsement of another person's behavior, perception or expressed views; the giving of symbolic or material aid to another" (p. 85). Similarly, House (1981) defined social support as "personal-level exchanges that involve the expression of affect, the provision of goods and services, and information relevant to one's self-evaluation" (p. 39). Antonucci, Birditt, and Akiyama (2009) emphasized the bidirectional nature of social support and defined social support as the provision or receipt of something (exchange), often including aid, affect, and affirmation, considered to be needed by the provider, recipient, or both.

Providing a more simplistic meaning of the concept, Enkenrode and Gore (1981) described social support in terms of number of friendships, proximity to relatives, and involvement with organizations. This definition, however, appears to emphasize structure rather than function (support) of relationship.

The above conceptualizations suggest that social support is dynamic and

multidimensional. Although the lack of agreement concerning these definitions of social support has produced inconsistences and lack of comparability among studies (Heitzman & Kaplan, 1988; Williams et al., 2004), a closer examination of these definitions reveals two major aspects of social support; the structural (the medium through which support is offered) and the forms or types of support. Three major forms of social support can be identified from the above conceptualizations—affective or emotional, instrumental or practical, and confidant or informational support.

Affective support is considered as the most important form of social support, emotional or affective support refers to the expression of love, sympathy, caring, trust, and acceptance of an individual (House, 1981; Wong, Yoo, & Stewart, 2005). Instrumental support includes actions intended to help meet individual's needs, such as providing financial assistance, offering shelter, or services needed to enhance the living condition of an individual (Semmer et al., 2008). Confidant support refers to having a partner with whom secrets are disclosed or private matters discussed (Broadhead et al., 1988; Wong et al., 2005).

When looking at social support, it is important to not only consider the type of support but also the amount and the sources of support (Gurung et al., 2003; Thoits, 1982). Variations exist in source, type, and amount of support available, with the latter known to increase in old age (Gurung et al 2003). Support can come from many sources, such as family, friends, neighbors, or even the government (Gurung et al., 2003; Nurullah, 2012). These sources constitute the social support systems (Thoits, 1982). Research has shown that some types of support can only be provided or obtained within certain relationships. It is argued that when the same form of support is obtained or

provided by different sources the support may not have the same impact (Gurung et al., 2003; Thoits, 1982). Findings of studies suggest instrumental support is more often provided by family members while emotional support and companionship for the most part are provided by friends (Burke, n.d.; Gurung et al., 2003). Felton and Berry (1992) found that emotional support greatly improved older adult's wellbeing when provided by friends but not when provided by family. However, they also found that confidant support contributed more to the wellbeing of the receiver when provided by family than when provided by friends and neighbors.

In the literature, social support is measured either as a perception that a person has assistance available, or an actual occurrence of assistance, often considered as enacted support (Gurung et al., 2003; Lakey & Orehek, 2011; Nurullah, 2012). Due to measurement difficulties, however, the majority of empirical studies have focused more on perceived availability of support rather than actual receipt of support. In many studies, no association was found between provided support and health or receiving support and poor health (Gleason, Iida, Shrout, & Bolger 2008; Lakey & Orehek, 2011; Lakey, Orehek, Hain, & VanVleet 2010; Uchino, 2009). In light of these methodological constraints and empirical limitations, perceived rather than enacted support was examined in this study.

Social support is an important construct because of its association to an array of health outcomes (BCMH, 2004; Cohen & Wills, 1985; Cummings & Kropf, 2009; Dimatteo, 2004; Fiori et al., 2006; Lakey & Orehek, 2011; Uchino, 2006; Uchino, 2009). It has consistently been found to be associated with improved health status of older adults. This typically is explained as the result of supportive actions older adults receive

from others that moderate the effects of stress associated with aging (Lakey & Orehek, 2011). The perception that family, friends, and neighbors will offer support (perceived support) in times of need is consistently linked to lower levels of distress and loneliness (Chen et al., 2013; Cohen & Wills, 1985), improved cardiovascular biomarker including heart rate, and both systolic and diastolic blood pressure (Thorsteinsson & James, 1999), reduced depressive symptomatology (Schwarzer & Guttierre-Dona, 2005), and reduced mortality among older adults (Shaw et al., 2007). Other studies have also found perceived social support to be associated with treatment and medication adherence among older adults (Cobb, 1979; Dimatteo, 2004; Fiori et al., 2006; Heitzman & Kaplan, 1988).

In other studies, however, no evidence was found for the positive impact perceived support is believed to have on the health and wellbeing of older people (Bolger & Amarel, 2007). Since perceptions are often a reflection of lived experience, the results of studies indicating no positive association between perceived availability of support may be a function of one's history of support receipt. It is reported that some supportive behaviors may even be deleterious to the recipient, as they often contribute to feeling of indebtedness and lower self-esteem (Lakey & Scoboria, 2005; Nurullah, 2012).

Scholars have attempted to uncover the processes by which perceived social support and health are related. Although some studies have postulated a moderating role of enacted support (Lakey et al., 2010), health behavior (Uchino, 2006), and coping and appraisal (Ben-Zur & Michael, 2007; Frazier, Tix, Klein, & Arikian, 2000; Uchino, 2009) in the association between perceived support and health, results did not support these hypotheses (Ben-Zur & Michael, 2007; Frazier et al., 2000).

However, Lakey and Orehek's (2011) work on relational regulation theory, which is premised in the idea that social interaction is the medium through which support is exchanged, is promising. This theory posits that affect, action, and thought of participants in interaction are regulated both by the individual and through relational influences, which occur primarily on a day-to-day basis. Relational regulation occurs through conversation and shared activities that elaborate on recipient's cognitive representation of relationship and quasi relationship. Perceived support is based primarily on relational regulation of affect through day-to-day interaction.

Relational regulation theory offers support for the direct effect hypothesis of social support, suggesting that individuals who are actively involved with others will report higher perceived social support and have good health. However, as a relatively new theory, it still needs further examination.

Health

The quality of a person's life may be considered with reference to its richness, completeness, and contentedness. A range of factors including good physical and mental health, education, financial security, secure occupational environment, spirituality, and strong, supportive social relationships contribute to the overall health of a person (Juniper & Styles, n.d).. Related to health, and often used interchangeably, is the concept of wellbeing (DHHS, 2012; Hanson, 2001). In most studies, health is conceptualized as physical and mental health, and is often indicated with measures such as disease symptoms, disability, functional status, cognitive functioning, functional performance, and participation in physical and social activities (American Thoracic Society, 2007;

DHHS, 2012; Golden et al., 2009; La Grow, Neville, Alpass, & Rodgers, 2012; Mann, McCarthy, Wu, & Tomita, 2005; Ware, 2003). These conceptualizations and measures are congruent with the World Health Organization's definition of health, which broadly includes measures of physical, mental, and social wellbeing. Evidence, however, suggests that health in the United States and in other parts of the world is narrowly defined and measured from a deficit perspective, often using measures of morbidity or mortality (Centers for Disease Control and Prevention (CDC), 2011; Hanson 2001; WHO, 1946). To expand its scope to reflect the WHO definition, and for research and policy making purposes, most researchers have now adopted the broad term health-related quality of life (CDC, 2011; Guyatt, Feeny, & Patrick, 1993).

Health is a broad, multidimensional concept that refers to the subjective and objective evaluations of physical and mental health, and their correlates such as social relationships and functional status (CDC, 2011; Department of Health and Human Services (DHHS) 2012; Kamphuis et al., 2002; Ware, 2003). A number of personal, economic, social, and environmental factors are known to influence a person's health, although most research has focused on personal (e.g., participation in physical and social activities), and social (social network and social support) factors (Cornwell & Waite, 2009; Perkins et al., 2013; Tay et al., 2013; Uchino, 2013, Uchino, 2006). Over the last few decades, more attention has been focused on health service delivery systems and policies surrounding health care as significant determinants of health (DHHS 2012).

Available evidence suggests that health problems become more prominent in late life, affecting quality of life and one's appreciation of life (Abu-Bader et al., 2002; Marjolein et al., 2013; Perkins et al., 2012). Among older adults, health has been

examined in relation to social network, social support, sleep problems, as well as chronic and acute conditions (Garcia, Banegas, Graciani Perez-Ragadera, Cabrera, & Rodriguez-Artalejo, 2005; Groessl et al., 2007; Smith et al., 2008). For instance, Garcia and colleagues' (2005) examined the association of social network to health-related quality of life in a population based study of 3600 Spanish non-institutionalized older adults, 60 years and older. Results of the study showed that individuals who were single and lived alone had poor social and mental health status. The results further indicated individuals who reported little or no contact with family members were more likely to obtain worse scores on physical role functioning, body pain, general health, and mental health subscales of the SF-36 questionnaire than those who reported frequent interaction with family. Health scores were also lower among individuals who had little or no contact with friends.

Examining the relationship: Social connectedness, perceived social support, and health

Research findings on social connectedness and social support in relation to aging and health are mixed. Most findings suggest a decrease in social connectedness following health deterioration in aging and a decline in a person's ability to develop and maintain relationships and social support (Antonucci et al., 2010; Bowling, Edelmann, Leaver, & Hoekel, 1989; Cummings & Henry, 1961; Golden et al., 2009; Kahn 1979; Shaw et al., 2007). Others suggest that aging is marked by a purposeful decrease in social ties allowing for reduction in some types of social relationships or that some forms of support increase with age and others remain relatively stable over time (Adams et al., 2004;

Bergeman, Neiderhiser, Pedersen, & Plomin, 2001; Carstensen, 1992; Cornman, Lynch, Goldman, Weinstein, & Lin, 2004; Gurung et al., 2003; Kahn, 1979).

Social connectedness, perceived social support, and health are interrelated elements, with each affecting and being affected by the other (see Figure 1). Support exchange is made possible through social ties. Perceptions about social support are usually veridical accounts of specific supportive actions shown through ties with others. It is, however, important to note that not all social relationships involve the exchange of support and that the availability of companionship does not equate provision of support in any form (Antonucci et al., 2009; Ashida & Heaney, 2008; Nurullah, 2012). It is reasonable to assume that large networks and healthy connections with members offer one the opportunity to obtain maximum support.

Health is a resource necessary for maintaining social connections (Bowling et al., 1989; Marjolein et al., 2013). Generally, good health in old age ensures the development, maintenance and renewal of social relationships or connections through which support is made available. In the event of significant health problems, development and maintenance of personal relationships are affected in several ways. Disability or illness may decrease older adults' chances of staying active as their mobility becomes affected (Alpass & Neville, 2003; Bowling et al., 1989). Impaired mobility limits one to be physically present around network members. Face-to-face contact therefore reduces and eventually results in loss of relationships. Moreover, decline in mobility prevents people from participating in physical and social activities, two essential elements necessary to maintaining health and developing social relationships (Alpass & Neville, 2003; Marjoleine et al., 2013). Poor mental health has been found to be associated with

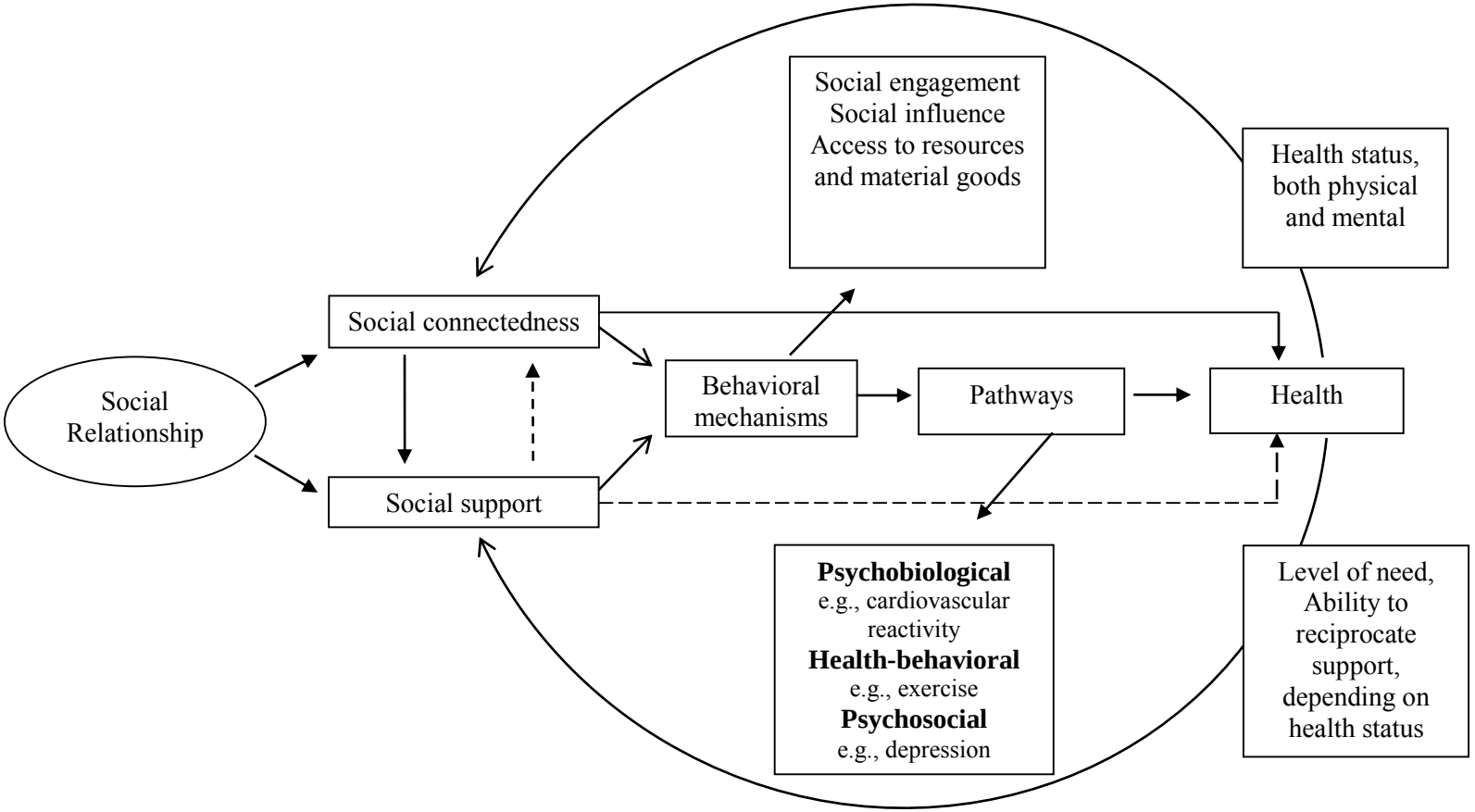

Figure 1: Social relationship and health model

[1] The broken lines connecting social support and social connectedness indicates support cannot be obtained without social ties

[2] Health represents both physical and mental wellbeing

decrease in social contact or interaction as it affects a person's ability to communicate with others (Bowling et al., 1989; Speech Pathology Australia, 2012), and eventually leads to the experience of loneliness (Fees, Martin, & Poon, 1999).

Health problems may cause imbalance in the exchange of support. Relationships are interdependent, and all social relationships are formed on the basis of subjective cost-benefit analysis, and critical assessment of alternatives. According to social exchange theory, people tend to keep the support exchanges in their social relationships in equilibrium (Homans, 1958), through the principle of reciprocity (Diekmann, 2004). Health deterioration makes it difficult to give support or reciprocate one received. A relationship marked by an imbalance in support exchange is likely to end (Diekmann, 2004). The case of older adults, however, is quite different as health problems increase their need for and receipt of support (Antonucci et al., 2010; Bergeman et al., 2001; Kahn 1979; Marjolein et al., 2013; Schwarzer & Gutiérrez-Doña, 2005). Older adults are likely to evaluate and perceive as high support if they receive enough resource from others to meet their needs.

Social connectedness and perceived social support are known to both directly and indirectly affect physical health and mental wellbeing. The mechanisms by which social relations, social support, and health are related continue to be investigated. Research offers the direct effect and the stress-buffer hypotheses (see Cohen & McKay, 1984; Cohen & Wills, 1985; Gibney & McGovern, 2012), support/efficacy model (see Antonucci et al., 2009), and the relational regulation theory (see Lakey & Orehek, 2011) as providing possible explanations for the association (Cohen & McKay, 1984; Cohen & Wills, 1985; Gibney & McGovern, 2012). By their direct effect, social relationships,

working through some behavioral mechanisms such as social engagement, social influence, and access to resources (Berkman, 2007), influence health through psychobiologic (e.g., cardiovascular reactivity, immune system function, blood pressure, stress response), health behavioral (diet, exercise, adherence to medical treatment, smoking, or alcohol use), and psychosocial (depression, self-efficacy, coping, stress management) pathways (Antonucci et al., 2009; Berkman, 2007; Fiori, McIlvane, Brown, & Antonucci, 2006; O'Luanaigh, et al., 2012; Uchino, 2009) (see Figure 1).

Larger social networks have been shown to positively impact the health and wellbeing of older adults (Steptoe et al 2013). They have been found to help one prepare for, cope with, and recover from many of distressing life events that characterize old age (Antonucci & Akiyama, 2002). Individuals with limited social networks have been found to be at increased risk of developing cardiovascular disease, infectious illness, mental health problems, and mortality (Antonucci et al., 2010; Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997; Golden et al., 2009; Holwerda et al., 2012; O'Luanaigh, et al., 2012; Stephens et al., 2011; Tiikkainen, & Heikkinen, 2005).

Studies conducted over the last decade offer mixed findings about the relationship between perceived social support and physical and mental health of older adults. Most studies have consistently shown perceived social support to be associated with improved physical and mental health (King, Willoughby, Specht, & Brown, 2006). Perceived support has also been linked to better adjustment to life stress (King et al., 2006), reduced depressive symptomatology (Schwarzer & Guttierre-Doma, 2005), and reduced health morbidity and mortality among older adults (Cummings & Kropf, 2009; Dimatteo, 2004; Fiori et al., 2006; Nurullah, 2012; Shaw et al, 2007). Some studies, however, have

reported that some supportive behaviors have no positive effects on health and wellbeing or may even be deleterious to the recipient (Ashida & Heaney, 2008; Nurullah, 2012). Findings indicate that under stressful situations, perceived support is positively related to negative affect and other mental health conditions such as depression and anxiety (Cummings & Kropf, 2009; Lakey & Orehek, 2011).

Theoretical framework

The convoy model of social relations

Kahn and Antonucci's (1980) Convoy Model of Social Relations is one of the general theoretical frameworks underpinning this study. Borrowing from anthropologist David Plath (1975), who used the term '*convoy*' to describe a special closeness that involves supportive interaction, Kahn and Antonucci used the term to denote close social relationships that surround a person, and provide different forms of support essential to the individual's development, health and overall wellbeing. Similar in meaning to convoy in the military, the social convoy protects, defends, socializes, and helps individuals safely navigate the challenges they face through time and space (Antonucci & Wong, 2010; Antonucci et al., 2011). Individuals develop and change over their lifetime. At every point in their life (from infancy to late adulthood), they are members of groups and organizations that help shape their life course (Antonucci & Wong, 2010).

The convoy model provides both *life span developmental and life course organizational perspectives*, for studying the process of aging and other life-course changes in relation to social relationships (Antonucci & Akiyama, 2002; Antonucci & Wong, 2010; Antonucci et al., 2011; Kahn & Antonucci, 1985). Each individual is

considered to be going through the life cycle surrounded by a set of people or groups to whom the individual is connected through the exchange of social support (Gurung et al., 2003; Kahn & Antonucci, 1985). A person's convoy at any given time consists of a set of persons or groups on whom the individual depends for support and those who depend on him or her for support. The support received or given may not be symmetrical as they are influenced by factors such as age, health, and social role.

The convoy model suggests that people go through life forming social networks which they are motivated to maintain irrespective of age-related changes one might experience and changes occurring in the network composition (Gurung et al., 2003). Individuals evaluate the network from time to time, becoming aware or noting specific strengths and weaknesses network members possess. This knowledge helps them to choose different network members to rely on for different types—emotional, informational, or instrumental—of support or assistance. Effort is made to keep supportive members, while nonsupportive members are avoided (Gurung et al., 2003).

The model posits that an individual's convoy is shaped over time by personal (e.g., gender, age, race, and marital status) and situational (e.g., norms, social roles, and expectations) factors, which define the nature of the support relationship one experiences (Antonucci, 2009; Antonucci et al., 2009; Birditt & Antonucci, 2007). These personal and situational factors affect one's health and wellbeing (Antonucci et al., 2009; Perkins et al., 2013). The convoy model identifies three major components of social relations: social networks, social support, and support satisfaction (Antonucci & Akiyama, 2002; Antonucci & Wong, 2010; Antonucci et al., 2009). Together these components help determine the extent to which social relationship is a resource or a risk factor. Social

networks, also known as network structure, refer to the objective descriptive characteristics of members in a social relationship such as the size of the network, age and gender of members, frequency of contact, and geographic proximity (Kirke, 2013). Each of these characteristics is an important determinant of health of members in a convoy. Social support refers to the provision or receipt of something, material or immaterial, considered to be needed by one or both parties involved in the support exchange (Antonucci, 2009; Antonucci et al., 2009). Although different forms of support exchanges have been identified (Birditt & Antonucci, 2007; Helgeson, 2003), the convoy model emphasizes three types—aid, affect, and affirmation, all of which are believed to influence health and wellbeing (Antonucci et al., 2009; Kahn & Antonucci, 1980). Individuals are psychological beings and have the ability to evaluate actions. It is important, therefore, to consider their feelings and judgments about support they receive. Act of support is evaluated differently by different people in different situations. In one instance, an act of support may be well received and gratefully appreciated whereas in another instance, it may be seen as unneeded or even demeaning.

Recent empirical evidence offers support for many aspects of the convoy model. For instance, findings indicate that both personal (e.g., sex and age) and situational factors (e.g., resource, role expectations, and demands) influence multiple aspects social relations and health (Antonucci & Akiyama, 2002; Gurung et al., 2003; Schwarzer & Gutiérrez-Doña, 2005; Shaw et al., 2007) with clear age and gender differences in network and types of support received. Shaw and colleagues' (2007) examined changes in social relationships throughout late life and found that whereas emotional support remained quite stable with advancing age, informational support increased with age. The

results also showed that social contacts with family and friends decreased with age with the higher among men than women.

The association between social relations with significant and generalized others and health has been well studied and documented, highlighting the importance of relationships to both mental and physical health (Fiori et al., 2006; García, et al., 2005; Golden et al., 2009; Hawkley, Masi, Berry, & Cacioppo, 2006; Stephens et al., 2011; Williams et al., 2004). Thus, it is important understand the dynamics of social relations and social support as they relate to the aging population. The literature on social support has addressed social relations' direct contributions to health and its ability to moderate the effects of stressful events which may impact one's wellbeing (Antonucci et al., 2009; Cohen, & Wills, 1985; Fiori et al., 2006; Uchino, 2006). This is documented in almost all social and behavioral science literature as the direct-effect and the stress-buffer hypotheses.

Direct effect and stress-buffer hypotheses

Interpersonal relationships are known to protect people from unhealthy effects of stressful conditions. Lack of positive social relations has been linked to negative psychological conditions such as depression and anxiety (Ashida & Heaney, 2008; Fiori et al., 2006). These negative psychological states, in turn, may influence physical health through behavior patterns or psychological processes that increase the risk for disease (Cohen & Willis, 1985).

Social support has widely been used to refer to the mechanisms by which relationship presumptively improve one's health by protecting an individual against

stressful events, including stresses often ascribed to the process of aging (Cohen & McKay, 1984; El-Bassel, Guterman, Bargal, & Su, 1998; Gibney & McGovern, 2012; Kahn & Antonucci, 1980). These mechanisms are precisely stated in what have been termed the direct or main-effect and the stress-buffer hypotheses (Cohen & Wills, 1985; Cohen & McKay, 1984; El-Bassel et al., 1998; Gibney & McGovern, 2012).

Direct-effect hypothesis

The direct-effect, also known as the main-effect hypothesis, suggests that social support has a helpful effect irrespective of whether a person is under stress or not. Stated differently, the hypothesis suggests that social support is advantageous under all conditions, at all times (Cohen & McKay, 1984; El-Bassel et al., 1998). Individuals with stronger social support, according to the direct-effect hypothesis, experience better health and higher levels of wellbeing than people with weak social support (Cohen & Wills, 1985; Gibney & McGovern, 2012). Even though it is well-established and supported empirically, theoretical development to explain the direct-effect hypothesis is lacking (Lakey & Orehek, 2011). Cohen and Wills (1985) suggested the direct-effect hypothesis of social support is evident through an individual's integration in social network that provides one with regular positive experience and stability in one's life situation. The integration provides positive affect and a greater sense of self-worth. Integration may help one to avoid situation with potential consequence of experiencing a psychological or physical disorder.

Stress-buffer hypothesis

The stress-buffer hypothesis postulates that in the face of stress inducing events the health and wellbeing of individuals with little or no social support is negatively impacted by the stressful events (Cobb, 1976; Cohen & McKay, 1984; Gibney & McGovern, 2012; Kahn & Antonucci, 1980). In other words, the health and wellbeing of those with stronger social support are protected from the deleterious effects of stressful event. Unlike the direct effect hypothesis, the stress-buffer hypothesis appears to be conditional, 'activated' only when stress is experienced. Thus, social support buffers individual's reaction to a stressful event or enhances one's coping ability (Antonucci et al., 2009). The stress-buffering hypothesis occurs when a person experiences an unwanted and unpredicted life change (perceived as threat) and personal resources are perceived to offer inadequate response to the life change, thereby leading one to seek support from others (Cohen & Wills, 1985; Kahn & Antonucci, 1980). Evidence of its effect is observed when the association between stress and health is weaker for individuals with high levels of social support than for those with low social support.

While the literature indicates largely consistent support for the direct effect hypothesis, the stress-buffering hypothesis appears to have empirical limitations, as studies have offered a more nuanced understanding of the hypothesis (Cohen & McKay, 1984; Lakey & Orehek, 2011; Thoits, 1982). Given that the effectiveness and direction of social relations effects may vary depending on the health conditions of a person, social relationships, as well intended as they are, may create or aggravate stressful situations (Antonucci & Wong, 2010; Antonucci et al., 2009; Thoits, 1982). Critics have rejected the proposition of the stress-buffer hypotheses and called for investigation into the

theoretical relationship between social support, life events, and psychological wellbeing (Carpenter, 2006; Mezuk, Diez Roux, & Seeman, 2010; Thoits, 1982).

Regardless of these shortcomings, the positive effects of direct effect and the stress-buffering hypotheses of social support in relation to health and wellbeing have been well documented (Cohen & Wills, 1985; El-Bassel et al., 1998; Mezuk et al., 2010). Numerous studies indicated that people who receive psychological and material support from family and friends tend to have better health than those with little or no supportive social contact (Carpenter, 2006; Cohen & Wills, 1985; Mezuk, et al., 2010). Social support working through both the direct-effect and stress-buffer mechanisms may affect health outcomes through lessening the "impact of stress appraisal by affecting a solution to a problem, reducing the perceived importance of the problem, soothing the endocrine system so that people are less reactive to perceived stress or by facilitating healthful behavior" (Cohen & Wills, 1985).

Social relationships and social support: An integration of theories

Social support is an important determinant of health and wellbeing, both for its direct contribution and for its ability to moderate the effects of stress (Kahn & Antonucci, 1980). Drawing from the life course perspective that focuses on the broader context within which people live, the convoy model is proposed as the structure within which social support is given and received (Antonucci & Wong, 2010; Kahn & Antonucci, 1980). The convoy model examines both micro- and macro-level influences that a set of people or groups has on the individual. Such groups may include family, the basic unit of society, school, employment, religious organizations, and the neighborhood (Antonucci

& Wong, 2010).

The convoy model addresses both the direct and the buffering effects of social support (Antonucci et al., 2009; Kahn & Antonucci, 1985). Social relations, the channel through which support is exchanged, can directly influence physical health and psychological wellbeing at any given time (Antonucci, 2009; Fiori et al., 2006). In addition, when stressful major life changes occur, social relations help moderate the pathological effects through support offered by others and by improving a person's coping skills (Birditt & Antonucci, 2007; Cohen & Wills, 1985; Helgeson, 2003; Uchino, 2006). (See Figure 2.)

Research has documented the effects of social relation and social support on psychological or mental health (Carpenter, 2006; Mezuk et al., 2010). In a multi-ethnic study of athereosclerosis, Mazuk and colleagues (2010) evaluated the stress buffering and the direct effect hypotheses of perceived emotional social support on inflammatory markers in a sample of 6814 individuals 45 years and older. The main finding suggested that perceived availability of emotional support had little influence on inflammatory markers, either through direct or stress buffering pathways. Consistent with direct effect hypothesis, low social support was found to be associated with higher levels of C-reactive protein, interleukin, and fibrinogen antigen, which are considered risk factors for cardiovascular morbidity and mortality. Consistent with the stress-buffer hypothesis, the findings showed evidence of high perceived emotional support buffering the association between high stress and C-reactive protein. No other evidence was found for the buffering hypothesis.

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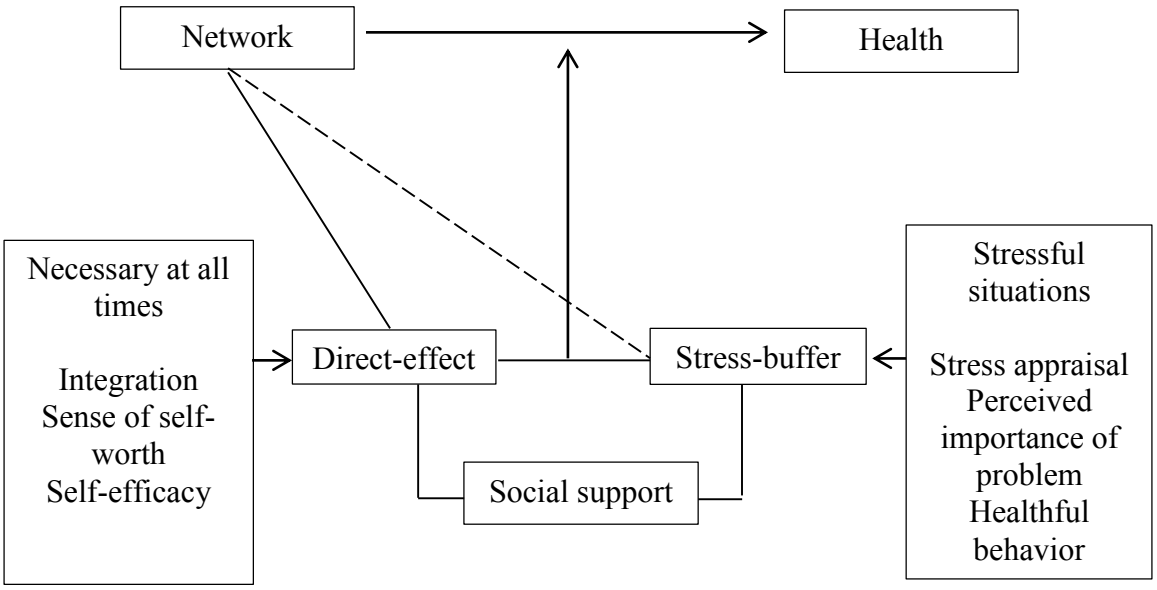

Figure 2: Network, support, and health model

1. Network (convoy) is essential for the provision of support
2. Network appears to have a direct relationship with health
3. Effect of support on health is seen through network integration (direct-effect) and in stressful times (stress-buffer)
4. Support seems to have a moderating effect on the relationship between network and health

Carpenter's (2006) study tested the moderating effect of social support (stress-buffering hypothesis) on the relationship between health status and stress-related psychological outcomes in a sample of gynecologic cancer survivors. The hypothesis that poorer cancer-related health status would be associated with poorer psychological outcomes was clearly supported. While no evidence for moderation was found (not statistically significant), individuals who had strong social support experienced less psychological distress. No direct relationship was found between social support and traumatic stress outcome. The results, however, provided evidence for the stress-buffering hypothesis. Perceived availability of social resources, including support from friends, appeared to be a protective factor against traumatic stress symptoms associated with poor physical health status.

The convoy model acknowledges each level of relationship (e.g., family, school) as involving some exchange of support—role demands and responsibilities. In general the model suggests that just as relationship is important and support functional, they can also be dysfunctional. Relationships can provide nurturance and support but they also can expose the individual to physical and psychological threats (Antonucci & Wong, 2010).

With the integration of the convoy model, and the direct effect and the stress-buffering hypotheses the negative aspect of relationship and support seem to disappear, suggesting that relationships and support are only beneficial to individual's health and wellbeing. It is important to note that although the support offered to a person may be well intended and serve the needs of the individual, the person may feel pressured to return the support he or she received, a situation that can cause psychological distress for the individual.

With respect to the personal and situational characteristics that influence a person's convoy, some studies suggest that characteristics other than social support play direct and moderating roles between life events including stress and health of an individual (Jackson, Knight, & Rafferty, 2010; Yip, Gee, & Takeuchi, 2008). For instance, Yip and colleagues (2008) found that compared to immigrant Asians, ethnic identity moderated the relationship between discrimination and mental health for US-born Asians between the ages of 41-50 years. Similarly, Jackson, Knight, and Rafferty's (2010) study on the stress-buffering role of unhealthy behavior in the relationship between stress and health revealed that for some participants (particularly Blacks), the relationship between stressors and meeting major-depression criteria was weaker among individuals involved in unhealthy behaviors than among those who had not. The authors concluded that by engaging in unhealthy behaviors, which may appear to have protective mental health effects, individuals who live in chronically stressful environments are able to cope better with stressors.

What remains unclear is the role personal and situational characteristics played in studies that found support for the moderating role of social support in the association between life events and health. The evidence provided above, however, suggests the need for further investigations to understand the independent contributions of personal and situational factors characterizing one's convoy, and social support in the relationship between life events and health.

The convoy model and the social support hypotheses will not be tested; instead, they will be used as conceptual lens describing and interpreting the elements of social relationships—social network or connectedness, and perceived support—and their effects

on older adults' physical health and psychological wellbeing.

Theoretical and methodological issues in social relationship and health studies

Theory, conceptualization, and measurement

A substantial body of research offers evidence that concepts used in social relationship studies such as social network, social support, and participation in social activities may serve as a protective mechanism against physical and psychological impacts of life events (thereby improving health) (Cobb, 1979; Cummings & Kropf, 2009; Dimatteo, 2004; Fiori et al., 2006; Lakey & Orehek, 2011; Nurullah, 2012; Thoits, 1982; Williams et al., 2004). However, the evidence must be accepted and interpreted with some level of caution, as there are theoretical and methodological issues with these constructs in the academic literature.

Theories are formulated to explain, understand, and predict phenomenon. In most cases, they are formulated to test and advance previous knowledge within the limits of established critical assumptions (Labaree, 2013). While the majority of research on social relationships and health are method-driven, only a few are theory-driven—wherein the researcher applies a particular explicit theoretical framework in order to explore and contextualize the problem they investigate (Public Health Action Support Team, 2011). It has been established that these concepts serving as the components of social relationship directly affect health and wellbeing. A limited number of theories, however, exist to explain the mechanisms by which social network and support are related to health and wellbeing. The direct-effect and the stress-buffer hypotheses have been most cited in the academic literature as offering possible explanations regarding the relationship between

social network, social support, and health. As noted earlier, while the direct-effect hypothesis has received empirical validation (Antonucci et al., 2009; Lakey & Orehek, 2011), the majority of studies have found little or no evidence for the stress-buffering hypothesis (Carpenter, 2006; Mezuk et al., 2010). Scholars continue to investigate the mechanisms, and Lakey and Orehek's (2011) recent work on relational regulation theory is considered promising. However, as a relatively new theory, it needs to be thoroughly examined.

Methodologically, relationship studies are riddled with conceptual and measurement problems. Conceptual problems include problems with conceptual definitions and boundary specification. Measurement problems include nature of concepts studied and inadequate report on psychometric properties.

Due in part to the complexity of social relationship phenomena, there is lack of agreement on definition for almost all concepts used in relationship studies (Kahn, 1979; Lubben & Gironda, 2004; Williams et al., 2004). Williams and colleagues (2004), for instance, identified over two dozens of definitions of social support. As a concept, social support lacks a universal definition accepted by all social researchers (Cobb, 1979; Thoits, 1982; Williams et al., 2004). One problem with the various definitions or conceptualization is a lack of consistency and comparability among studies (Williams et al., 2004). Closely related is the problem of concept operationalization that is necessary for measurement purposes. Heitzman and Kaplan's (1988) review of studies assessing methods for measuring social support identified 23 different operational definitions (e.g., social ties, social network, information given, guidance, social interaction, social integration, etc.) for measuring social support. Despite this, many studies on social

support have operationalized it as receipt of emotional, informational, or instrumental support. The problem with these operational terms is the overlap in meaning or understanding of these forms of support, thereby making it difficult to distinctively assess the contribution of each to health and wellbeing of an individual. For instance, the act of supporting one financially, considered a form of instrumental support, may connote an expression of love and thus the provision of emotional support,

Level of connectedness is often measured by network size, frequency of interaction with others, and participation in social activities (Cornwell & Waite, 2009; Cornwell, 2008; Shaw et al., 2007). Deciding where one's social network begins and ends, which network size is adequate for the development and wellbeing of the individual, who provides better support to whom and in what situation, and what level of involvement in social activities is healthy for the individual has proven challenging in relationship studies (BCMH, 2004; Dickens, Richards, Greaves, & Campbell, 2011; Tilburg, 2002; Voils et al., 2007). Small network size and less participation in social activities have been used in the literature as indicators of low level of connectedness or integration (Ashida & Heaney, 2008; Cleak & Howe, 2003; Voils et al., 2007). Some research and theories, however, reject this position, claiming that quality is more important than quantity in relationships (Besser & Priel, 2008; Bradley & Cafferty, 2001; Tejeda, 2008; Teo, Choi, & Valenstein, 2013), and regarding that satisfaction is more important than the number of activities one participates in (Blace, 2012; Eakman, Carlson, & Clark, 2010; Levasseur, Desrosiers, & Whiteneck, 2010).

Most research on social relationships requires participants to give a general rating of their support network, rather than rating specific support providers. General measures

are used, as researchers are unable to distinctively identify provider, recipient, and relational influences. Consequently, the association between a general measure of perceived support and health reflects some unknown combination of social influences and support recipient personal characteristics. Respondents make summary judgments of their social network on rules that seem to equalize supportiveness across different providers. It therefore becomes difficult to ascertain who provides better support to whom and in what situation.

Concept measurement in relationship studies presents a challenge for most researchers. Because of their qualitative and quantitative nature, concepts used in relationship studies are sometimes difficult to study. Quantitative measures offer the opportunity to examine a particular construct in a large sample; it is obvious, however, that the rich meaning of the construct may be missed as personal expressions are not a characteristic of quantitative measures. For instance, in trying to assess the strength of one's social ties, it is not enough to inquire of respondents the size of their social network, but also to find out if the size of network matters to them and reasons they offer to support their claims. Similarly, frequency of contact either directly (e.g., face-to-face) or indirectly (e.g., telephone) may serve, and has been used in studies, as an indicator of tie's strength (Voils et al., 2007). It is important to note that dwelling on this quantitative measure, one loses the meaning of what it means to be strongly connected to another. What is important, therefore, and needs maximum attention is the need to assess concepts in relationships studies from both quantitative and qualitative standpoints.

Several studies report different instruments or scales used to assess these concepts. While the validity and reliability of most instruments are reported in the

literature, several remain unreported (Asante & Lundahl, n.d). In the words of Lubben and Gironda, (2004) most instruments used in relationship studies have "unknown or unreported psychometric properties" (p. 20). Researchers consider the general lack of attention to reporting the validity and reliability analysis of most assessment instruments worrisome. Without reports of instrument validity and reliability, it becomes difficult to ascertain whether or not the instruments used actually measured what they were intended to measure and how reliable the instruments were in providing results that are consistent and trusted. This results in difficulty accepting the findings of studies as true and reflecting the situation in the real world.

The development of valid and reliable indicators of the concepts is worth considering. Items such as presence or absence of spouse, friends, or confidants, living arrangement, frequency of contact with other, number of people seen within a certain time frame, and the number of social activities one participates in have largely been used in studies examining social relationships. These measures are used as indicators of social connectedness, the level of integration, and in most instances, measures of support one receives (Ashida & Heaney, 2008; Cornwell & Waite, 2009; Voils et al., 2007). Ideally, each concept would have precise conceptual and operational definitions, with little or no room for overlap.

The review of previous studies suggests social relationship is an important element in the life of the older adults. Its impact on the physical health and mental wellbeing continues to be of interest to scholars, hence the significant number of studies done in this area of enquiry. Theories and models have been developed, and hypotheses formulated, as the review suggests, with the idea of furthering the understanding of the

association between social relationship and health of an individual. Multiple unexplored or less explored areas in this association need to be studied to add to existing knowledge on social relationships and their association to health and wellbeing. The current study aimed to investigate and understand the individual contributions of social ties and social support to the health of the adult population and to contribute to practice, policy, and knowledge development in this area.

CHAPTER 3

RESEARCH METHODS

This chapter addresses the quantitative approaches and analytic strategies that were used to study the specified research questions and find support for the stated hypotheses. First, the Utah Fertility, Longevity, and Aging (FLAG) study—the original data source for the current study—is summarized. Next, the current study's design and sample are described, the four research questions and hypotheses guiding this study are restated, the variables and measures from the FLAG study relevant to the current study are reviewed, and preliminary analyses (conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity) are presented. Finally, the quantitative analytic strategies used in the study are discussed.

Fertility, Longevity, and Aging (FLAG) study

Background and purpose

The FLAG study, an observational longitudinal study, is composed of a statewide multiple statistical analysis of collected and existing medical and demographic records of geographically stable older adults. The study began in 2004 and data collection is ongoing (FLAG study protocol, n.d.). Evidence available suggests humans differ widely in their age at death and health status over their life course. The FLAG project is

premised on the hypothesis that a constellation of factors, both genetic and environmental, influence the rate of aging and longevity and attempts to test this claim by identifying families known to have exceptional longevity on whom to measure epidemiologic, social, cognitive, psychological, and molecular traits believed to be associated with aging and longevity.

Sample and data collection

FLAG utilizes both primary and secondary data. Primary data include the use of blood samples, clinical exams, and questionnaires to obtain information relevant to the study. Secondary data include information on medical and demographic records of subjects obtained through the Utah Population Databases (UPDB).

The first wave of the FLAG project had two main phases. The first phase primarily consisted of a series of statistical analyses conducted by the researchers on existing records in UPDB and from Centers for Medicaid and Medicare Studies (CMS) to identify subjects eligible for the study. The second phase involved recruiting families with excess longevity and an age-sex matched control group (i.e., individuals without characteristics of longevity) based upon statistical analyses completed in phase I. Prior to obtaining informed consent, the mini-mental state examination (MMSE) was administered to assess whether prospective subjects were appropriate candidates for inclusion in the FLAG study. Primary data were collected from the two groups identified above in the second phase (FLAG study protocol, n.d.).

From the identified exceptionally long-lived families, 900 participants were recruited and enrolled in the study. FLAG includes 500 exceptionally long-lived (EL)

persons (proband group) who are approximately 90 years and older, and 400 of their offspring and nieces/nephews (offspring group) who are estimated to be between 50 to 75 years of age. Two hundred individuals were also identified from the UPDB and serve as the age-sex matched control group for both the proband and the offspring groups. Data were collected on multiple variables from the proband and offspring groups and the matched control group, including but not limited to the following: socio-demographic characteristics, health, medical, and reproductive history, cognitive functioning, depression, social network and support, religion, and an array of clinical measures such as hearing, vision, grip strength, blood pressure, pulse, heart rate, lung functioning, height weight, body temperature, and deoxyribonucleic acid (DNA).

Institutional Review Board (IRB)

Data were collected with adherence to policies and procedures regarding the protection of human subjects (FLAG study protocol, n.d.). A two-part IRB request regarding informed consent was received. The first part was a waiver of consent for use of existing UPDB data and medical diagnoses data from CMS. The second part was approval granted by the University of Utah Institutional Review Board for obtaining primary data from human subjects.

Current study

Design

This cross-sectional study utilized secondary data from the first wave of data collected in the FLAG study. Data on social connectedness, perceived social support, and

health of older adult were analyzed with the purpose of understanding the relationship between the dimensions social connectedness and perceived social support and health.

Study sample

The study sample was comprised of participants, ages 50 years and older, from the offspring group in the FLAG study. Inclusion criteria included age (50+), and having data on social connectedness and perceived social support, the two predictor variables examined in this study. A total of 325 participants meeting these inclusion criteria were involved in the current study.

Research question and hypotheses

The current study was undertaken to examine the association between social connectedness, perceived social support, and physical and mental health of older adults. The study further aimed to determine the effect of perceived social support on the association between social connectedness and health of older adults. To investigate these associations, the study addressed following questions and hypotheses using a set of health, social, and demographic variables from the FLAG study:

- (Q1) Are there associations between the dimensions of social connectedness, perceived social support, and physical and mental health of older adults?

  Hypothesis 1: Dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) will be positively associated with physical and mental health of older adults.

- (Q2) Are there differences in how the dimensions of social connectedness and perceived social support relate with the physical and mental health of older adults?

  Hypothesis 2: Compared to the dimensions of social connectedness, higher scores on the dimensions of perceived social support will correspond with self-rated good physical and mental health scores.

- (Q3) What dimensions of social connectedness and social support are important to physical and mental health of older adults?

  Hypothesis 3: Compared to the dimensions of social connectedness, the dimensions of perceived social support will be significantly stronger predictors of self-rated physical and mental health.

- (Q4) Does perceived social support moderate the relationship between social connectedness and physical and mental health of older adults?

  Hypothesis 4: Perceived social support will moderate the relationship between social connectedness and physical and mental health of older adults.

Variables

Data for this study were based on self-reported answers of older Utahns who participated in the FLAG project. Variables addressed included the following: (1) social connectedness; (2) perceived social support; (3) physical and mental health; (4) depression; and (5) socio-demographic characteristics (age, gender, marital history, living arrangement, religious affiliation, religiosity, and socio-economic status). These variables were grouped under predictor, criterion, and covariate variables.

Predictor variables

Social connectedness

A participant's social network, measured in the FLAG study with the Duke Social Support Index (DSSI), was used as the social connectedness measure in the current study. Designed for use with older adults, the DSSI offers a measure of the level or degree of a person's connectedness with others—family, friends, and neighbors (Landerman et al., 1989; Pachana, Smith, Watson, McLaughlin, & Dobson, 2008). The DSSI has 10 items with 5-point Likert scale responses from 0 = None of the time to 4 = All of the time. Participants responded to items such as ""How many times did you talk to some friend, relatives or others on the telephone in the past week (either they called you or you called them)?" and "Do you feel useful to your family and friends (i.e., people who are important to you?)". The 10 items were further grouped into 2 dimensions measuring, frequency of contact with network members (considered *network* hereafter), and satisfaction with network.

Items on both dimensions were recoded into categorical variables with response categories ranging from 1 = Hardly ever to 3 = Most of the time. Network dimension scores ranged from 2 to 9 with higher scores showing more social contacts. The satisfaction with network dimension scores ranged from 9 to 21. Higher scores indicated greater level of satisfaction with social network. Scores for the overall index ranged from 11—30, with higher score indicating more connectedness. Cronbach's alpha coefficients of .578 and .726 were recorded for the network and satisfaction with network dimensions, respectively. The overall index was found to have a reasonable internal reliability with a Cronbach's alpha of 0.74, and a small to moderate interitem correlation recorded in this

study. Construct validity was supported in previous research (George et al., 2010; Goodger, Higganbotham, & Mishra, 1999).

Perceived social support

Perceived social support was measured with the Duke—UNC Functional Social Support (DUNCFSS) Questionnaire, which was developed to provide a brief assessment of functional social support (Broadhead et al., 1998; Sansoni, Marosszeky, Sansoni, & Fleming, 2010). It is designed specifically to measure an individual's perception of the amount and type of personal social support. The DUNCFSS instrument has 10 items with 5-point Likert scale responses from 1 = Much less than I would to 5 = As much as I would like to). Participants responded to items such as "I get love and attention; I get chances to talk to someone I trust about my personal and family problems. The 10 items were further grouped into 3 subscales (dimensions) measuring affective support, confidant support, and instrumental support, with scores ranging from 2-10, 5-20, and 5-20, respectively. Scores for the overall index ranged from 12-50, with higher scores reflecting higher perceived social support. Cronbach's alpha coefficient of .741, .825 and .686 were recorded for affective, confidant, and instrumental support, respectively. The overall index was found to have an excellent internal consistency with a Cronbach's alpha of 0.86, and a moderate to strong interitem correlations found in this study. (See Table 1.)

Table 1: Summary statistics for dimensions of social connectedness, perceived social support, and health measures

Scale and dimensions	Items in scale	Cronbach's alpha	Range	*M*[a]
Social connectedness				
Network	3	.578	2—9	0.262***
Satisfaction with network	7	.726	9—21	0.309***
Overall index[b]	10	.740	11—30	0.233***
Social support				
Affective support	3	.741	2—10	0.506***
Confidant support	4	.825	5—20	0.542***
Instrumental support	3	.686	5—20	0.433***
Overall index[b]	10	.867	12—50	0.425***
Health				
Physical health	10	.754	10—100	0.364***
Mental health	5	.813	24—92	0.490***
Depression	29	.846	0—29	0.183***

Notes: *p<.05; **p<.01; ***p<.001

[a] Mean interitem correlation

[b] Overall index represents a combined score of all individual subscales/dimensions

Criterion variables

Health—physical and mental

Physical and mental health were measured with the Medical Outcome Study Short-Form 36 (SF-36) in the FLAG study. The SF-36 comprises a generic, coherent, and easy to administer quality-of-life measure designed to examine functioning and wellbeing in older adults. The 36 items are used to compute 8 domains that primarily measure physical and mental health: physical functioning (PF), role limitations – physical (RP), bodily pain (BP), general health (GH), energy (E), social functioning (SF), role limitations – emotional (RE), and mental health (MH) (McHorney et al., 1993). After recoding, each item is scored on a 0-100 range. A higher score indicates more favorable health status (RAND, 2009). For purposes of the current study, the physical and mental health domains were examined. Examples of items in the questionnaire include: "In general would you say your health is____. Response categories ranged from 1 = Excellent to 5 = Poor. "During the past 4 weeks, how much of the time has your physical health or emotional problem interfered with your social activities (like visiting friends, relatives etc.)." Response categories ranged from 1 = All of the time to 5 = None of the time.

Cronbach's alpha coefficients of 0.75, and 0.81, with moderate to strong interitem correlations were recorded for physical health and mental health, respectively, indicating both domains of the SF-36 scale have acceptable internal reliability. (See Table 1.) The validity of the SF-36 scale has been tested in relation to socio-demographic and clinical variables, and it has been proven to be a valid measure (Failde & Ramos, 2000; Findler et al., 2001; Gandek et al., 1998).

Depression

Depression was assessed with the 30-item Geriatric Depression Scale (GDS). The GDS required a participant to respond by answering “yes” or “no” in reference to how he or she felt over the past 30 days, giving an indication of whether or not the participant is depressed. One point was assigned to each answer and the cumulative score was rated on a scoring grid. The grid set a range of 0-9 as "normal", 10-19 as "mildly depressed", and 20-30 as "severely depressed" (Encyclopedia of Mental Disorders, 2013).

Examples of items in the scale include the following: “Are you basically satisfied with your life?; Have you dropped many of your activities and interests?; Do you feel that your life is empty?” (See Appendix for scale.) The GDS has an excellent internal consistency with a Cronbach’s alpha value of 0.84 and moderate to strong interitem correlations recorded in this study. (See Table 1.)

Covariates

Covariates included seven items asking participants about their age, gender, marital status, living arrangement, socio-economic status, and religious affiliation and religiosity. Age was a continuous variable ranging from 50 to 81 years. To examine whether or not the levels of connectedness and support change with aging, age was recoded into categorical variable with three response categories: 0 = 50-59, 1 = 60-69, and 3 = 70-81. Gender was a categorical variable with two response categories: 0 = Male, and 1 = Female. Marital status was a categorical variable with five response categories: 1 = Never married, 2 = Married/Living as married, 3 = Separated, 4 = Widowed, and 5 = Divorced. Since a majority of the participants were married, this variable was recoded

into a dichotomous variable with response categories: 0 = Not married/single and 1 = Married. In regard to living arrangement, participants indicated number of people living in household, including self. The number ranged from 1 to 9, with 1 indicating living alone. Since a majority of the participants fell between 2 and 9, living arrangement was recoded into a dichotomous variable with response categories: 0 = Living alone and 1 = Living with others. Socio-economic status (SES) measured in terms of *family's gross income* was a continuous variable with response categories ranging from 0 to 100,000 or more. Three groups of SES were identified: 1 = Poor (individuals making 39,999 or less), 2 = Fair, (individuals making 40,000 to 49,999), and 3 = Good (individuals making 50,000 or more, with the majority falling between 50,000 and 69,999). With a majority of the participants falling in the 'good' category, individuals in the 'poor' and 'fair' categories were put together as a group. SES was recoded into categorical variable with two response categories: 0 = Poor to fair, representing individuals with family gross income less than 49,999, and 1 = Good, representing participants with family gross income of 50,000 or more. Religious affiliation was a categorical variable with six response categories: 1 = Latter-day Saints (LDS), 2 = Protestant, 3 = Catholic, 4 = Jewish, 5 = Some other religion, and 6 = No religion. Religiosity was a categorical variable with five response categories: 1 = Deeply religious, 2 = Fairly religious, 3 = Only slightly religious, 4 = Not at all religious, 5 = Against religion, and 6 = Don't know. Since a majority of the participants considered themselves religious, religiosity was recoded as a dichotomous variable with response categories, 0 = Not religious and 1= Religious. (See Appendix for instruments.)

Data analysis procedure

Preliminary analysis

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. These data were screened for outliers and missing data and were not significant to affect the analyses and results. Correlations among variables were examined. Correlations were weak to strong in strength, ranging from, r = .002 to .721. This suggested the unlikely possibility of multicollinearity, in which case correlation coefficients will be higher (r = .9 and above) (Pallant, 2010; Tabachnick & Fidell, 2001).

Since the study aimed to investigate the moderation effect of perceived social support on social connectedness and selected health measures, steps were taken to ensure the conditions needed to allow for moderation analyses to be conducted were met. These steps included estimating sample size needed for sufficient power to detect the moderation effect, transforming predictor and moderator variables, and creating an interaction term. The predictor variable, social connectedness, and the moderator, perceived social support, were continuous variables. Both were standardized or centered so that they had a mean of 0 and a standard deviation of 1. To estimate sample size, the G*Power program was used. It was determined that a total sample of 300 was needed to perform the moderation analysis (Sample size calculation: effect size = 0.0625, $\alpha = 0.05$, power = 0.90, number of group = 2, predictors = 3, Response variables = 1, sample size needed = 300) (Faul, Erdfelder, Buchner, & Lang, 2009). The product term was created by multiplying the centered predictor (social connectedness) and moderator (perceived social support) variables. This was done with the Predictive Analytics Software (PASW).

Statistical analysis

The data were processed using the Predictive Analytic Software 18 (PASW 18). Descriptive statistics were used to provide basic information—frequency, percentage, mean, and standard deviation—about the study sample. Descriptive statistics were also used to check variables of interest for any violation of the assumptions underlying statistical techniques used to address the research questions (Pallant, 2010). Inferential statistics were later used to analyze the types and degrees of relationship or association among the variables of interest.

In addition to maintaining the individual dimensions of the instruments used to measure the constructs under investigation, summed scores were computed to help with the analysis. Reliability analyses were conducted to test instruments' reliability with the study sample. Correlation analyses were used to examine the strength and direction of relationship between the covariates, the predictor, and the criterion variables. Multiple regression analyses were conducted to examine how well the dimensions (indicators) of social connectedness and perceived social support are able to predict physical and mental health when controlling for the effects of covariates.

Since the study aimed at investigating the association between social connectedness, perceived support, and health, it was obvious that participants will vary on all these measures. It was expected that some participants would obtain higher health scores than others, and rank higher on the dimensions of social connectedness and perceived social support, suggesting they were more connected and supported. Group difference on these measures (social connectedness, perceived support, and physical and mental health measures) were tested using Chi-square test for independence for

categorical variables and *t*-test for continuous variables. The moderating effect of perceived social support on the relationship between social connectedness and physical and mental health was tested with multiple regression analysis (Baron & Kenny, 1986; Pallant, 2010; Tabachnick & Fidell, 2001; Trochim & Donnelly, 2008). To control the probability of committing Type 1 error, the significance level for these tests was set at alpha value .05. Analysis outputs in Chapter 4 are presented with tables to facilitate understanding of how data were analyzed and conclusions reached.

CHAPTER 4

FINDINGS

This chapter provides descriptive data for participants for variables examined in the study. The chapter also presents statistical findings for each research question and hypothesis identified in Chapter 1.

Descriptive data

Socio-demographic characteristics of study participants

The mean age of the sample was 64.89 ± 6.98, with a range from 50 to 81 years. More than half (58.2%) of the participants were female. Most (83.4%) were married. The remaining 16.6% were divorced (3.4%), separated (6.5%), or widowed (6.8%). The majority (71.8%) reported good social-economic status. More than two-thirds (89.2%) indicated they lived with others (spouse, children, siblings). Almost all participants belonged to a religious faith with 94.1% identifying with the Church of Latter-day Saints (LDS) faith. (See Table 2.) This is consistent with the religious composition of the population in the state where the study was conducted.

Table 2: Socio-demographic characteristics of study participants

	Categories	*N*	%	*M(SD)*
Age	--	325	--	64.89 (6.98)
Gender	Male	136	41.8	--
	Female	189	58.2	
Marital status	Unmarried/single	54	16.6	--
	Married	271	83.4	
Socio-economic status	Poor-Fair	87	28.1	--
	Good	222	71.8	
Living arrangement	Alone	32	9.8	--
	With others	292	89.8	
Religious affiliation	LDS	305	94.1	--
	Protestant	0	0	
	Catholic	3	.6	
	Jewish	0	0	
	Some other religion	6	1.9	
	No religion	11	3.4	

Note: Because of missing data *N* is not always equal to 325

Mean scores of social connectedness, perceived social support,
and health measures

Table 3 shows the mean scores of both predictor and criterion variables examined in this study. Social connectedness mean scores of 9.91±1.34 and 19.96±1.26 were recorded for the network and satisfaction with network dimensions, respectively. Mean score for the overall index of social connectedness was 29.75 ± 2.62. Scores ranged from 16-33, with high scores indicating more connections and greater satisfaction with network. Based on the mean scores, participants appeared to have strong social connections, and to be highly satisfied with their social connections.

The sample's mean score for the overall index of social support was 41.88 ± 6.84, with scores ranging from 16—50. High scores indicated higher perceived social support. Mean scores for the three dimensions were: affective support = 8.72±1.44; confidant support = 16.67±3.33; and instrumental support = 17.80±2.76. Higher scores reflect higher perceived social support; thus, the mean score suggested participants perceived the support they received from others as good. (See Table 3.)

The sample's mean score for depression was 4.53 ± 4.20, which suggested low incidence of depression. Scores for depression also showed less variability because most participants (89.2%) were not depressed. This offered statistical and empirical grounds for excluding depression from subsequent analyses.

The sample's mean scores on the SF-36 scale were 84.03 ± 15.22, 7 and 3.65 ± 13.66 for physical, and mental health domains, respectively. Higher scores indicated more favorable health on the above mentioned domains. (See Table 3.)

Table 3: Mean scores of social connectedness, perceived social support, and health measures

	N	Mean	*SD*	Range
Social connectedness				
Network	310	9.91	1.34	2—9
Satisfaction with network	323	19.96	1.26	9—21
Overall index	325	29.75	2.62	11—30
Social support				
Affective support	325	8.72	1.44	2—10
Confidant support	325	16.67	3.33	5—20
Instrumental support	243	17.80	2.76	5—20
Overall index	325	41.88	6.845	12—50
Health				
Physical health	324	84.03	15.22	10—100
Mental health	325	73.65	13.66	24—92
Depression	325	4.53	4.20	0—29

Note: Overall index represents a combined score of all individual subscales/dimensions

Sample demographics according to the level of social connectedness

A Chi-square test for independence was conducted to test the bivariate associations between sample demographic characteristics and the level of social connectedness. Using Yates Continuity Correction, social connectedness was significantly associated with religiosity, $X^2(1, n = 325) = 15.247$, $p<.01$, phi = .217. (See Table 4.) The results suggested individuals who were connected (65.4%) were more likely to be affiliated with religious organization compared to those who were not affiliated with any religious organization (34.6%). The rest of the demographic (age, gender, marital status, socio-economic status, and living arrangement) variables showed no association with social connectedness.

Sample demographics according to the level of support

Marital status $X^2(1, n = 325) = 18.230$, $p<.001$, phi = .237, socio-economic status $X^2(1, n = 325) = 7.736$, $p<.01$, phi = .166, living arrangement $X^2(1, n = 325) = 15.217$, $p<.001$, phi = .228, and religious affiliation, $X^2 (1, n = 325) = 13.941$, $p<.01$, phi = .207 were found to be significantly associated with social support. (See Table 5.)

The results indicated a statistically significant difference between the proportions of married (69.4%) and unmarried/single individuals (38.9%) who felt supported. There was a statistically significant difference between the proportions of individuals with poor – fair (51.7%) and good (69.4%) socio-economic status in relation to support. The proportion of people living with others (67.8%) who felt supported was statistically significantly different from those who lived alone (31.3%). The proportion of

Table 4: X^2-test – Distribution of sample demographic characteristics according to level of social connectedness (n=325)

		Connected (n=213)		Not connected (n=112)				
	Category	*n*	%	*n*	%	X^2	*P*	Effect size
Demographic								
Age	50-59	50	63.3	29	36.7	1.119	.572	--
	60-69	102	64.2	57	35.8			
	70+	61	70.1	26	29.9			
Gender	Male	80	59.7	54	40.3	3.014	.083	--
	Female	133	69.6	58	30.4			
Marital status	Single	33	61.1	21	38.9	.122	.726	--
	Married	180	66.4	91	33.6			
SES	Poor to fair	52	59.8	35	40.2	1.738	.187	--
	Good	152	68.5	70	31.5			
Living arrangement	Alone	18	56.3	14	43.8	.991	.320	--
	With others	195	66.8	97	33.2			
Religious Affiliation	LDS	206	67.5	99	32.5	15.247	.002	.217
	Catholic	2	100	0	0			
	Some other religion	2	33.9	4	66.7			
	No religion	2	18.2	9	81.8			

Notes: LDS = Church of Latter-day Saint

Table 5: X^2-test – Sample demographic characteristics and perceived social support (*n*=325)

		Supported (*n*=209)		Not supported (*n*=116)				
	Category	*n*	%	*n*	%	X^2	*P*	Effect size
Demographic								
Age	50-59	52	65.8	27	34.2	.273	.872	--
	60-69	100	62.9	59	37.1			
	70+	57	65.5	30	34.5			
Gender	Male	85	63.4	49	36.6	.025	.874	--
	Female	124	64.9	67	35.1			
Marital status	Single	21	38.9	83	61.1	18.230	.001	.237
	Married	188	69.4	33	30.6			
SES	Poor to fair	45	51.7	42	48.3	7.736	.005	.166
	Good	154	69.4	68	30.6			
Living	Alone	10	31.3	22	68.8	15.217	.001	.228
arrangement	With others	198	67.8	94	32.2			
Religious	LDS	201	65.9	104	34.1	13.941	.003	.207
affiliation	Catholic	2	100	0	0			
	Some other religion	0	0	6	100			
	No religion	5	45.5	6	54.5			

Notes: LDS = Church of Latter Day Saints

participants with religious affiliations who felt supported (65.2%) was significantly different from those who were not affiliated with any religious organization (34.8%). Married participants who lived with others, those with good socio-economic status, and those affiliated with religious organizations felt more supported than unmarried participants who lived alone, those who reported poor to fair socio-economic status, and those who were not affiliated with any religious organization. (See Table 5.)

Differences in dimensions of social connectedness and perceived social support in relation to physical and mental health

Social connectedness

Using independent samples *t*-test, the mean scores of the sample on health variables were compared in relation to the dimensions of social connectedness and perceived social support. (See Table 6.) Results showed statistically significant differences in mean scores on the satisfaction with network dimension in relation to physical and mental health. For physical health, participants with higher scores (M = 85.10, SD = 13.462) on the satisfaction with network dimension were significantly different from participants with lower scores (M = 80.99, SD = 19.339) on the dimension, t (323) = -2.117, p = .035. Magnitude of the difference in means score (mean difference = -4.116, 95% *CI*: -7.940—-.292) was small (Eta squared = .014).

In terms of mental health, a statistically significant difference was found between participants who scored higher (M = 76.02, SD = 12.143) on the satisfaction with network dimension than those who scored lower (M = 66.72, SD = 15.637); t (323) = -5.533, p =

Table 6: Means score differences in dimensions of social connectedness in relation to physical and mental health (*t*-test)

	Connectedness					
	Network			Satisfaction with network		
	High (n = 209)	Low (n = 101)	*t*	High (n = 242)	Low (n = 81)	*t*
	M	*M*		*M*	*M*	
Health						
Physical health	84.04	82.97	-.568	85.10	80.99	-2.117*
Mental health	73.94	72.20	-1.039	76.02	66.72	-5.533***

Notes: *p<.05; **p<.01;*** p<.001

Effect sizes (eta squared) — .01 = small effect; .06 = moderate effect; .10 = large effect

Satisfaction with network and physical health = 0.014;

Satisfaction with network and mental health = 0.08

.001. Magnitude of the difference in the mean scores (mean difference = -9.305, 95% *CI*: -12.613—-5.533) was moderate (Eta squared = .08). No significant differences were found in the mean scores on the network dimension in relation to physical and mental health. Generally, older participants who were more satisfied with their network were more likely to have better physical and mental health compared to those who were less satisfied with their network.

Perceived social support

The independent samples *t*-test showed statistically significant differences for all the dimensions of social support in relation to physical and mental health. (See Table 7). For physical health, significant differences were found in mean scores for participants who ranked high on the affective support dimension (M = 86.36, SD = 12.89) and those who ranked low (M = 79.74, SD = 18.056); t (324) = -3.817, p = .001; participants who ranked high on the confidant support dimension (M = 85.89, SD = 13.566) and those who ranked low (M = 81.14, SD = 13.566), t (324) = -2.769, p = .006; and participants who ranked high on the instrumental support dimension (M = 86.50, SD = 12.671) and those who ranked low (M = 81.63, SD = 16.631), t (242) = -2.566, p = .011. Magnitude of the differences in the means scores (mean difference) ranged from -4.747 to -6.620, with small effect sizes, (Eta squared = .023 to .043).

In terms of mental health, significant differences were found in mean scores for participants with higher scores on the affective support dimension (M = 76.99, SD = 12.073) and those with lower scores (M = 67.47, SD = 14.334); t (325) = -6.342, p = .001; participants with higher scores on the confidant support dimension

Table 7: Variations in dimensions of perceived social support in relation to physical and mental health (*t*-test)

	Support dimensions								
	Affective		*t*	Confidant		*t*	Instrumental		*t*
	High (*n* = 211)	Low (*n* = 114)		High (*n* = 198)	Low (*n* = 127)		High (*n* = 154)	Low (*n* = 89)	
	M	*M*		*M*	*M*		*M*	*M*	
Health									
Physical health	86.36	79.74	-3.817***	85.89	81.14	-2.769**	86.50	81.63	-2.566**
Mental health	76.99	67.47	-6.342***	76.83	68.69	-5.469***	76.36	68.72	-4.782***

Notes: *p<.05; **p<.01;*** p<.001

Effect sizes (eta squared) — .01 = small effect; .06 = moderate effect; .10 = large effect

Affective support and physical health = 0.043; Affective and mental health = 0.110

Confidant support and physical health = 0.023; Confidant and mental health = 0.084

Instrumental support and physical health = 0.026; Instrumental support and mental health = 0.086

(M = 76.83, SD = 12.371) and those with lower scores (M = 68.69, SD = 15.188), t (325) = -5.468, p = .001; and participants who ranked high on the instrumental support dimension (M = 76.36, SD = 11.168) and those who ranked low (M = 68.22, SD = 15.188), t (243) = -4.782, p = .001. Magnitude of the differences in the mean scores (mean differences) ranged from 8.139—-9.577, with moderate to large affect sizes (Eta squared = .08 to.11). (See Table 7.) In summary, older adults who perceived receiving more affective, confidant and instrumental support were more likely to have better physical and mental health than those who perceived receiving minimal affective, confidant, and instrumental social support.

Social connectedness, perceived social support, and health

Results of the study suggested that social connectedness is not always accompanied by social support as evidenced by the moderate correlation between social connectedness and perceived social support (r = .461, p<.01) in this population-based sample of older adults. (See Table 8.) Relatedly, a correlation coefficient of determination, R^2 = .173 showed both variables shared 17.3 % of their variance, which suggests that social connectedness and social support are separate constructs that are moderately correlated. The sections below examine the study's four hypotheses in relation to their independent association and relative importance to the three health variables under study – physical health, mental health, and general health.

Table 8: Correlations among study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Age	-													
2 GD	-.002	-												
3 MS	-.032	-.161**	-											
4 SES	-.217***	-.184***	.318***	-										
5 LA	-.047	-.072	.721***	.239***	-									
6 RG	-.163**	-.118*	.145**	.043	-.109	-								
7 NW	.114*	.188***	.041	-.042	-.003	-.192***	-							
8 SwN	.132*	.057	.108	.146**	.133*	-.073	.375***	-						
9 AS	.053	.088	.230***	.167**	.231***	-.106	.233***	.559***	-					
10 CS	.113*	.077	.132*	.141**	.147**	-.084	.298***	.591***	.707***	-				
11 IS	.003	-.144*	.212***	.246***	.169**	-.002	.129*	.238***	.579***	.518***	-			
12 PH	-.139*	-.133*	.129*	.238***	.125*	.018	.053	.185***	.240***	.167**	.174**	-		
13 MH	.215***	-.102	.112*	.108	.086	-.077	.159**	.417***	.456***	.365***	.362***	.234***	-	
14 DP	-.102	.119*	-.134*	-.241***	-.109	.029	-.254***	-.484***	-.377***	-.380***	-.415***	-.397***	-.682***	-

Notes: *p<.05, **p<.01, ***p<.001

Correlation between social connectedness and perceived social support, r = .461, p<.001

GD = Gender; MS = Marital status; SES = Socio-economic status; LA = Living arrangement; RG = Religiosity; NW = Network; SwN = Satisfaction with network; AS = Affective support; CS = Confidant support; IS = Instrumental support; PH = Physical health; MH = Mental health; DP = Depression

Research questions and hypotheses

Question 1/Hypothesis 1

Dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) will be positively associated with physical and mental health of older adults.

Table 8 presents results from correlation analyses testing the association between covariates, predictor, and criterion variables examined in this study. For the predictor and criterion variables, significant weak to moderate positive correlations were found between the satisfaction with network dimension of social connectedness, and physical and mental health. The network dimension was significantly associated with mental health, but not with physical health. Coefficients of significant correlations ranged from, r = .159 to .417, ps<.01. The results generally indicated that higher scores on the dimensions of social connectedness scale corresponded with higher scores on physical and mental health domains.

Results also showed significant weak to moderate positive correlations between the dimensions of social support (affective, confidant, and instrumental support), and physical health and mental health.

Significant correlation coefficients ranged from, r = .167 to .456, p<.01. Higher scores on the dimensions of social support index correlated with higher scores on the physical, mental, and health domain. In support of hypothesis 1, satisfaction with network, affective, confidant, and instrumental support dimensions were found to be positively associated with physical and mental health of older adult. The association between the network dimension was significant with mental health but not with physical

health.

Question 2/Hypothesis 2

Compared to the dimensions of social connectedness, higher scores on the dimensions of perceived social support will correspond with self-rated good physical and mental health scores.

Logistic regression analyses were conducted to test the impact of the dimensions of social connectedness and perceived social support on the likelihood that study participants would report their health status as good. Two models were tested for physical and mental health. Each model contained a set of five predictor variables, including network and satisfaction with network, and affective, confidant, and instrumental support.

Predicted probabilities of good physical health

Result for model 1 testing physical health was statistically significant ($X^2(5, n = 231) = 27.165, p<.001$), indicating the model was able to distinguish between participants who reported good physical health. The model with all the predictors explained 15.2% (Negelkerke R square = .152) of the variance in physical health. Affective and instrumental support significantly predicted physical health. Affective support was a stronger predictor of reporting good physical health, with an odds ratio of 3.405, which showed that participants with high affective support scores were more than 3 times more likely to report good physical health than those with low affective support (OR = 3.405 (1.558—7.444). The odds of reporting good physical health was 1.976 for instrumental support received, which indicated that participants with high levels of instrumental

support were more likely to report good physical health than those with low instrumental support (OR = 1.97, *CI* = 1.014—3.848, $p<.05$). (See Table 9.)

Predicted probabilities of good mental health

Results of model 2 testing mental health were statistically significant (X^2 (5, 231) = 29.564, $p<.001$), with 16.0% (Negelkerke R square = .160) of the variance in mental health explained by the set of predictor variables. The satisfaction dimension of connectedness significantly predicted mental health ($p<.05$). The odds of reporting good mental health increased by 3.823 for participants who scored higher on the satisfaction dimension (OR = 3.823, *CI* = 1.735—8.426, $p<.05$), which indicated participants who were more satisfied with their network were more likely to report good mental health than those who were less satisfied. (See Table 10.)

The results of both models highlight some differences with regards to how social connectedness and perceived social support were associated with physical and mental health. While the satisfaction dimension of social connectedness significantly predicted mental health, the affective and instrumental dimensions of perceived social support predicted physical health. Results of the logistic regression suggested social connectedness and perceived social support may affect aspects of health of older adults differently.

Table 9: Logistic regression: Predicted probabilities of good physical health

Variable	B	S.E.	Wald	OR (95% *CI*)
Social connectedness				
Network	-0.438	.325	1.82	0.645(0.342—1.219)
Satisfaction w/network	-0.598	.391	2.34	0.550(0.256—1.183)
Social support				
Affective[(a)]	1.225	.399	9.424**	3.405(1.558—7.444)
Confidant	0.136	.415	0.107	0.873(0.387—1.970)
Instrumental[(b)]	0.681	.340	4.001*	1.976(1.014—3.848)

Notes: *p<.05; **p<.01; ***p<.001

[(a)] High levels of affective support

[(b)] High levels of instrumental support

Table 10: Logistic regression: Predictors of good mental health

Scale dimension	B	S.E.	Wald	OR (95% *CI*)
Social connectedness				
Network	-0.221	0.308	0.515	0.802(.438—1.466)
Satisfaction w/network[a]	1.341	0.403	11.061***	3.823(1.735—8.426)
Social support				
Affective	0.696	0.382	3.322	2.006(0.949—4.240)
Confidant	0.020	0.384	1.003	1.020(0.480—2.926)
Instrumental	0.403	0.342	1.392	1.497(0.766—2.926)

Notes: *p<.05; **p<.01; ***p<.001

(a) Higher levels of satisfaction with network

Question 3/Hypothesis 3

Compared to the dimensions of social connectedness, the dimensions of perceived social support will be significantly stronger predictors of self-rated physical and mental health.

Physical health

Table 11 presents results from hierarchical regression analyses examining the effects of social connectedness and social support on self-rated physical health, after controlling for the influence of socio-demographic variables. Model 1 examined the effects of five of the socio-demographic variables on physical health. The model, with all the variables, was significant, $F(5, 213) = 3.862$, $p = .002$, and explained 8.3% (R-squared = .083) of the total variance in physical health. SES (B = 6.717, $p = .01$) significantly predicted physical health (R-square change = .083, $p<.05$). The remaining demographic variables were not associated with physical health ($p>.05$). (See Table 11.)

Model 2 examined the effect of network and satisfaction with network (the two dimensions of social connectedness) on physical health, after controlling for the effects of socio-demographic variables. The model was significant, $F(7, 211) = 3.168$, $p = .003$. Inclusion of the dimensions of social connectedness did not affect the model's performance in predicting physical health, as neither significantly predicted physical health, R-square change = .012, F change (2, 211) = 1.395, $p = .250$, after controlling for the effects of socio-demographic variables.

The dimensions of social support—affective, confidant, and instrumental support—were introduced in model 3. Their inclusion enhanced the model's performance

Table 11: Co-efficients and standard errors from regression of physical health scores on covariates and predictor variables

Variables	Model 1	Model 2	Model 3
Demographics			
Age[a]	-0.201 (0.143)	-0.236 (0.145)	-0.377* (0.141)
Gender[b(i)]	-3.736 (1.980)	-4.392* (2.037)	-5.436**(2.038)
Marital status[b]	0.523 (4.084)	0.649 (4.089)	-1.700 (4.024)
Living arrangement[b]	2.938 (5.828)	2.487 (5.826)	3.119 (5.657)
SES[b]	6.717**(2.499)	6.370**(2.570)	6.031**(2.468)
Social Connectedness			
Network[a]		0.647 (0.776)	0.553 (0.756)
Satisfaction w/network[a]		0.787 (0.688)	-0.124 (0.793)
Social support			
Affective[a]			4.178***(1.057)
Confidant[a]			-0.794 (0.438)
Instrumental[a]			-0.199 (0.455)
R	0.288	0.308	0.402
R^2	0.083	0.095	0.162
Adjusted R^2	0.062	0.065	0.122
R^2 Change	0.083	0.012	0.067
Intercept	8.504***	4.471***	4.264***
Unweighted N	219	219	219
F	3.862**	3.168**	4.019***
df(residual)	5(213)	7(211)	10(208)

Notes: *p<.05; **p<.01; ***p<.001

SES = Socio-economic status

[a] Continuous variable

[b] Dichotomous variable

[i] Reference category is female

[ii] Reference category is good SES

Unstandardized regression co-efficients shown

Standard errors are presented in parenthesis

Higher significant positive coefficient indicates better physical health

in predicting physical health, with the model as a whole explaining 16.2% of the total variance in physical health, *R*-square = .162, $F(10, 208) = 4.019$, $p<.001$. The affective support dimension helped explain 6.7% of the variance in physical health, *R*-square change = .067, *F* change = (3, 208) = 5.530, $p = .001$. Confidant and instrumental support were not significant predictors of physical health. *R* was significantly different from zero at the end of each model. None of the dimensions of social connectedness was associated with physical health following the introduction of the perceived support dimensions. Age (B = -0.377, $p<.05$), gender (B = -5.436, $p<.01$) and SES (B = 6.031, $p<.01$) were significant predictors of physical health. (See Table 11.) While one dimension of perceived social support significantly predicted physical health, none of the dimensions of social connectedness predicted physical health. The third hypothesis of the study was partially supported.

Mental health

Table 12 presents results from hierarchical regression analyses examining the effects of social connectedness and social support on self-rated mental health, after controlling for the effects of socio-demographic variables. Five of the socio-demographic variables were entered in Model 1, which explained 8.2% (*R*-squared = .092) of the total variance in mental health. Age (B = .433, $p = .001$) and SES (B = 4.804, $p = .033$) significantly predicted mental health, (*R*-square change = .092, $p<.05$). The rest of the demographic variables were not associated with mental health ($p>.05$). (See Table 12.)

Model 2 examined the effect of the dimensions of social connectedness—network and satisfaction with network—on mental health. Including both dimensions improved the model's performance in predicting mental health, with this model explaining 23.8%

Table 12: Regression of mental health scores on covariate and predictor variables

Variables	Model 1	Model 2	Model 3
Demographics			
Age[a]	0.433***(0.129)	0.344** (0.120)	0.361 (0.117)
Gender[b(i)]	-2.804 (1.775)	-3.976** (1.685)	-3.995** (1.688)
Marital status[b]	2.529 (3.663)	3.601 (3.382)	1.328 (3.333)
Living arrangement[b]	-4.247 (5.226)	-5.981 (4.819)	-6.146 (4.685)
SES[b]	4.804* (2.241)	3.154 (2.085)	2.196 (2.045)
Social Connectedness			
Network[a]		0.300 (0.642)	0.125 (0.626)
Satisfaction w/network[a]		3.372***(0.569)	2.381***(0.657)
Social support			
Affective[a]			1.925* (0.875)
Confidant[a]			-0.252 (0.362)
Instrumental[a]			0.742* (0.377)
R	0.303	0.487	0.540
R^2	0.092	0.238	0.292
Adjusted R^2	0.070	0.212	0.258
R^2 Change	0.092	0.146	0.054
Intercept	4.710***	-1.304	-1.425
Unweighted *N*	219	219	219
F	4.307***	9.391***	8.573***
df(residual)	5(213)	7(211)	10(208)

Notes: *p<.05; **p<.01; ***p<.001

SES = Socio-economic status

[a] Continuous variable

[b] Dichotomous variable

[i] Reference category is female

[ii] Reference category is good SES

Unstandardized regression co-efficients shown

Standard errors are presented in parenthesis

Higher significant positive coefficient indicates better mental health

of the variance in mental health, *R*-square = .238, $F(7,211) = 9.391$, $p = .001$. Of the two dimensions, satisfaction with network significantly predicted mental health and explained an additional 14.6% of the variance in mental health, *R*-square change = .146, *F* change (2,211) = 20.163, $p = .001$, after holding all other variables constant.

The dimensions of social support—affective, confidant, and instrumental, were entered in model 3. Their inclusion also enhanced the model's performance in predicting mental health, with the model as a whole explaining 29.2% of the total variance in mental health, R-square = .292, $F(10, 208) = 8.573$, $p<.001$. Affective (B = 1.95, $p = .029$) and instrumental (B = .724, $p = .050$) support were significant predictors of mental health. Both dimensions explained an additional 5.4% of the total variance in mental health after controlling for the influence of socio-demographic variables and the dimensions of social connectedness, *R*-square change = .054, *F* change (3,208) = 5.320, $p = .001$.

Model 3 highlights the predictive ability of satisfaction with network. Together, satisfaction with network, and affective and instrumental support were significant predictors of mental health. Results of the analyses partially support the third hypothesis.

Question 4/Hypothesis 4

Perceived social support will moderate the relationship between social connectedness and physical and mental health of older adults.

Physical health

The overall scores of social connectedness and perceived social support were used in this analysis which involved two steps. *Step 1* examined the effects of social

connectedness (predictor) and perceived social support (moderator) on physical health. The unstandardized regression coefficient for social connectedness was, B = .0586, which was not significant at the conventional .05 level (p = .530). The unstandardized regression coefficient for perceived social support was, B = 3.221, which was significant (p = .001), *R*-square change = .054, *F* change (2, 321) = 9.123, p = .001. This indicated a significant positive association between perceived social support and physical health in the sample. (See Table 13.)

Step 2 examined the effect of the interaction term on physical health. The unstandardized regression coefficient for the interaction term (Connectedness_X_Support) term, B = -1.110 was not significant (p = .110). R-square change obtained for the interaction term was .008, suggesting a lack of moderation effect of social support.

Mental health

Like physical health, two steps were involved in this analysis. The effects of social connectedness and perceived social support on physical health were examined in *step 1*. The unstandardized regression coefficient for social connectedness, B = 2.794, and perceived social support were both significant, *ps* = .001. This indicated a significant conditional effect, with 19.6% of the total variance in mental health explained by social connectedness and perceived social support, *R*-square change = .196, *F* change (2, 322) = 39.257, p = .001. (See Table 14.) *Step 2* examined the effect of the interaction term. The unstandardized regression coefficient for the interaction term (Connectedness_X_Support), B = -.764, was not significant (p = .183). An R^2 change =

Table 13: Moderation analysis: Effect of social support on relationship between social connectedness and physical health

Step and variable	B	SE B	95% *CI*	β	R^2	R^2 Δ
Step 1						
Social connectedness[a]	0.586	0.931	-1.24, 2.41	0.039	0.054	0.054
Social support[a]	3.221	0.933	1.38, 5.05	0.212***		
Step 2						
Connectedness_X_Support[b]	-1.110	0.691	-2.47, 0.25	-0.105	0.061	0.008

Notes: *p<.05; **p<.01; ***p<.001

CI – Confidence Interval

Correlation between social connectedness and perceived social support, r = .461, p<.001

[a] Continuous measures are centered/standardized with a mean of 0 and standard deviation of 1

[b] Moderation – interaction term

1. A favorable effect of connectedness diminishes with support,
2. A moderator-interaction effect is substantially reduced
3. Effect size for interaction term, R^2 Δ (change) set at ≥.02

Table 14: The moderation effect of social support on relationship between social connectedness and mental health

Step and variable	B	SE B	95% *CI*	β	R^2	R^2 Δ
Step 1						
Social connectedness[a]	2.794	0.770	1.28, 4.30	0.204***	.196	0.196
Social support[a]	4.231	0.770	2.71, 5.46	0.310***		
Step 2						
Connectedness_X_Support[b]	-0.764	0.573	-188, 036	-080	.200	.004

Notes: *p<.05; **p<.01; ***p<.001

CI – Confidence Interval

Correlation between social connectedness and perceived social support, r = .461, p<.001

[a] Continuous measures are centered/standardized with a mean of 0 and standard deviation of 1

[b] Moderation – interaction term

1. A favorable effect of connectedness diminishes with support,
2. A moderator-interaction effect is substantially reduced
3. Effect size for interaction term, R^2 Δ (change) set at ≥.02

.004, ($F(1, 321) = 1.780$, $p = .258$) obtained suggested perceived social support did not have any moderating effect. (See Table 14.)

In both analyses, perceived social support was not found to moderate the relationship between social connectedness and physical and mental health. The fourth hypothesis of the study was not supported.

Summary of results

Results of the study showed the dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) were positively correlated. The dimensions, with the exception of the network dimension, also maintained positive associations with physical and mental health. In terms of predicting good physical and mental health, the affective and instrumental support dimensions of perceived social support were significantly associated with physical health, but not with mental health. Mental health was associated only with the satisfaction with network dimension of social connectedness. These findings suggest social connectedness and perceived social support may affect different aspects of health independent of the other.

In assessing the predictive abilities of social connectedness and perceived social support after controlling for the influence of covariates, the affective support dimension was a significant predictor of physical health. None of the dimensions of social connectedness predicted physical health. The satisfaction with network dimension was a significant predictor of mental health. Unexpectedly, the affective and instrumental support dimensions of perceived social support significantly predicted mental health.

When testing for the moderation effect of perceived social support on the relationship between social connectedness and physical and mental health, a significant conditional effect was found for perceived social support in relation to physical health**.** Similarly, both connectedness and perceived social support had significant positive associations with mental health. The interaction term and physical and mental health were not significantly associated. Perceived social support did not moderate the relationship between social connectedness and physical and mental health.

Within-dimension differences were also found in relation to physical and mental health. Individuals with high scores on affective, confidant, and instrumental support dimensions reported better physical and mental health than those with lower scores. Similarly, participants with higher scores on the satisfaction with network dimension reported better physical and mental health compared to those with lower scores.

Other correlates of physical and mental health found in this study included age, gender, and SES. Age was positively correlated with mental health, with an increase in age corresponding with favorable mental health status. SES was also positively associated with physical and mental health. Participants with higher SES were more likely to report better physical and mental health than those with lower SES. A negative association was found between gender and physical and mental health. Compared to men, women were more likely to report poor physical and mental health.

CHAPTER 5

DISCUSSION

This chapter summarizes significant findings of this study in relation to the research questions and hypotheses. It also highlights the strengths and weaknesses/limitations associated with study methods and analyses; addresses the study's implications for social work practice and education, policy and research; and identifies future directions for research.

Social connectedness, perceived social support, and health: The association

Participants involved in the FLAG study have exceptional longevity (i.e., average life expectancies at age 65 higher than the national average) (Welsh-Bohmen et al., 2006). While this might partially be attributed to genetic factors, the current study addressed social environmental factors that might offer explanations for their longevity.

The findings that social connectedness and social support, two important aspects of human relationships, were related to health status of older adults did not come as a surprise. Most of the analyses showed they had significant, positive, small-to-medium in-strength associations with the health of older adults. The results of the current study were consistent with previous research which reported higher levels of connectedness correlating with self-assessed good health status (Chalise, Kai, & Saito, 2010; Cornwell

& Waite, 2009; Fiori et al., 2006; Matire & Franks, 2014). Results, however, showed social support having stronger associations than social connectedness to health status of older adults. While it reflects participants' regard for social support rather than number of people in their network, this finding clearly shows social support is important to health in late life.

The finding that social support had a stronger association than social connectedness to the health of older adults is contrary to findings of earlier studies that highlighted the importance of connectedness to health and wellbeing of older adults (Ashida & Heaney, 2008; Rook, 1987). In Ashida and Heaney's (2008) study, for instance, social connectedness was positively associated with support. Both measures, however, correlated with health differently. Whereas social connectedness positively correlated with health status, social support did not. Social support negatively correlated with the health status of older adults.

While the present study highlights the relative importance of social support, previous studies suggest connectedness may be relatively more important to the health and wellbeing of older adults than perceived availability of social support (Ashida & Heaney, 2008). Future studies may investigate the underlying factors responsible for these differential associations of social connectedness and social support to the health and wellbeing of older adults.

Social connectedness and perceived social support were both related to self-rated good health status in this study. As already noted, participants in the FLAG study were selected due to their exceptional longevity. While this quality appears to result from delayed onset of aging phenotype, their longevity cannot be solely attributed to genetic

factors. The influence of social environmental factors should not be discounted. From a social standpoint, healthy and productive aging is the result of meaningful and supportive social connections (Lennartsson & Silverstein, 2001; Zunzunegui et al., 2003). Strong social ties are known to influence the development of self-efficacy, which in turn can positively impact one's health and wellbeing (Antonucci et al., 2009).

Social connectedness in previous research was operationalized as the objective presence or absence of social ties. It is argued that social connectedness has a psychological component, such that a lack of social connectedness is often experienced as a feeling of emotional or social loneliness (Cornwell & Waite, 2009; De Jong Gierveld & Van Tilburg, 2006). Loneliness, in most research has also been studied in the context of social support (Chen et al., 2013; Dykstra & Fokkema, 2007; Liu & Guo, 2007; Tomaka, Thompson, & Palacios, 2006). In these studies, social support suggested the availability of social ties, and thus the absence of feelings of loneliness, which highlights the intricate association between social connectedness and social support. Results of the present study indicated loneliness was minimal in the sample. Participants appeared to be well connected and received a great deal of support, possibly from network members. Hence, the finding that both constructs were related to self-assessed health status and wellbeing of older adults confirmed the study expectations and results of previous research.

What dimensions of social connectedness and social support are important to physical and mental health?

Three major elements of social relationships can be identified from the literature—social networks (a measure of social connectedness), social support, and satisfaction with relationship (Antonucci & Akiyama, 2002; Antonucci & Wong, 2010; Antonucci et al., 2009). These elements together help determine the degree to which social relationship is a resource or a risk factor to individual's health and wellbeing. Consistent with previous research, findings of the current study further highlighted the multidimensionality of social connectedness and social support constructs, suggesting that different aspects of these constructs are related in different ways to health and wellbeing in older adults.

Social connectedness: Dimensions

Network

Social network provides the context within which people can interact with one another, thereby leading to the perception of being socially connected (Ashida & Heaney, 2008). The importance of social network cannot be underestimated as a mechanism through which productive and health aging occurs and a protection against many health and behavioral limitations that could compromise quality of life of older adults (Fiori et al., 2006; Lennartsson & Silverstein, 2001; Zunzunegui et al., 2003). Contrary to expectations, however, the findings of this study showed no significant association between the network dimension of the social connectedness scale and physical and mental health, when the effects of other variables were controlled for. The direction of

association also leaves much to be desired. In contrast to most previous studies, the results of the present study seemed to suggest a possible negative impact of the network dimension of social connectedness on the health status of older adults. This finding is consistent with Antonucci, Akiyama, and Lansford's (1998) study, which suggested negative consequences of social network on health may arise from demands placed on older adults with little or no resources to meet the demands. Findings of their study showed that older women who reported larger network size, with a resulting increase in demands, were less happy than those who reported smaller network size.

Satisfaction with network

Older adults value their relationships with others. In one study, older adults consistently ranked their relationships to family and friends second only to health as the most important area of life (Marak, 2011). Satisfaction with social connectedness is important because it represents a person's overall assessment of quality and quantity of social contacts available to the individual. Satisfaction with network can be measured in terms of the amount of support a person receives. This, however, suggests the possibility of rating as high a person's level of connectedness irrespective of the size of one's network. Significant associations were found between satisfaction component of the social connectedness and physical and mental health. Consistent with findings of earlier research (Chao, 2011), satisfaction with social ties (measured in terms of support received) was found to be associated with self-rated good in physical and mental health. The associations between both the network and satisfaction dimensions and the health of older adults underscore the value older adults attach to quality rather than quantity of

social ties (Besser & Priel, 2008; Bradley & Cafferty, 2001; Tejeda, 2008; Teo, Choi, & Valenstein, 2013).

Social support: Dimensions

Support exchange is one of the most important functions of social network. Social support occurs when members of a social network provide assistance, material or otherwise, with the intention of helping one another (Ashida & Heaney, 2008). Findings of this study offer a confirmatory evidence supporting studies that showed higher levels of support correlating with improved physical and mental health (King et al., 2006). What is not clear, however, and needing extensive research is how the different forms of support associate with the health status of older adults. The works of Chao (2011) and Felton and Berry (1992) offer a compelling evidence of the importance of distinguishing the different dimensions of social support and who they associate with health status of older adults.

Affective support

The finding that affective support was significantly associated with physical and mental health is consistent with the findings of (Antonucci et al., 2009; Chao, 2011). Operating through social and psychological pathways, affective support has been documented to greatly improve older adult's health (Felton & Berry, 1992). To many older adults, participation in social activities is a mechanism by which their need for affection is met. Engagement in social activities gives them the feeling that they are liked, trusted, accepted, and understood (Antonucci et al., 2009; Mukherjee, 2012; Pynnönen et

al., 2012). Feeling supported, emotionally, has been found to be associated with reduced risk of mental illness (CDC, 2008).

Research indicates that certain types of support can only be provided or obtained within certain relationships. For instance, it is documented that instrumental support is more often provided by family members while emotional support and companionship are more often provided by friends (Burke, n.d.; Felton & Berry, 1992; Gurung et al., 2003). Previous research documents that the effectiveness of support depends on the source of the support (Felton & Berry, 1992; Gurung et al., 2003; Thoits, 1982). In one study, affective support significantly improved older adult's health and wellbeing when provided by friends rather than family members (Felton & Berry, 1992). The level of connectedness of the sample of older adults being studied is believed to have influenced the amount of affective support they obtained from their social networks, hence the improvement in their physical, mental, and general wellbeing.

Confidant support

In this study, confidant support was positively associated with physical and mental health. The availability of confidant support suggested lower levels of emotional and social loneliness, both of which have been found to be associated with improved cognitive functioning, functional performance, and less morbidity and mortality in older adults (La Grow et al., 2012; Lawler, Mold, & McCarthy, 2013). A confidant means someone with whom an individual can share personal sensitive information. Correlation analysis showed confidant support correlated with age, living arrangement, social network, and satisfaction with network. Aging creates 'the need to belong' with which

older adults strive to maintain, renew, or form new relationships. The findings that the majority of the participants lived with others, practiced religion, and were socially connected suggest they could draw from the large pool of their social contacts people they could rely on and share personal information with: their confidants.

Instrumental support

Instrumental support plays a major role in the lives of older adults. Its source and relationship to health and wellbeing of older adults has been documented (Burke, n.d.; Gurung et al., 2003). In one study, instrumental support was more strongly associated with wellbeing when provided by family rather than nonfamilial relations (Felton & Berry, 1992). Evidence available further suggests depression is lower among individuals who receive adequate instrumental support from their network (Chao, 2011).

The findings of this research confirms previous studies which indicate that instrumental support is more often provided by family and tends to be associated with improved health status of older adults (Felton & Berry, 1992). With nearly 90% of the sample indicating they live with others, possibly with spouses, children, siblings, or any other extended relatives, the finding that provision of instrumental support was associated with self-rated good mental health did not come as a surprise.

In a nutshell, perceived availability of social support, in any form, can be a source of general positive affect, enhanced self-worth, and feelings of being socially connected and protected. Similarly, research also documents situations where excessive support provision negatively affected the health and wellbeing older adults. Seeman (1996), for instance, found that the provision of instrumental support, which was well intended,

caused deterioration in the physical and mental health of older adults as it weakened older adults' confidence to remain independent. The findings of this study, in confirming earlier research, underscore the need to not only ensure the integration of older adults but also ensure they receive the needed support to live normal and healthy lives.

Variations in association of social connectedness and perceived social support to physical and mental health

For the most part a positive relationship, with a small to medium in strength correlation was found between social connectedness and perceived social support and health. This indicated being socially connected and receiving maximum support were associated with self-rated good physical and mental health in the sample of older adults. Differences, however, were found in the predictive abilities of both measures in relation to good health. In line with previous studies (Hawkley et al., 2006; Losada et al., 2012), results of the present study highlighted the ability of perceived social support but not social connectedness in predicting good physical and mental health.

Support exchange among members of a network is perhaps the most important function of social network (Ashida & Heaney, 2008). Quality or satisfaction with relationship can be measured by the exchange of support. Relationships with frequent support exchange are more likely to be rated supportive than relationships characterized by sporadic giving and receipt of support. Supportive relationships are known to be critically involved in the achievement and maintenance of good health. With its significant association with physical and mental health, the findings of this study

underscore the relative importance older adults attached to quality (support) rather than quantity of social ties.

It is equally important to acknowledge not all social relationships exist to facilitate the provision of support. According to Ashida and Heaney (2008), some networks exist simply for pleasurable interaction. As physical and mental functioning begins to deteriorate, close and supportive relationships compensate for these losses by assisting individuals to prepare for, cope with, and recover from many of the changes that occur with aging. With these mechanisms in place, the direct impact of these losses, which is possible mental health disorder, is believed to have been minimized, hence the finding of a positive predictive association between social support and self-rated mental health.

The linear association between social connectedness and social support has made most researchers to consider them inseparable constructs (Aboim et al., 2013; Hawkley et al., 2006; Kroenke et al., 2006; Pedersen et al., 2012; Yuan et al., 2011). There is little theoretical explanation that social connectedness and social support may be different constructs, thereby relating differently to the physical health and mental wellbeing of older adults. The findings of the present study offers support to the premise on which this study is based.

The moderation effect of perceived social support

It has long been established that social support is a function of social connectedness and most older adults enter into new relationships for the support benefits they stand to gain. Following this line of reasoning one might conclude that the

relationship between social connections and health status of older adult would be moderated when the effect of support is controlled for. Surprisingly, the interaction term did not correlate with physical or mental health. Although significant conditional effects were observed, the nonsignificant interaction terms suggested social support did not moderate the association between social connectedness and health status of the sample of older adults studied.

Social connectedness and social support shared a smaller percentage of their variance, which suggested both measures were separate constructs with a moderate correlation. This necessitated the examination of their independent associations with health in the study. The lack of support for the moderating effect of support on the association between social connectedness and health may require further investigation.

Social support's ability to reduce psychological and physiological consequences of adverse life events has been documented (Martire & Franks, 2014). The availability of active social network generally increases a person's sense of belongingness, security, and community. This is able to impact the psychological state of the individual and influence the development of health-related behaviors and self-efficacy, both of which are known to have positive impact on a person's health and wellbeing (Antonucci et al., 2009). Social connectedness, therefore, may have impacted the health of the sample through mechanisms other than the social support. Future research may be directed toward finding the mechanisms besides support through which social connectedness influences health and wellbeing of older adults.

Social connectedness, perceived social support, and socio–demographic characteristics

Social relationship remains a significant aspect of human life. Along the life course (from infancy to late adulthood), people are members of groups and organizations. A person's level of connectedness is often marked by the number of individuals, groups, and organization to which one is associated. The current study indicated that being religious was associated with higher level of social connectedness. While this reflects a major demographic characteristic of the region of the country where this study was conducted, the finding is also consistent with previous studies. Religion can provide a platform for renewing old relationships and forming of new ones, and lower levels of isolation have been reported among individuals who are religious and/or actively involved in religious activities (Cornwell et al., 2008; Han & Richardson, 2010).

Aging usually is marked by challenges to remaining socially connected (Goldsmith, 2012). A decrease in the ability to form new relationships leads to a decrease in social contact but results in the desire to maintain at least a minimum quantity of meaningful and supportive interpersonal relationships. Without a doubt, such meaningful and supportive relationships in late life are possible through familial networks. Although not an absolute measure of a person's level of connectedness, the living arrangement (majority living with others, possibly with spouse, children, or siblings) suggested they were not isolated.

According to the Convoy Model of Social Relations, groups of people surrounding an individual create the context within which support exchange occurs (Kahn & Antonucci, 1985). The literature suggests support exchange is influenced by

factors such as age, gender, marital status, and socio-economic status among others (Gurung et al., 2003; Kahn & Antonucci, 1985). The finding that marital status, socio-economic status, and living arrangement correlated with social support confirmed the findings of earlier research (Chabila & Masaiti, 2012; Victor, & Bowling, 2012; Victor, Scambler, Bowling, & Bond, 2005). Older adults who were married reported good socio economic status, and lived with others appeared to be more supported than individuals who were not married, lived alone, and reported poor financial status. Additionally, older adults with good socio-economic status appeared to be more supported than those with lower socio-economic status.

What socio-demographic characteristics are important to physical and mental health?

Several socio-demographic variables have been shown to influence the formation and maintenance of social ties as well as the type and amount of support one can receive. It is important to acknowledge that while influencing social ties and support, these socio-demographic factors both directly and indirectly affect the health status of older adults. Findings of the present study lend support to both health benefits and risks associated with age, gender, and socio-economic status. In the hierarchical regression analyses predicting the different health status, an increase age was found to be associated with self-assessed poor physical health, but good mental health in the sample of older adults studied. Gender—being female—was found to be associated with poor physical and mental health. The impact of socio-economic status on the health of older adults was much more profound. Good socio-economic status correlated with self-rated good

physical and mental health status.

The literature documents a relatively long tradition of recognized impact of aging, gender, and SES differences on health status of older adults. Aging puts a limitation on a person's ability to participate in physical activity. Inadequate participation in physical activity is often cited as a risk factor for many of the diseases and condition that are major causes of mortality and disability among older adults (Pynnönen et al., 2012; Reichstadt et al., 2010). Recent studies document an estimated 21% of older adults 65 years and older meeting criteria for a mental health disorder (Karel, Gatz, & Smyer, 2012). The finding of age correlating with better mental health, as this study suggests, seems contrary to findings of most research on aging and mental health. Although little evidence exists in support of the positive correlation between age and mental health, reasons underlying this association are yet to be established. With regards to the sample being studied, one can speculate the attributes of exceptional longevity, of which mental health is a critical piece, as a possible reason for the positive association between age and mental health.

Compared to men, women are known to be more social and enjoy interactive exchanges more than their male counterparts (Antonucci, Akiyama, & Lansford, 1998). Research suggests women, compared to men, are more self disclosing and more involved in their relationships (Antonucci et al., 1998) and suffer more when disrupted (Rosch, 2014). Although they tend generally live longer than men, available evidence suggests extreme old age is often related to loneliness and isolation, which are risk factors for several physical morbidities, including hypertension, type 2 diabetes, and obesity among others (Asante & Lundahl, n.d.).

The observation that SES is correlates with health status is not new. Lower socio-economic status has been known to compromise one's health (Hughes & Simpson, 1995; Pampel, Krueger, & Denney, 2010). Conditions for which strong correlations with SES have been found include depression, cardiovascular biomarkers and diseases, and mortality (Cohen-Mansfield et al., 2009; Liu & Guo, 2007; Tong et al., 2011). Although depression was dropped from subsequent analyses on both statistical and empirical grounds, the low incidence of depression probably reflects the absence of significant poverty in sample studied. This finding is consistent with earlier research that found low SES to be associated with higher psychiatric morbidity, of which depression ranked the highest (Lorant, Deliège, Eaton, Robert, Philippot, & Ansseau, 2003; Murata, Kondo, Hirai, Ichida, & Ojima, 2008). SES is also known to both affect the incentives or motivations for healthy behavior and the means to reach health goals (Pamel et al., 2010). Higher SES is linked with investment in future longevity, improved access to basic health care services, and healthy behaviors, all of which positively affect a person's physical health and mental wellbeing (Pamel et al., 2010).

For the most part, the sample involved in this study could be considered a healthy sample. Participants generally ranked as good their physical and mental health. The state of physical and mental health in the sample reflects the overall status of health of older adults in the state of Utah. Utah ranks below national averages on most chronic or medical conditions (e.g., hypertension, obesity, coronary health disease, myocardial infarction, diabetes, and stroke) common in the adult population (Kaiser Family Foundation, 2013; United Health Foundation, 2012). The low prevalence of chronic conditions probably reflects effects of lifestyle factors including low smoking and alcohol

use, of which the state of Utah again ranks below national averages (Kaiser Family Foundation, 2013).

Integrative summary—strengths, limitations, and implications of study

There are a substantial amount of studies done on social relationships and health of older adults. With little consideration for the various components of relationships, findings of previous studies have concluded that social relationships are directly associated with health of older adults. It is on this premise and what the literature offers that this population-based study was conducted to examine the independent contributions of social ties (connectedness) and perceived social support to the physical health and mental wellbeing in representative sample of older adults, aged 50 years and older. With social connectedness and social support considered inseparable concepts as shown in most studies (few studies suggest otherwise) and by the Convoy Model of social relations, this study further investigated the moderating role of perceived social support in the relationship between social connectedness and health of the sample to be studied.

Strengths and limitations of the study

Findings of this study add to existing literature on social relationship and health in the adult population. Contrary to popular notion on the importance of social connectedness to health, the findings of this study implicitly suggest the effect of social connectedness on health of older adults operates through social support. Contributing to existing literature, the findings of this study highlight the importance of social support in relation to the health of older adults. Additionally, this study adds to the limited number

of studies that simultaneously examine dimensions of social connectedness and social support and their association with physical and mental health of older adults.

Data collected at a single time in the FLAG project were used in the current study. The multistage sampling technique used to select study participants, hypothetically, suggests sample representativeness, thus permitting findings of this study to be generalized to population at different locations and time. However, the results of this study must be interpreted with caution, as socio-demographic characteristics of the participants may have influenced the results of the study. Older adults in Utah may be significantly different from older adults living in other states of America or countries around the world. This places a limitation on the findings, thereby limiting their generalizability.

It is also revealed in the review that quantitative rather than qualitative measures are always used in studies of this nature. The quantitative rather than qualitative measures used in gathering data present a limitation worth considering. Concept overlap (different concepts used synonymously) is a common feature of quantitative measures. It creates several measurement and interpretation problems, which often results in difficulties to distinctly identify what is being measured and by which concept. Due to the functional association, the concepts social connectedness and social support are often used interchangeably. Items making up both social connectedness and social support scales used in this study had several areas of overlap, thus appearing to measure a singular concept. This is believed to have influenced participant's responses on these scales, thereby affecting the study's internal validity. It is, however, suggested concepts used in relationship studies should be given precise conceptual and operational definitions, with

more valid and reliable measures developed to measure them.

Another problem with quantitative measures is that by their structure, respondents are often limited in terms of amount of information they can provide. This study would have benefited, for instance, with participants providing qualitative information on what it means to be connected or supported. Essential information that may have implications for policy and practice was therefore missed. Qualitative research is needed to offer an in-depth understanding of respondents' positions on some of the finding of this research. It is hoped that policy and practice will benefit from future qualitative studies examining older adults' perspectives on health (physical and mental) implications of having a small and large network, as well as obtaining less and greater levels of support from network.

Social connectedness and perceived social support have both been found to be associated with health. Correlation rather than predictive association has been reported in almost all studies examining the association between social relationships and health. Correlation does not imply causality. Being a cross-sectional study, this study is limited by the fact that correlation, but not causality, can only be determined. It is, therefore, not possible to determine if social connectedness and perceived social support lead to or predict better health or poor health among older adults.

Implications of the study

In an era characterized by health promotion activities and with the healing quality that relationships possess, studies of this nature become essential. The outcome of this study has implications for social work practice and education, policy, and research.

Social work practice

While interventions are constantly developed to offer relief from health problems, the outcome of this study is valuable in designing practice interventions intended to increase not only social support, but also to improve social ties through which support is offered. Such interventions could be in-home visits through which older adults will be able to connect with other individuals, either family or friends. Social work practitioners could also educate families of older adults on the importance of staying connected with older family members and what it means to provide emotional, confidant, or instrumental support to them. It is believed strong ties and adequate support contribute to greater sense of belongingness and social fulfillment. Such interventions, therefore, will help alleviate the problem of isolation and loneliness that have almost been accepted as characteristic of aging.

Social work education

Addressing the many health complications and social problems people may be faced with in late life requires creating awareness and effective training of a generation of health and human service professionals with the will to join in such efforts. With the surge in health promotion activities, particularly in the areas of nonconventional means of promoting health and wellbeing, findings of this study become essential. It is important students join the conversation around health and the nonconventional means of promoting it, of which social relationship is a major component. It is believed that findings of this study might inform the training of social work students with gerontology

focus, prepared to provide social and/or supportive services to help older adults to live independent or stay in the community.

Policy

The attempt to address the problem of isolation and loneliness may also be considered at the policy level. With findings supporting staying connected and supported influence an individual's health status, policy intervention might be designed and implemented with the aim of targeting older adults at risk of becoming socially isolated. A policy intervention may take the form of community employment opportunities for older adults. While the manifest function may well be enhancing the economic wellbeing of older adults, such policy may latently function to help older adults stay active and connected to other individuals in the community.

Research

Further research is needed to confirm results of and fill in the gaps identified in this study. While previous studies suggest social connectedness is more important to the health and wellbeing of older adults compared to social support, the current study suggests otherwise. It is suggested that future studies investigate the underlying factors responsible for these differential associations of social connectedness and social support to the health and wellbeing of older adults. It is evident from the literature review that perceptions about social support are influenced by actual support made available to one in times of need. There is the need, however, to study and better understand how

psychological and environmental/situational factors may affect older adults' assessment of their social support.

Findings of this study showed a lack of significant association between the network dimension of social connectedness and physical health. Aging, usually, is marked by a decrease in network size, following the loss of both significant and generalized others who through their connections are able to influence the level of physical activities in the elderly. It is suggested that research focus on understanding how older adults adapt to changes in their social relationships. These may have implications for both practice intervention and policy related efforts aimed at increasing the level of physical activities and social connectedness, and the availability of social support for older adults.

From the literature, it was revealed that the majority of studies on relationships and health are method-based, rather than theory-based. The reason for this can partly be attributed to the limited number of studies examining the mechanisms by which social relationships and health are related. Investigating these mechanisms was beyond the scope of the current study. Research is needed to understand the underlying mechanisms from which theories offering plausible explanations for the association can be developed. Additionally, with findings supporting the relative importance of social support to health and wellbeing, research might be directed toward finding better ways of making social support central in relationships or better still finding ways to improve support exchange in relationships.

Summary

This study investigated the associations of dimensions of social connectedness (network and satisfaction with network) and perceived social support (affective, confidant, and instrumental support) to physical and mental health, and examined whether or not the association between social connectedness and physical and mental health of older adults was attributable to perceived social support.

Results showed the dimensions of social connectedness (with exception of network dimension) and perceived social support were positively associated with physical and mental health. Findings generally suggest social connectedness and perceived social support may affect different aspects of health independent of the other. Findings also suggest perceived social support may be relatively more important to the health and wellbeing of older adults than social connectedness and underscore the relative importance older adults attach to quality rather than quantity of social ties.

The significance of this study lies in its contribution to existing literature and the information it provides that is relevant to social work practice and education, policy, and research. Of importance is the realization this study, perhaps, is the first to simultaneously examine dimension of social connectedness and perceived social support and their associations to physical and mental health of older adults. The study also showed that social support has a significant influence on the physical and mental health of older adults, a finding that is contrary to what previous studies suggest.

The outcome of this study is valuable in designing practice and policy interventions intended to increase not only social support, but also to improve social ties through which support is offered. The findings might also inform the training of social

work students with gerontology focus, educated to provide social and supportive service to help older adults live independently or stay in the community. In terms of research, it is suggested that future studies investigate the underlying factors responsible for these differential associations of social connectedness and social support to the health and wellbeing of older adults.

APPENDIX A

STUDY INSTRUMENTS

Utah Fertility, Longevity and Aging Study

Socio-demographic information

1. How old were you on your last birthday ☐☐☐

2. Are you Male or Female?

   - o Male
   - o Female

3. What is your current marital status

   - o Never married
   - o Divorced
   - o Separated
   - o Widowed
   - o Married/Living as married

4. Please mark the box next to the income group which best represents your family's gross income before taxes for the last calendar year. Include income from all sources as wages, salaries, social security, retirement benefits, help from relatives, rent from property and so forth.

   - o 0 – 1,999
   - o 2,000 – 6,999
   - o 7,000 – 9,999
   - o 10,000 – 14,999
   - o 15,000 – 19,999
   - o 20,000 – 24,999
   - o 25,000 – 29,999
   - o 30,000 – 34,999
   - o 35,000 – 39,999
   - o 40,000 – 44,999
   - o 45,000 – 49,999
   - o 50,000 – 59,999
   - o 60,000 – 69,999
   - o 70,000 – 79,999
   - o 80,000 – 89,999
   - o 90,000 – 99,999
   - o 100,000 or more

5. How many people live in your house including yourself? ☐☐

6. Do you consider yourself

   - o LDS
   - o Protestant
   - o Catholic
   - o Jewish
   - o Some other religion
   - o Not a religious person

7. In general, how often do you attend religious services per month?

   - o 4 or more time per month (once a week)
   - o 2 to 3 times per month
   - o 1 time per month
   - o Less than once a month
   - o Occasionally during the year
   - o None

8. Aside from attendance at religious services, do you consider yourself to be

   - o Deeply religious
   - o Fairly religious
   - o Only slightly religious
   - o Not at all religious
   - o Against religion
   - o Don’t know

General Health History

Office use: SF36

The next questions ask about your health:

1. In general, would you say your health is

   - o Excellent
   - o Very good
   - o Good
   - o Fair
   - o Poor

2. Compared to other people your age, how would you rate your health in general now?

   - o Excellent
   - o Very good
   - o Good
   - o Fair
   - o Poor

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
Vigorous activities such as running, lifting heavy objects, participating in strenuous sports	o	o	o
Moderate activities such as moving a table, pusjing a vacuum cleaner, bowling, or playing golf	o	o	o
Lifting or carrying groceries	o	o	o
Climbing several flights of stairs	o	o	o
Climbing one flight of stairs	o	o	o

Bending, kneeling, or stooping	o	o	o
Walking more than a mile	o	o	o
Walking several blocks	o	o	o
Walking one block	o	o	o
Bathing or dressing yourself	o	o	o

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health

	Yes	No
Cut down on the amount of time you spent on work or other activities	o	o
Accomplished less than you would like	o	o
Were limited in the kind of work or other activities	o	o
Had difficulty performing the work or other activities (for example, it took extra effort)	o	o

5. During the past 4 weeks, have ,you had any of the following problems with your work or other regular activities as a result of emotional problems (such as feeling depressed or anxious)?

	Yes	No
Cut down on the amout of time you spent on work or other activities	o	o
Accomplished less than you would like	o	o
Did work or other activities less carefully than usual	o	o

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors or groups?

- o Not at all
- o Slightly
- o Moderately
- o Quite a bit
- o Extremely

7. How much bodily pain have you had during the past 4 weeks?

- o None
- o Very mild
- o Mild
- o Moderate
- o Severe
- o Very severe

8. During the past 4 weeks, how much did pain interfere with your normal activities (including both activities outside the home and housework)?

- o Not at all
- o A little bit
- o Moderately
- o Quite a bit
- o Extremely

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please choose the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks…

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
Did you feel full of pep?	o	o	o	o	o	o
Have you been a very nervous person?	o	o	o	o	o	o
Have you felt so down in the dumps that nothing could cheer you up?	o	o	o	o	o	o
Have felt calm and peaceful	o	o	o	o	o	o
Did you have a lot of energy	o	o	o	o	o	o
Have you felt down hearted and blue	o	o	o	o	o	o
Did you feel worn out	o	o	o	o	o	o

Have been a happy person	o	o	o	o	o	o
Did you feel tired	o	o	o	o	o	

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc)?

- o All of the time
- o Most of the time
- o Some of the time
- o A little of the time
- o None of the time

11. How TRUE or FALSE is each of the following statement for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
I seem to get sick a little easier than other people	o	o	o	o	o
I am as healthy as anybody I know	o	o	o	o	o
I expect my health to get worse	o	o	o	o	o
My health is excellent	o	o	o	o	o

Office use: GDS

1. Below is a list of questions describing how you might have felt. Please answer based on your feeling over the past 30 days.

	Yes	No
Are you basically satisfied with your life?	o	o
Have you dropped many of your activities and interests?	o	o
Do you feel that your life is empty?	o	o
Do you often get bored?	o	o
Are you hopeful about the future?	o	o
Are you bothered by thoughts that you just cannot get out of your head?	o	o
Are you in good spirits most of the time?	o	o
Are you afraid that something bas is going to happen yo you?	o	o
Do you feel happy most of the time?	o	o
Do you feel helpless?	o	o
Do you often get restless or fidgety?	o	o
Do you prefer to stay home at night, rather than go out and do new things?	o	o
Do you frequently worry about the future?	o	o
Do you feel that you have more problems with memory than most?	o	o
Do you think it is wonderful to be alive now?	o	o
Do you often feel downhearted and blue?	o	o
Do you feel pretty worthless the way you are now?	o	o
Do you worry a lot about the past?	o	o
Do you find life very exciting?	o	o
Is it hard for you to get started on new projects?	o	o
Do you feel full of energy?	o	o
Do you think most people are better off than you are?	o	o
Do you frequently get upset over little things?	o	o
Do you frequently feel like crying?	o	o
Do you have trouble concentrating?	o	o
Do you enjoy getting up in the morning?	o	o
Do you prefer to avoid social gatherings?	o	o
Is it easy for you to make decisions?	o	o
Is your mind as clear as it used to be?	o	o

Social Connectedness and Social Support

Office use:

DSSI

The following questions ask you about some things that other people might do for you or give you that may be helpful or supportive.

1. How many times during the past week did you spend some time with someone who does not live with you? For example, you went to see them or they came to visit you, or you went out together.

o	None	o	four times
o	One time	o	five times
o	Two times	o	six time
o	Three times	o	seven times or more

2. How many times did you talk to some friends, relatives or others on the telephone in the past week (either they called or you called them)?

o	None	o	four times
o	One time	o	five times
o	Two times	o	six time
o	Three times	o	seven times or more

3. About how often did you go to meetings of social clubs, religious meetings or other groups that you belong to in the past week?

o	None	o	four times
o	One time	o	five times
o	Two times	o	six time
o	Three times	o	seven times or more

4. Does it seem that your family or friends (i.e. people who are important to you) understand you?

   - o None of the time
   - o Hardly ever
   - o Some of the time
   - o Most of the time
   - o All of the time

5. Do you feel useful to your family and friends (i.e. people important to you)?

- None of the time
- Hardly ever
- Some of the time
- Most of the time
- All of the time

6. Do you know what is going on with your family and friends?

   - None of the time
   - Hardly ever
   - Some of the time
   - Most of the time
   - All of the time

7. When you are talking to tour family and friends, do you feel you are being listened to?

   - None of the time
   - Hardly ever
   - Some of the time
   - Most of the time
   - All of the time

8. Do you feel you have a definite role in your family and among your friends?

   - None of the time
   - Hardly ever
   - Some of the time
   - Most of the time
   - All of the time

9. Can you talk about you deepest problems with at least some of your family and friends?

   - None of the time
   - Hardly ever
   - Some of the time
   - Most of the time
   - All of the time

10. How satisfied are you with the kinds of relationship you have with your family and friends?

- o Extremely dissatisfied
- o Very satisfied
- o Somewhat satisfied
- o Satisfied most of the time
- o Satisfied all of the time

Office use: DUNCF

1. As you read each statement, please choose the answer which is closest to your situation on a scale of 1 to 5 with 1 being much less than you would like and 5 being as much as you would like.

	1	2	3	4	5
I get love and attention	o	o	o	o	o
I get chances to talk to someone I trsut about my personal and family problems	o	o	o	o	o
I get invitations to go out and do things with other people	o	o	o	o	o
I have people who care about what happens to me	o	o	o	o	o
I get chances to talk about money matters	o	o	o	o	o
I get useful advice about important things in my life	o	o	o	o	o
I get help when I need transportation	o	o	o	o	o
I get help when I'm sick in bed	o	o	o	o	o
I get help with cooking and housework	o	o	o	o	o
I get help taking care of my child(ren)	o	o	o	o	o

APPENDIX B

CONSENT LETTER: CONSENT AND AUTHORIZATON DOCUMENT

CONSENT LETTER

DATE

SUBJECT NAME
SUBJECT ADDRESS
CITY, STATE, ZIP

Dear SUBJECT NAME:

Thank you for your interest in the **Family Longevity Study**. As we discussed on the phone, this packet contains the consent form and the questionnaire for the study.

Please begin by reading the "Consent and Authorization Document". It explains the study and provides you with information regarding your rights as a participant. If you have any questions about the project, please call me at the number below. If you still wish to participate, please complete the questionnaire, reading the instructions on the front page before you begin. After you have finished, please review it to ensure that no question or page was accidentally skipped.

A member of my staff will contact you within two weeks to set up a time to visit with you in person. As mentioned previously, this can be done at a location which is convenient to you, such as your home. The staff member who visits you will review your questionnaire and get your signed "Consent and Authorization Document."

We appreciate your willingness to participate in our research efforts. If you have questions about the project or the questionnaire, please call me at (801) 581-3194 or toll free at 1-800-444-8638 (extension 1-3194).

Sincerely,

Diana Lane Reed
Research Coordinator
Huntsman Cancer Institute

Ken R. Smith
Principal Investigator
Huntsman Cancer Institute

CONSENT AND AUTHORIZATION DOCUMENT

WHAT IS THE PURPOSE OF THE STUDY?

You are being asked to participate in a research project that will identify factors that may explain why some persons are long-lived. We know that people age differently but the reasons for the differences are not clearly understood. There are many factors that are related to aging and that may affect how long people live, often called longevity. The goal of this study is to measure factors believed to be related to aging and to look for genes that may be associated with living longer. This study is being conducted at Huntsman Cancer Institute at the University of Utah. About 900 subjects will be enrolled into the study.

You have been selected for this study because you belong to a family that includes many long-lived members.

WHAT AM I BEING ASKED TO DO?

This study will improve our understanding of social and genetic factors affecting aging. To make the research possible, we would like to ask you to do the following:

Complete a questionnaire which will be mailed to you prior to a home visit by one of our research staff or may be completed as an in-person interview. The questionnaire asks about some demographic information (e.g., age, marital status), physical activity, participation in social groups, occupational history (e.g., type of work you have done), medical history (e.g., illnesses you have had) and reproductive history (e.g., birth dates of your children). It also contains some standard questions about memory and emotional well-being. The questionnaire will take you approximately one hour to complete. Assistance by phone or in-person is available to help you with the questionnaire. A shorter version of the questionnaire will be made available if you feel you are unable to complete the full questionnaire. The shorter version will take approximately 30 minutes to complete.
If you agree to participate in this study, we will schedule an appointment for a trained member of our research staff to visit your home. This visit will take approximately 2 hours and will consist of the following:

- Obtain written, informed consent
- Review completed questionnaire or conduct an in-person interview to collect questionnaire information

Where we have obtained consent to proceed with the full protocol we ask that you:

- Provide a Blood Sample (several tubes will be drawn by a person specially trained to draw blood; the total amount is approximately 3 tablespoons) or we will obtain a mouthwash sample (Blood draw will not be performed on those who have recently had a blood transfusion or those with leukemia)

- Perform the following clinical measures:
  - Height and Weight
  - Temperature
  - Grip strength
  - Blood pressure
  - Heart rate
  - Lung function
- Perform several tests of cognitive function (e.g., memory, vocabulary, abstract reasoning)

We may also ask you for contact information for some of your relatives (name, address, and phone number); we may need to contact some of your relatives and invite them to participate in order to strengthen the study.

HOW LONG WILL I BE INVOLVED?

The study consists of a questionnaire which you will complete at home, and a visit from our study staff. The mailed questionnaire will take approximately one hour to complete. It will take approximately two hours for the visit to your home. During this visit you will review your questionnaire with study staff, sign the forms, complete the clinical and cognitive measures and provide your blood sample. It is possible we might contact you about providing us with additional information after the home visit, but you will be able to choose at that time whether you would like to participate any further.

WHAT WILL THE STUDY DO WITH THIS INFORMATION AND BLOOD?

We will send blood samples to Associated Regional and University Pathologists (ARUP). They will analyze these blood samples for several features that occur naturally in the blood but that are strongly suspected for affecting how long people will live and their physical and mental well-being.

Two tubes of blood will be sent to deCode Genetics, Inc., where the genetic information (DNA) will be evaluated. The evaluation will consist of examining how your DNA compares to that of other people, some who have a family history of long life and some who do not.

With your permission, some of your blood will be stored at the Huntsman Cancer Institute Tissue Procurement Facility. This will be stored for possible future analyses as a follow-up to our genetic analyses where we seek to identify factors affecting how long people live. You will indicate whether we should keep or destroy any samples that remain at the end of this study.

None of your identifying information, such as your name, address or phone number, nor any of your medical information, will be sent to deCode Genetics or ARUP. They will have only your blood sample and a number that our scientists will use to distinguish your sample from those of other people.

In order for us to identify the genes that are involved in aging, we need to be able to combine genetic and medical information about people and their family members. The project staff at the University of Utah will store information about your medical and family history in a secure computer along with laboratory information about your donated specimens and your clinical measures. Only members of our research staff who have signed pledges of confidentiality will be able to view both the medical information and identifying information at the same time.

WHAT ARE THE RISKS OF PROVIDING A BLOOD SAMPLE?

The risks of drawing blood include the possibility of brief dizziness, bruising, swelling, slight bleeding from the site of puncture, and uneasiness associated with needles. There is also a remote chance of infection or fainting.

There is the remote possibility of an accidental breach of confidentiality. Should this occur, you should know that, rarely, insurers or employers may discriminate based on medical information or knowledge that you have participated in a genetic study. This study seeks to find genes associated with longevity, which is a positive outcome. The likelihood that you would be discriminated against based on information indicating that you may be long-lived is extremely remote.

UNFORSEEABLE RISKS: Your participation may also involve risks to participants that are currently unforeseeable. If this occurs you will be notified if possible and given an opportunity to decline further participation.

WHAT ARE THE BENEFITS OF PROVIDING A BLOOD SAMPLE?

There are no direct medical benefits to you from your taking part in this study. The purpose of this study is strictly research. Therefore, you will not be given the results of any blood or mouthwash sample you provide for genetic testing. There are no diagnostic or treatment features in this study. However, the information gained from the study may benefit future generations.

Upon request, we will provide to you the results of general laboratory tests obtained from your blood sample and clinical measures (height, weight, blood pressure, temperature, grip strength, lung function) that are taken as part of this study, along with normal range values for these tests. If you have any questions or concerns about these results, we direct you to consult with your medical care provider.

WHAT ARE THE ALTERNATIVES TO STUDY PARTICIPATION?

This study is for research purposes and is not being done to improve your personal health or welfare. You have the choice of not being in the study and can discontinue further participation at any time.

HOW IS MY CONFIDENTIALITY PROTECTED?

Every effort will be made to protect your confidentiality. All personal information will be kept in locked cabinets and secured computers. Your blood or mouthwash sample will be assigned a code number. In addition, information that can identify you or any of your family members will be assigned a code number. The list of names and matching code numbers will be stored separately from other study information and will be available only to the study staff members at Huntsman Cancer Institute who have signed confidentiality agreements.

The University of Utah maintains family history databases for use in research projects like this one. Your family history information (names and relationships) will be given to database managers who are approved by Huntsman Cancer Institute to update those databases. Medical information that we collect will be stored in a separate database. If researchers at Huntsman Cancer Institute or other approved researchers are provided with your information or blood, they will be given only your code number. In other words, no one outside of Huntsman Cancer Institute will ever be able to link your name with your information. All research records that identify you will be kept private to the extent allowed by law. The one exception is that your research records can be reviewed under certain circumstances, such as during the course of a program review by the federal agency which funds our research.

The results of the questionnaires you have completed will be summarized for research purposes only and will not identify you in any way. The information contained in your questionnaires will not be made available to your physician, or your insurance company. You may refuse to answer any questions on the questionnaires without adversely affecting your further participation in this or in any future studies. We are collecting social security numbers on the questionnaire. You can withhold your social security number and still participate.
A summary of the results of this study with no identifying information may at some time be published in a medical or scientific journal.

PERSON TO CONTACT:

If you have questions, complaints or concerns about this study, or if you think you may have been injured from being in this study, you can contact Diana Lane Reed at (801) 581-3194. Diana can be reached at this number during 8:00 am – 5:00 pm Monday through Friday. If you have an appointment with staff trained to draw your blood after these hours, they will address your questions or concerns and will contact the Principal Investigator if necessary.

INSTITUTIONAL REVIEW BOARD:

Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or

concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

RESEARCH PARTICIPANT ADVOCATE:

You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by e-mail at participant.advocate@hsc.utah.edu.

REASEARCH-RELATED INJURY:

If you are injured from being in this study, medical care is available to you at the University of Utah, as it is to all sick or injured people. The University of Utah does not have a program to pay you if you are hurt or have other bad results from being in the study. The costs for any treatment or hospital care would be charged to you or your insurance company (if you have insurance), to the study sponsor or other third party (if applicable), to the extent those parties are responsible for paying for your medical care you receive. Since this is a research study, some health insurance plans may not pay for the costs.

The University of Utah is a part of the government. If you are injured in this study, and want to sue the University or the doctors, nurses, students, or other people who work for the University, special laws may apply. The Utah Governmental Immunity Act is a law that controls when a person needs to bring a claim against the government, and limits the amount of money a person may recover. See Section 63G-7-101 to 904 of the Utah Code.

VOLUNTARY PARTICIPATION:

Your participation in this study is voluntary. You can choose not to participate in the study. If you do decide to participate you will be asked to sign this consent form. You are free to withdraw at any time and without giving a reason. This will not affect the relationship you have with the investigator or staff nor standard of care you may receive at the University of Utah Health Sciences Center. Also, participation in the study may be stopped by the investigator without your consent. Foreseeable reasons for stopping your participation include repeated failures to keep study appointments or inappropriate behavior with study staff.

ARE THERE ANY COSTS OR COMPENSATION?

There is no cost to you or your insurance company for any of the procedures in this study, and you will receive no payment for your participation.

It is important to understand that deCode Genetics, Inc., is a for-profit company and hopes to make money by identifying genes that have useful medical applications. The principal investigator might also benefit financially if this study is successful. However,

even if this study leads to important medical advances, you will not personally receive any financial benefits because you have participated.

NEW INFORMATION:

The purpose of this study is strictly research. Therefore, you will not be given the results of any blood or mouthwash sample you provide for genetic testing. However, if it is determined that there may be a new test or information with possible medical benefit to you or your family, we will attempt to contact you by letter. You would make a decision at that time whether you wish to learn personal genetic information. This would be done as a clinical service separate from this study, which may involve a fee for clinical genetic counseling and testing.

AUTHORIZATION FOR USE OF YOUR PROTECTED HEALTH INFORMATION

Signing this document means you allow us, the researchers in this study, and others working with us to use information about your health for this research study. You can choose whether or not you will participate in this research study. However, in order to participate you have to sign this consent and authorization form.
This is the information we will use:

- ID numbers generated by our computer system
- Name, address, and telephone number so we can contact you throughout this study
- Your birth date
- Your social security number if you choose to provide it
- Demographic information such as race, gender and occupation
- Family history (including birth dates, death dates)
- Personal medical history (including surgeries, illnesses, procedures, treatments, use of medications)
- Information about your dietary habits (including alcohol consumption)
- Blood sample or mouthwash (buccal cell) sample
- Information from a physical examination including blood pressure reading, grip strength, temperature, height, weight, heart rate, and lung function.
- Information about your memory, recognition and concentration collected on tests of cognitive function

Others who will have access to your information for this research project are the University's Institutional Review Board (the committee that oversees research studying people) and authorized members of the University's workforce who need the information to perform their duties (for example: to provide treatment, to ensure integrity of the research, and for accounting or billing matters).
In conducting this study, we may share your information with groups outside the University of Utah Health Sciences Center. The information we share may include information that directly identifies you. These are the groups:

- The National Institute on Aging, a division of the U.S. National Institutes of Health, which is the funding agency for this research project and has the right to audit and review the results of this study.

- Researchers who work in other academic departments at the University of Utah, who assist in analyzing data for all aspects of this research. The information provided to them will be the minimum necessary to conduct the research.

Information disclosed to groups outside the University of Utah Health Sciences Center may no longer be covered by the federal privacy protections.
You may revoke this authorization. **This must be done in writing.** You must either give your revocation in person to the Principal Investigator or the Principal Investigator's staff, or mail it to **Ken Smith*, The Utah Study of Fertility, Longevity and Aging*, Huntsman Cancer Institute, 2000 Circle of Hope, Room 4143, Salt Lake City, UT, 84112.** If you revoke this authorization, we will not be able to collect new information about you, and you will be withdrawn from the research study. However, we can continue to use information we have already started to use in our research, as needed to maintain the integrity of the research.
This authorization does not have an expiration date.

CONSENT:

Please read each sentence below, think about your choice, and mark "**YES**" or "**NO**".
No matter what you decide to do, your decision will not affect your medical care.

May the University of Utah or its research partners retain your blood and/or mouthwash sample(s) after the end of this research project for use in future longevity research?

□ **YES, my sample(s) may be saved for future longevity research**
□ **NO, my sample(s) must be destroyed at the end of this research project**

IF YES, may the University of Utah or its research partners keep your name and other identifying information with the sample(s)?

□ **YES, my personal identifiers and medical information can be kept with my sample(s).** All information will be kept secure and confidential.

□ **NO, my name and identifiers must be removed from my sample(s). My sample(s) cannot be linked back to me.** *If this option is chosen, samples may be destroyed at the end of the research project*

If you grant permission for the sample(s) to be used in future research by the University of Utah or its research partners, the Institutional Review Board will review and approve each new project. The Institutional Review Board may require that you be contacted for your permission prior to the use of the sample(s) in a new project if it determines new consent is required for your protection.

You have the right to withdraw your consent in the future. You need to notify the investigator of your decision. If you decide to remove identifiers from your sample(s), you will not be able to withdraw your sample later because it cannot be linked back to you.

I confirm that I have read and understand this consent and authorization document and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I will be given a signed copy of the consent and authorization form to keep.

CONSENT (continued):

I agree to participate in this research study and authorize you to use and disclose health information about me for this study, as you have explained in this document.

_____
Participant's Name

_____ _____
Participant's Signature Date

_____
Name of Person Obtaining Authorization and Consent

_____ _____
Signature of Person Obtaining Authorization and Consent Date

If the participant is unable to give consent and authorization, consent and authorization is given by the following authorized personal representative of the individual:

LEGALLY AUTHORIZED REPRESENTATIVE CONSENT STATEMENT:

I confirm that I have read this consent and authorization document. I have had the opportunity to ask questions and those questions have been answered to my satisfaction. I am willing and authorized to serve as a surrogate decision maker for

_____.
Participant's Name

I have been informed of my role and my obligation to protect the rights and welfare of the participant. I understand that my obligation as a surrogate decision maker is to try to

determine what the participant would decide if the participant were able to make such decisions or, if the participant's wishes cannot be determined, what is in the participant's best interests. I will be given a signed copy of the consent and authorization form to keep.

_____
Name of Authorized Personal Representative

_____ _____
Signature of Authorized Personal Representative Date

Indicate the legal representative's authority to act for the individual:

☐ Spouse
☐ Adult (18 years of age or over) for his or her parent
☐ Individual with power of attorney
☐ Guardian appointed to make medical decisions for individuals who are incapacitated

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